

Connection of Ngati Tuwharetoa (Bay of Plenty) With the Kawerau Geothermal Field, New Zealand

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ABSTRACT

The Kawerau Geothermal Field (KGF) lies in the northern Taupo Volcanic Zone (TVZ) near and under the town of Kawerau, in New Zealand's Bay of Plenty region, situated 100 km south-east of Tauranga and 58 km east of Rotorua.

Ngati Tuwharetoa views the geothermal resource as a taonga (treasure) provided for them when Ngatoroirangi disembarked from the Te Arawa waka in the 1300's from Hawaiki. Tuwharetoa is a fourth generation descendant of Ngatoroirangi, who had mana whenua (authority) and exercised rangatiratanga (absolute sovereignty) over the area. Maori settled in the Kawerau area since that time, using geothermal for cooking, horticulture and warmth.

In 1953 the New Zealand Government passed an Act of Parliament which gave itself the sole rights to take, tap and use the geothermal energy.

The town of Kawerau and the Kawerau industrial site were located above the KGF in the early 1950s to use of the geothermal energy for the processing of logs from the surrounding forests for newsprint, wood pulp and lumber.

In 2003, Ngati Tuwharetoa (Bay of Plenty (BoP)) signed a Deed of Settlement with the Crown settling historical grievances arising from breaches of the Treaty of Waitangi by the Crown. As part of settlement the Ngati Tuwharetoa (BoP) historical connection with the KGF was recognised by way of Statutory Acknowledgements.

The Ngati Tuwharetoa (BoP) Settlement Trust (NTST) was established to give effect to the Treaty Settlement. NTST established Ngati Tuwharetoa Geothermal Assets Ltd (NTGA), who purchased the Crown's interests and assets in the Kawerau steamfield in 2005. NTGA is considered to be the world's largest supplier of geothermal direct heat energy for industrial use, equating to half of the world's total steam supply for industrial applications.

The purchase facilitated reconnection to the KGF geothermal taonga and provides opportunity for social and economic growth within the rohe (tribal territory or boundary).

1. INTRODUCTION

Ngati Tuwharetoa (BoP) traces its connection to the KGF from the arrival of their great ancestor, Ngatoroirangi in 1300s. There is an interwoven connection between the people of Ngati Tuwharetoa (BoP) and the natural resources of the KGF.

It is the responsibility of Ngati Tuwharetoa (BoP) to protect the tikanga (customs and traditions) and cultural, traditional, historical and spiritual values of the KGF, to ensure these are valued and passed on to future generations.

2. LOCATION AND BACKGROUND

The KGF lies in the northern TVZ near and under the town of Kawerau, in New Zealand's Bay of Plenty region. The TVZ has one of the greatest concentrations of geothermal activity in the world, with some 29 significant geothermal areas. The majority of these geothermal areas are on Maori-owned lands. By the late 1980s the Crown; through use of the Public Works Act, concluded a programme of geoscience and drilling activities to identify NZ's geothermal areas. The TVZ extends from White Island to the Central North Island National Park, south of Taupo. The extent of the TVZ geothermal activity is rivalled only by the Yellowstone National Park.

The Kawerau resource is a liquid-dominated alkali-chloride hydrothermal system, with deep thermal upflow in the greywacke basement in the south and outflow to the north and west. In earlier times, chloride-bearing hot springs emerged at the surface in the Rotoitipaku and Umapokapoka thermal areas on the western margin of the Field and the Parimahana thermal area to the south west of the Field. Hot spring waters flowed from these thermal areas and from the Tarawera River and Ruruanga Stream at the south-eastern foot of the Onepu Hills (Powell, 2011).

3. TRADITIONAL ASSOCIATION WITH THE GEOTHERMAL SYSTEM

3.1 Historic Association

In June 2003, Ngati Tuwharetoa (BoP) and the Crown entered a Deed of Settlement ("Settlement") to settle historical and on-going grievances, in recognition of the Crown's unjust actions and breaches of the Treaty of Waitangi (founding document of NZ between the British Crown and various Maori chiefs). The Deed of Settlement was part of the Ngati Tuwharetoa (BoP) Claims Settlement Act 2005.

Ngati Tuwharetoa (BoP)'s deep historical connection with the Kawerau land and resource was recognised by Crown Statutory Acknowledgements. Section 46 of the Ngati Tuwharetoa (BoP) Claims Settlement Act 2005 records "*The Crown acknowledges the statements made by Ngati Tuwharetoa (BoP) of their particular cultural, spiritual, historical and traditional association with, and use of, the geothermal energy and geothermal water located in the Kawerau Geothermal system...*"

Schedule 5.16 of the Deed of Settlement further acknowledges: "*The geothermal resource is a taonga for Ngati Tuwharetoa. Ngati Tuwharetoa attributes the origins of the geothermal energy and geothermal water in the Kawerau Geothermal System to their great ancestor Ngatoroirangi, high priest of Te Arawa waka.*

When Ngatoroirangi travelled inland and reached the summit of Tongariro, the intense cold began to weaken him. At once he called to his two sisters, Huiwai and Hauhangaroa in Kawaiiki, to help him by sending fire. They heard his cry and sent the gods of fire, Pupu and Te Hoata, who journeyed under the sea and the land to assist him.

Throughout the journey they would surface and it was at these places that they left part of the fire – Whakaari (White Island), Moutohora (Whale Island), Okakaru (Parimahana), Tarawera, Orakei, Taupo and Turangi...

Tuwharetoa was a direct descendant of Ngatoroirangi, who had mana whenua and exercised rangatiratanga over the area. For Tuwharetoa people, the presence of the geothermal resource constantly reaffirmed the existence and authority Kūiwi, Haungaroa and the gods of fire, Pupu and Te Hoata...".

3.2 Geothermal Resource a Taonga

The geothermal energy and water located in the KGF is a taonga to Ngati Tuwharetoa, use of the geothermal resource has enabled people to live and thrive in the region since early times. The people of Ngati Tuwharetoa settled in the Kawerau area in part, for the ability to freely access and utilise the geothermal resource in the lands and the thermal lakes, rivers and hot springs. Geothermal was used holistically, as a special place of healing and recuperation and for the early cultivation of plants, especially kumara. The natural heating from the geothermal activity provided for growing kumara seedling. The steam was used for cooking (similar to a hangi) and the warmth, a breeding ground for eels and morihanga (fresh water fish / carp). The sulphur was used for medicine and the hot water from thermal lakes, springs and seepages was used for bathing.

In as late as the 1950s prior to the industrial development in Kawerau, Ngati Tuwharetoa people were still extensively using the geothermal resource for daily living.

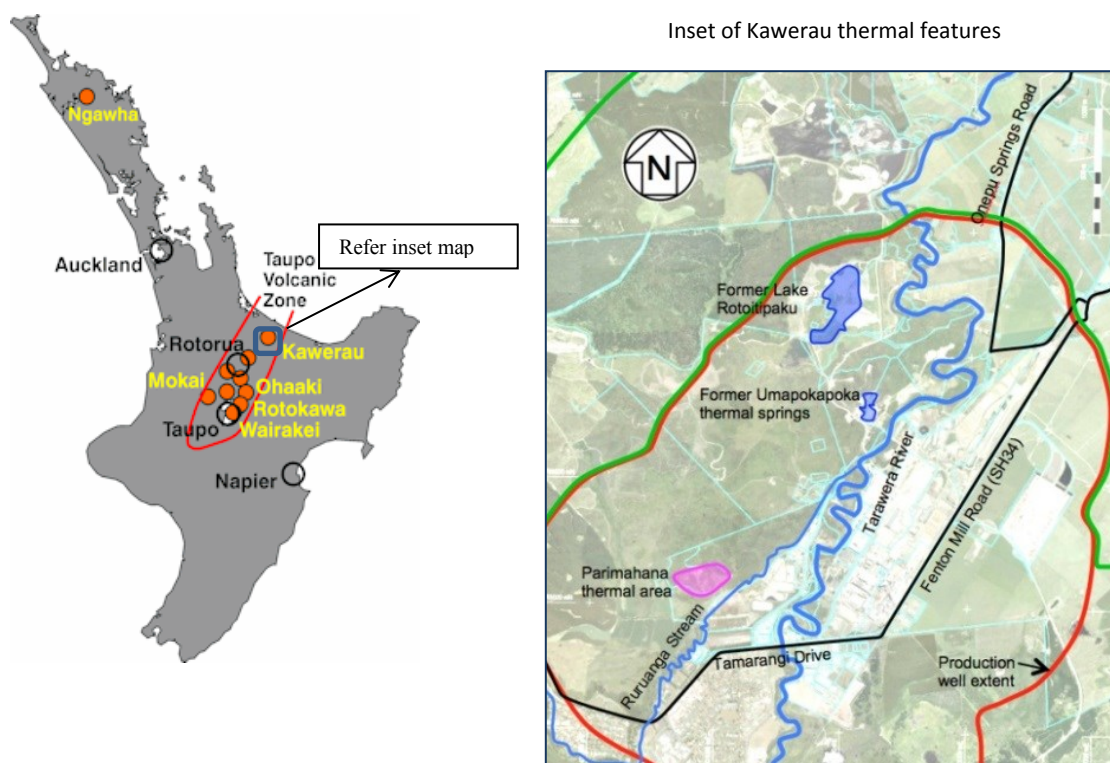


Figure 1: Taupo Volcanic Zone in the North Island of New Zealand with inset map of the Kawerau thermal features

3.3 Crown Land Confiscation and Alienation

The Deed of Settlement acknowledges the following summary of events which gave rise to the Ngati Tuwharetoa (BoP) claim:

A period of "War" between the Crown and Maori started in the Waikato in July 1863 and eventually extended to the Bay of Plenty. During the Bay of Plenty hostilities a Crown official James Fulloon and others were killed, which resulted in a Crown expedition of some 500 men mounted to apprehend those alleged to be responsible. That expedition included Māori who were not Ngati Tuwharetoa and laid siege to a number of pa at which Ngati Tuwharetoa hapu (sub-tribe) lived. This resulted in conflict in which Ngati Tuwharetoa people were killed.

A Proclamation of Peace by the Crown on 2 September 1865 declared that land would be seized from any hapu or iwi (tribe) who did not give up those people allegedly responsible for killing James Fulloon. Ngati Tuwharetoa people at Parawai pā evacuated the pa to join other Bay of Plenty iwi at Te Kupenga pā. Some of the people allegedly responsible for the death of James Fulloon were at Te Kupenga pā. The Crown attacked Te Kupenga pā and on 20 October 1865 all the people remaining at Te Kupenga pā surrendered to the Crown.

As a result of this conflict, the Crown confiscated 87,000 acres of Ngati Tuwharetoa (BoP) land pursuant to the New Zealand Settlements Act 1863, on the pretense that Ngati Tuwharetoa people had been engaged in “rebellion” against the Crown. Much of this confiscated land was given to other iwi who supported the Crown. Some land (approximately one quarter) was returned but not in accordance with customary forms of tenure by hapū and iwi and, as a result, the land became susceptible to partition and alienation. Illegal Crown purchases (some of which were sanctioned by the Native Land Court, a product of the 1865 Native Lands Act, converted traditional communal landholdings into individual titles) of Ngati Tuwharetoa land in the 1870s and 1880s resulted in alienation of almost all of the land that had been returned to Ngati Tuwharetoa (BoP).

The Crown sanctioned drainage of the Rangitaiki swamp in the early 1890s and also altered the course of the Rangitaiki River by cutting a direct channel to the sea so that it no longer fed into the Tarawera River. These actions had significant adverse effects on Ngati Tuwharetoa waahi tapu (sacred place) and areas for gathering food and other resources and affected the thermal seepages along the banks of the Tarawera River and the Umapokapoka geothermal area.

In this way, the Crown’s acts of confiscation and alienation impacted on the relationship of Ngati Tuwharetoa (BoP) tangata whenua (people of the land) with the geothermal resource. Attempts by kaumātua (Maori male elder) over many generations, to seek redress for these confiscations and alienation were to no avail.

4. LEGISLATION AFFECTING GEOTHERMAL RESOURCES

4.1 Treaty of Waitangi

The Treaty of Waitangi (dated February 1840) between the British Crown and Maori Tribes of New Zealand, Article 2, provided that Maori were guaranteed tino rangatiratanga over their taonga. Maori could retain a continued control and enjoyment of taonga and could only sell taonga to the Crown.

There continues to be difficulty in reconciling the English and Maori versions of the Treaty and it is considered many Māori may have believed they were simply giving the British Queen first offer on land, after which they could sell it. The English interpretation of the Treaty prevented the sale of Māori land to anyone other than the Crown.

The Treaty of Waitangi Act 1975 provided statutory recognition of the Treaty of Waitangi. The Act established the Waitangi Tribunal, through which Maori are able to take grievances arising from Treaty injustices that breach the promises made in the Treaty of Waitangi, including the taking of taonga.

4.2 Statutes

In more recent times, the New Zealand Government has enacted a number of statutes that affect the use of geothermal resources, including the Geothermal Steam Act 1952 and the Geothermal Energy Act 1953. The various Acts of Parliament appear to be an attempt to control access to and use of, the geothermal resource. In particular, the Geothermal Energy Act 1953 gave the Crown (NZ Government) the sole right to “take, tap, use and apply” geothermal energy.

The function of controlling the allocation and use of geothermal resources now falls under the Resource Management Act and is undertaken by Regional Councils.

5. ESTABLISHMENT OF KAWERAU AND THE MILLS

The 1953 Geothermal Energy Act was introduced at the time of negotiations to construct the Tasman Pulp and Paper Mill in Kawerau, when development of the KGF began.

The Wairakei geothermal power station (in Taupo, NZ) was also being planned at this time for development.

The Kawerau Pulp and Paper Mill development, with its geothermal energy source, was NZs first major industrial use of geothermal. The development was funded and built by the NZ Government and Fletcher Trust. The Kawerau Township and mill site were intentionally located above the KGF to enable the Crown to have a cost effective supply of geothermal energy to the mills for the processing of logs being extracted from the surrounding forests to produce newsprint, wood pulp and lumber.

This development was undertaken without the consent of or consultation with, Ngati Tuwharetoa (BOP). The mill complex was established on local tangata whenua lands. The Kawerau Township was established partly on land the Crown had confiscated and partly on land owned by local tangata whenua, and acquired by the Crown under threat of acquisition under the Public Works Act. These actions further resulted in alienation of lands and the people losing control of and access to, the geothermal resource.

Drilling of the first geothermal wells for the development began in 1952 by the NZ Government, with production to the mills commencing in 1957.

The establishment of both the Kawerau Township and the Mills led to the pollution and degradation of the Tarawera River by urban and industrial waste. At that time it was practice in NZ to discharge Mill waste to land and to the Tarawera River.

6. NGATI TUWHARETOA (BOP) TREATY CLAIM

6.1 The Claim

The above actions led to the iwi of Ngati Tuwharetoa (BoP) lodging a Treaty of Waitangi claim, known as Wai 62 in 1988. The claim related to breaches by the Crown of its obligations under the Treaty relating to the Raupatu (confiscation) of most of the land and inadequate compensation process leading to alienation of remaining lands.

6.2 Deed of Settlement

On 6 June 2003 the Treaty claim was settled when Ngati Tuwharetoa signed a Deed of Settlement (“Deed”) with the Crown as part of the Ngati Tuwharetoa (BoP) Claims Settlement Act 2005 (Settlement Act). The Settlement Act contains a Crown apology for breaches of the Treaty of Waitangi and its principles;

“Its confiscation of Ngati Tuwharetoa lands was unjust and a breach of the Treaty of Waitangi and its principles.”

“... the cumulative effect of the Crown’s actions, particularly its failure to actively protect Ngati Tuwharetoa interests in the land they wished to retain has left the iwi virtually landless. The Crown breached the Treaty of Waitangi by failing to ensure that Ngati Tuwharetoa was left with sufficient land for their present and future needs.”

- (a) *The passing of the Geothermal Energy Act 1953 by the Crown (without the consent of Ngati Tuwharetoa);*
- (b) *Ngati Tuwharetoa having lost control of, and access to, the Kawerau Geothermal System; and*
- (c) *The pollution and degradation of the Tarawera River and the Okakaru area; have caused a sense of grievance within Ngati Tuwharetoa that is still held today.”*

The Settlement included a package of cultural, financial and commercial redress:

- Statutory acknowledgments and Deeds of Recognition which recognise the deep historical connection and special association of Ngāti Tūwharetoa (BoP) with Rotoma Forest Conservation area, Lake Rotoma Scenic Reserve, Lake Tamarenui Wildlife Management Reserve, and parts of the Tarawera and Rangitaiki Rivers.
- Statutory Acknowledgement over geothermal water and geothermal energy located in the Kawerau Geothermal System.
- Deed of Recognition acknowledging the traditional, cultural, spiritual and historical association of Ngāti Tūwharetoa with the Parimahana scenic reserve;
- Transfer of five areas of special significance.
- \$10.5 million in combination cash and Crown properties.
- Right of Refusal for the purchase of the Crown’s geothermal assets associated with the supply of steam to the Kawerau Tasman Pulp and Paper Mill.

The Crown acknowledged the following as the rohe (tribal territory or boundary) of Ngati Tuwharetoa (BoP) Area of Interest.

6.3 So What Does This Mean?

In recognizing the injustices caused to Ngati Tuwharetoa (BoP) by the Crown’s actions, the Settlement enables the people of Ngati Tuwharetoa (BoP) to move forward; to provide for its people, and future economic growth.

The Deed of Settlement included a structure whereby NTST is the Governance Entity under the Settlement Act and also an Iwi Authority for the purposes of the Resource Management Act 1991.

The NTST Trust Deed records the Fundamental Duty of the Trustees to “*administer the assets and liabilities of the Trust as kaitiaki (guardian) for Ngati Tuwharetoa*”. The Settlement redress was transferred to NTST in 2005.

NTST established a corporate structure to effectively manage its assets and operations (Figure 3).

Arising from the Settlement process, NTST established its company NTGA to purchase the Crown’s Kawerau steam field assets. In June 2005 (not as redress under the Deed) the sale was concluded and NTGA purchased most of the Kawerau geothermal wells, pipelines, the Crown’s direct heat business and existing commercial supply contracts, resource consents and intellectual property.

NTGAs long term vision aligns with the guiding principles of the NTST Trust Deed, which requires the Trustees to “*be guided by the recognition of the need for the interests of the whanau (extended family) and hapu of Ngati Tuwharetoa*” to nurture and grow assets for those that follow. Actions undertaken today, the next five years and beyond must ensure future generations are better positioned and prepared to build on what today’s generation passes on.

While the Settlement redress compensates and recognizes injustices, the purchase of the geothermal assets reconnects the people with the geothermal taonga.

7. NGATI TUWHARETOA GEOTHERMAL ASSETS (NTGA)

7.1 NTGA Operations

The business of NTGA is a wholesaler in which the company supplies geothermal energy to Kawerau industry, primarily for process heat and electricity generation. Simply put, NTGA undertakes its business operations by establishing infrastructure (mainly

wells, separators and pipelines) to enable the product (geothermal energy) to be delivered to NTGA's customers with residual fluids discharged by injection or to the Tarawera River.

In this way, the NTGA business model differs from that normally seen within the New Zealand geothermal industry, which is dominated by electricity generation.



Figure 2: Ngati Tuwharetoa (BoP) Area of Interest (Deed of Settlement)

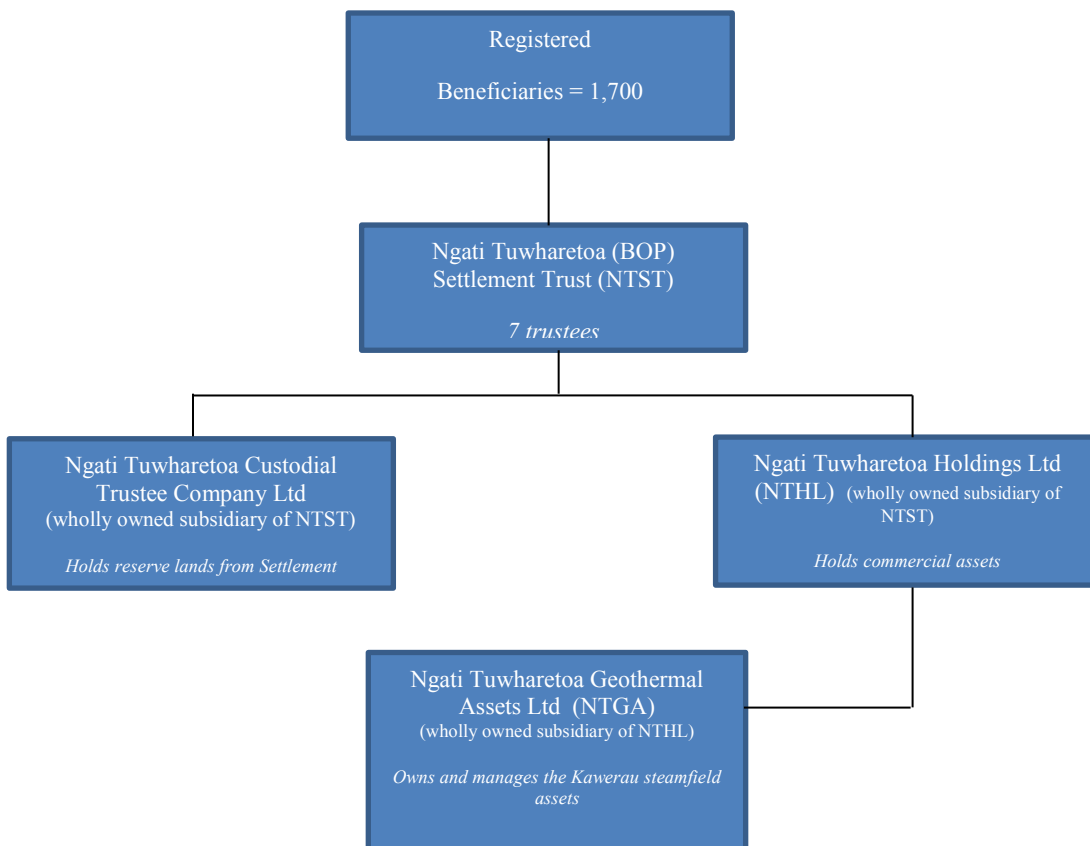


Figure 3: Relationship between Ngati Tuwharetoa beneficiaries, Ngati Tuwharetoa (BOP) Settlement Trust and subsidiary companies.

The geothermal energy currently supplied is in the form of steam or brine. The business is driven by the needs and demands of its industrial customers. While at times the energy demand is at a constant rate (eg electricity generation) that is not the norm. For example, some industries may operate for 12 hours each day and others for 24 hours each day – and at fluctuating flow rates rather than constant base load. There are sophisticated distribution and control systems to accommodate the mix of constant and inconsistent demand by its users.

NTGA is the largest resource consent holder on the KGF, its suite of consents is reflective of the wholesale business:

- two resource consents to take up to 89,400 tonnes per day of geothermal fluid (steam and separated geothermal water) for provision of industrial electricity generation and other cascading uses and to discharge residual geothermal fluid:
 - the first consent for 44,400 tonnes per day acquired from the Crown is fully utilised
 - the second consent granted in 2014 for 45,000 tonnes per day has yet to be utilized. Additional investment will be required to utilise this resource consent.
 - Various consents for its operations including air discharge, drilling, discharge consent and water take for drilling purposes.
- The Crown's steam field business was 50 years old at the time of purchase and there had been a lack of re-investment in the old assets. At the time of purchase, around 40+ wells had been drilled; however a number had failed due to enthalpy decline from reservoir cooling; or issues with deposition. A number of these earlier wells are plugged or used as monitor wells (Bloomer).

NTGA presently has six production wells and five injection wells in operation with associated infrastructure and computer control systems. Other tappers on the KGF are Mighty River Power and Geothermal Developments Ltd who have additional wells.

In addition, NTGA has made significant investment in the understanding of the field, including extensive scientific surveys, reservoir testing, production and reservoir modelling utilising its network of deep, shallow and groundwater monitoring wells. Results of the various monitoring are used within the Kawerau reservoir and subsidence models.

NTGA is a member of a Steamfield Management Agreement and Steamfield Management Plan with Mighty River Power and Norske Skog Tasman; to implement appropriate sustainable planning and management for development of the KGF.

Residual geothermal fluid from NTGA's operations is discharged under consent to ground via NTGA's injection wells and to the Tarawera River via a cooling channel and the Umapokapoka lagoon. Fluids through the Umapokapoka lagoon flow to the Tarawera River through a bathing pool facility.

7.2 Customers

The NTGA operations utilise geothermal fluid in multiple ways to maximise its use and to meet customer requirements. NTGA has expanded its customer base and made significant investment in the KGF to provide for supply agreements. Since purchasing the assets in 2005, NTGA has spent close to \$65m in new infrastructure to improve the reliability of its business, increase capacity and provide for new customers.

- At the time of acquiring the steam field business, approximately 340 tonnes per hour raw geothermal steam was supplied to the Norske Skog Tasman (NST) pulp and paper mills for timber processing and to generate electricity. Following the closure of part of the Mills operations, an average 220tph steam is now supplied to the mill, made up of both low pressure and high pressure steam from NTGA's integrated system.
 - An average 25tph of the high pressure steam supplied to NST is passed on to Carter Holt Harvey Wood Products for use in their timber drying kilns
- In 2010 SCA approached NTGA to develop a process to provide a "clean steam" that could be used in their tissue plant and replace natural gas. NTGA developed a system similar to the clean steam system used within the NST plant. Simplistically, the process strips out the geothermal gases (primarily carbon dioxide and hydrogen sulphide). This was an innovative new development for NTGA, designed to provide 26tph of clean steam replacing the steam from existing gas-fired boilers. The plant has duplicate separation plants and heat exchangers to ensure backup for service or repair and ensure minimal disruption to the SCA supply at times of maintenance, inspections or outage.
- In 2013 NTGA concluded supply agreements with NST to supply 114 tonnes per hour steam and 600 tonnes per hour separated water for its new 23MWe power plant called TOPP1. NTGA constructed the following infrastructure to fulfil the supply agreement obligations:
 - Injection wells KA49 and KA53 were drilled and commissioned to receive the additional injection fluids. 4kms of pipelines were constructed to connect to TOPP1 for disposal of fluids, which included the pipeline crossing the Tarawera River via connection to the NST waste bridge.
 - Production well KA30 was connected to the integrated system. KA30 is located to the south-west of the steam field, and was drilled by the Crown in 1980 but had not been connected because of the distance to the main steam field. Since connection in 2013 the well is producing an average 100tph steam – slightly less than initial completion testing.
 - A DN-600 two-phase pipeline was constructed to connect KA30 to a new separation plant SP30 (capable of 200tph steam). The pipeline crosses the Ruruanga Stream and construction of a pipe bridge was required to cross the Tarawera River. The pipeline construction then connected from SP30 to TOPP1.

- An acid dosing plant was constructed as part of the reinjection system to treat the pH in fluids and reduce the risk of scaling from silica polymerisation. Following commissioning, testing is underway to determine the on-going need for acid dosing.
- NTGA has recently contracted with Sequal Lumber for the supply of up to 30tph raw geothermal steam, to be utilised for kiln drying. Construction of a pipeline is underway to supply steam from SP30 to Sequal Lumber and the construction of a return condensate line.
- Pressurised separated hot water is supplied to Nova Energy for electricity generation. NOVA Energy's TG1 Ormat power plant (constructed in 1989) is a 1.5MWe Ormat binary plant which uses up to 280tph of water at about 180oC. The cooled geothermal water returned from the plant is further cooled through a cooling channel, before discharge to the Tarawera River. The remaining geothermal fluid from the separation plant is injected.
- Pressurised separated hot water is supplied to Nova Energy's TG2 Ormat power plant (constructed in 1993). TG2 is a 2.5MWe Ormat binary plant which uses up to 240tph of water at about 100oC. The TG2 cooled geothermal water returned from the plant is discharged through the Umapokapoka Lagoon before discharge via bathing pools to the Tarawera River.
- Two phase fluids are available for supply to Geothermal Developments Limited as top up for electricity generation.

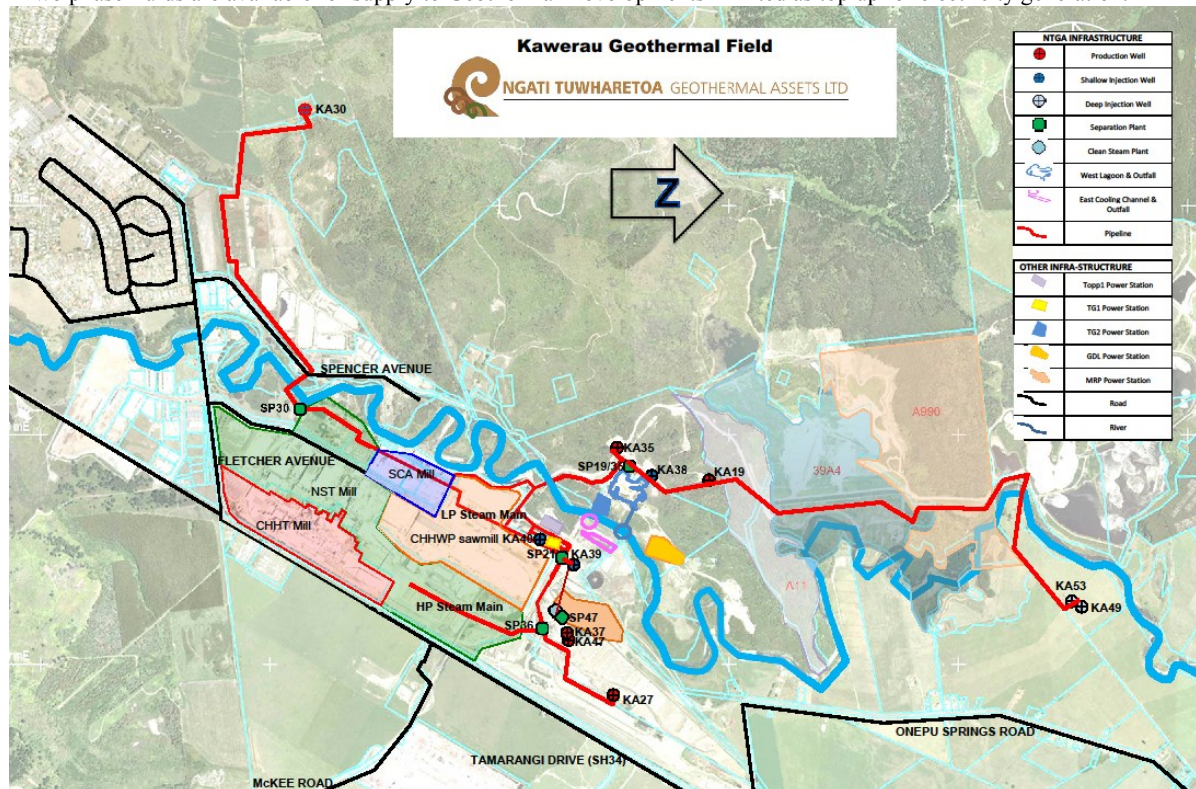


Figure 4: Kawerau steam field showing layout of NTGA infra-structure

7.3 Waste Heat Utilisation

The viability of cascade use is dependent on having third party users for the lower temperature geothermal water and the economics of supply. At the time of writing NTGA is in dialogue with industry into additional cascade uses including glasshouses, waste disposal and wood drying for further uses.

A schematic layout of NTGA's steam field operations follows (Figure 5). This depicts the flow of geothermal fluid, both steam and separated geothermal water, from extraction through to discharge by injection and to the Tarawera River.

8. FUTURE PLANS FOR THE KAWERAU GEOTHERMAL FIELD

The Kawerau resource (Figure 6) is categorised as a Development Geothermal System by the Bay of Plenty Regional Council for development subject to consents.

Any increase in supply to customers requires NTGA to upgrade existing infrastructure including the drilling of additional production and injection wells.

There are a number of key factors which make Kawerau attractive for industry, and which NTGA will capitalize on to grow its geothermal business:

- energy within the KGF
- demand for geothermal as a renewable energy

- neighbouring Kaingaroa forest
- existing wood processing industry
- rail link to the Port of Tauranga.

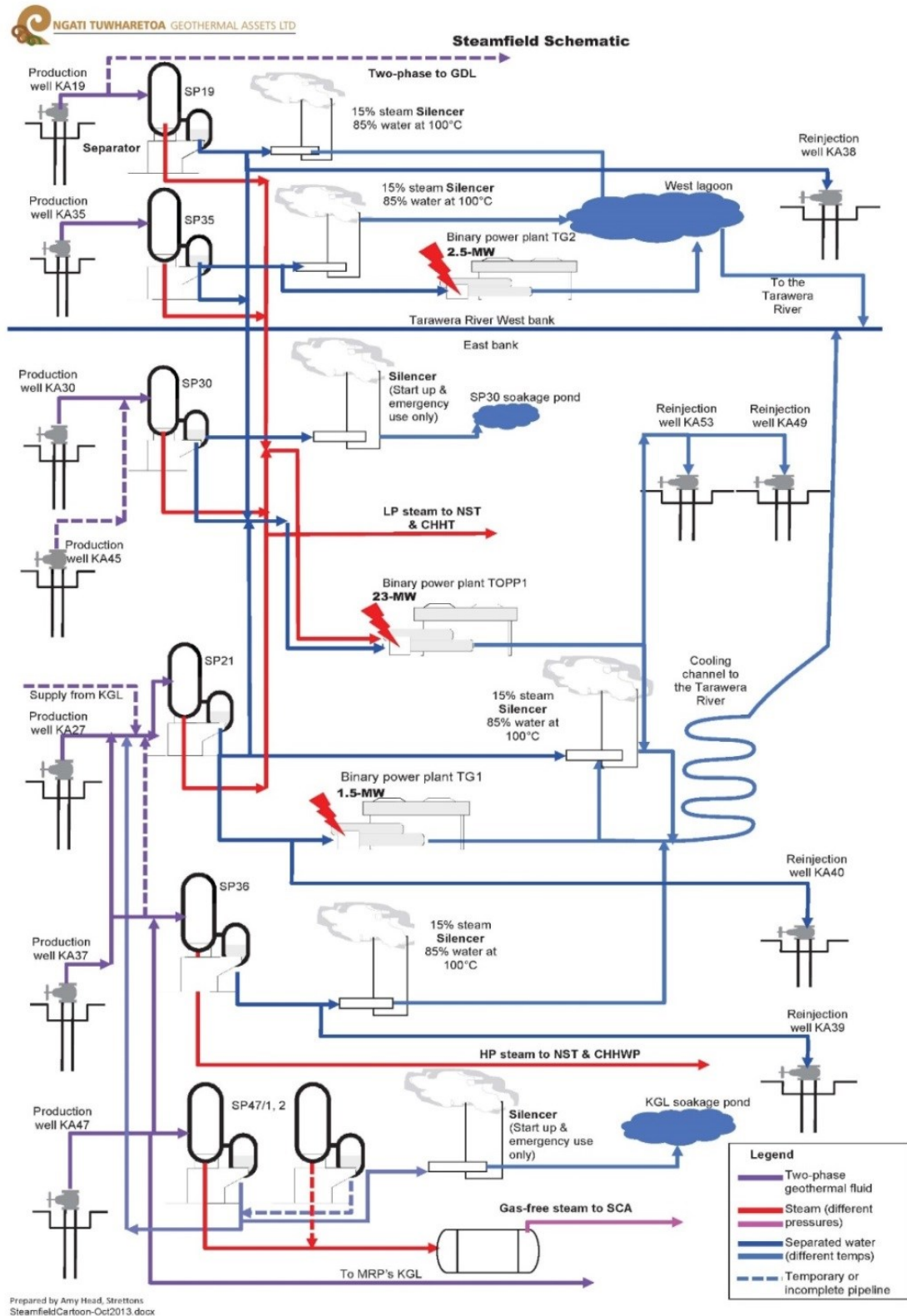


Figure 5: Schematic of NTGA's steam field operations 2014.

NTGA strongly advocates that processing the logs in NZ provides significant benefits above exporting logs. Currently around half NZs logs are exported. NZ needs to reinvigorate and expand the great work done in establishing Kawerau in the 1950s, marrying the trees with the geothermal energy and the people.

Kawerau is ideally positioned to take advantage of the wall of wood that is becoming available in the region, as NZ log harvests are set to increase by over 50% in the next decade. NTGA is assisting to promote access to reliable and cost-competitive geothermal energy, vital for processing the raw logs to processed products, creating downstream jobs in the process. It is important to be able to provide steam for direct heat uses such as kiln drying. Expanded industry in Kawerau has greater potential for flow on social and economic benefits in terms of increased employment, than electricity generation does.

Currently the majority of NTGAs assets are located on Norske Skog lands. As available land becomes more limited, it is vital to secure access rights to lands for future drilling and development, either through Joint Venture relationships, contractual arrangements or ownership.

NTGA enjoys a relationship with Ormat Industries and in this regard is working to secure an arrangement for future geothermal power plant development.

Ngati Tuwharetoa Holdings Ltd continues to actively seek opportunities to increase the returns from its landholdings and provide a long-term diversified income stream. Among investigations, there is positive progress into greenhouse ventures to utilize geothermal energy which would produce a significant amount of employment for the region.

Of course, economic aspirations cannot be separated from social aspirations and the desire to create economic activity and jobs in Kawerau. In this regard, there is a strong desire to up-skill and enhance opportunities for Ngati Tuwharetoa (BoP) people to be involved in NTSTs growing businesses.



Figure 6: Kawerau Industrial Complex

9. CONCLUSIONS

Following the significant Raupatu, the people of Ngati Tuwharetoa (BoP) experienced difficult socio-economic circumstances over a considerable period of time. Efforts of kaumātua over many decades successfully led to the Settlement and ultimate reconnection with the KGF. NTST has a deep commitment and obligation to the sustainable management of this geothermal resource as guardian and kaitiaki, with this guardianship a sacred and enduring duty.

NTGA is proud that it has the management and resources to operate what is reputed to be the world's largest supply of geothermal direct heat energy for industrial use, around half of the world's total steam supply for industrial applications. As an abstractor on the KGF, NTGA has an obligation to its owners to ensure the sustainable management of the reservoir as tangata whenua and kaitiaki. The economic aspirations of NTGA align with the NTST values and sit behind the requirement for sustainable management of the resource.

NTST is a thriving business with a great future. The group has grown from a \$10.5 million financial Settlement in 2005, to an estimated value today of > \$85 million.

Now the people of Ngati Tuwharetoa (BOP) are able to give effect to a long expressed desire to promote and facilitate economic development by and amongst Ngati Tuwharetoa (BOP).

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