

Assessment of Environmental Effects – Geothermal Reservoir

An Assessment of Environmental Effects (AEE) is a requirement under the Resource Management Act (RMA) for any proposed industrial activity.

Detailed research ensures thorough understanding of the effects of any new activities on the areas where we live, work and play, and identifies where it is necessary to avoid, remedy or mitigate these effects.

Independent experts have researched the predicted effects of the Te Ahi o Maui geothermal power plant and concluded that the effects of this plant on the environment will be extremely minimal. You can read more about this research in the Te Ahi o Maui fact sheet series.

Background

The word 'geothermal' comes from the Greek words 'geo' meaning earth, and 'therme' meaning heat. Geothermal energy is produced from the heat contained in the core and the mantle of the earth (the layer between the surface and the outer core). In some areas where the earth's crust is thin or broken, or where the hot magma (liquid rock) is close to the crust, there are spots of high temperatures.

Naturally occurring ground water travelling through these 'hot spots' heats up in a process similar to that which occurs in a coffee percolator. Some of this hot geothermal water goes back to the surface to appear as hot springs, mud pools, geysers or fumaroles (where steam and gas spout from a crack in the earth). Where geothermal water meets a pocket of very fractured or permeable rock, it will fill the gaps and form a geothermal reservoir. These reservoirs become much hotter than the surface hot springs, and can reach temperatures of more than 350°C. It is from these reservoirs that the geothermal water and steam can be taken to produce electricity.

New Zealand is located on the boundary between the Indo-Australian and Pacific plates and geothermal systems are common along this boundary. New Zealand's geothermal features have a long history of use. Māori settlers gravitated toward geothermal areas for cooking, washing, bathing, warmth, preserving, ceremonial use and

healing. To this day, Māori also use geothermal minerals as paints, wood preservatives and dyes.

Taupō Volcanic Zone (TVZ)

The Taupō Volcanic Zone is a 'V' shaped area that extends from White Island in the Bay of Plenty to Mount Ruapehu in the central North Island. The volcanic field is relatively young and is one of the earth's most active geothermal regions.

Over time, magma moved into the stretched and fractured crust of the zone resulting in temperatures of at least 350°C at depths of less than 5 km. This provides a huge heat source from which geothermal systems have developed and been sustained for hundreds of thousands of years.

Twenty-nine geothermal areas have been identified in the zone, although only about half of these have potential to be used as sources for energy generation.

Within the zone, there are three main geothermal field types:

- very low temperature fields, which are used for heating homes and offices and supply domestic hot water
- moderate to low temperature fields are usually less than 140°C
- high temperature fields can be between 200-350°C and are quite rare. The Kawerau geothermal field is an example of this field type.





Kawerau geothermal field

The Kawerau geothermal field (in figure 1 at left) spans approximately 30-35 km² and lies on the eastern edge of the Taupō Volcanic Zone. It is located within the flood plains of the Tarawera River, close to Mount Putauaki and the Onepu Hills.

Volcanic activity in the area is due to large scale rifting, where fractures and fissures in the earth's crust allow lava to move close to the surface. Geothermal activity in the Kawerau field originates from a greywacke (a type of rock) basement, which is at a depth of about 600m in the south and about 1200m in the north. Overlying the greywacke basement is volcanic and sedimentary material.

The greywacke basement has many volcanic faults and fractures running through it, which makes the rock very permeable, especially at deeper levels. Hot fluid is thought to move through the permeable greywacke, originating from an 'up flow' in the southern end of the field and moving upwards and towards the north-northeast of the field.

Development of the Kawerau geothermal field

In the early 1950s, government departments carried out scientific surveys and shallow drilling to investigate the geothermal potential of the Kawerau area.

Tasman Pulp and Paper Company built a mill in the vicinity of the field in order to utilise the available geothermal energy for paper drying, timber drying and power generation. The construction of the mill boosted the Kawerau population and economy significantly.

The improvements in geothermal technology and a move towards renewable energy sources sparked interest from other developers who saw the potential to utilise this natural resource without polluting the environment. Since then, five other power generation plants were built.

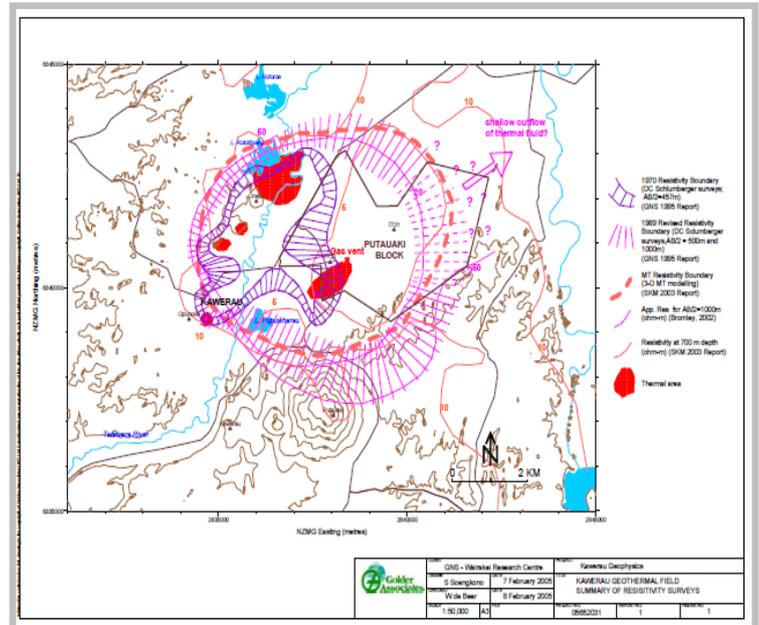


Fig 1- The Kawerau geothermal field (Source: Bignall and Harvey 2005)

Questions? Please contact us

The Te Ahi o Maui Geothermal Project is a partnership between Eastland Group Limited and Kawerau A&D Ahu Whenua Trust.

For more information:

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