

Assessment of Environmental Effects - Noise

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.

Noise

The Te Ahi o Maui geothermal project has carefully researched the anticipated noise that will result from the construction and long-term operation of its proposed power plant. The research considered each of the activities associated with the construction and operation of the power plant. Scientists were able to predict the level of noise, in decibels (dBA) that would come from each activity, as well as the timing, duration and location of the noise. Noise levels can also be expressed as LAeq (equivalent continuous sound pressure level) or LAm_{ax} (maximum sound pressure level recorded during a noise event).

This noise level data was loaded into a computer-based modelling tool that enabled the researchers to predict the individual noise effects from each activity, as well as the total effects of all of the activities associated with the Te Ahi o Maui project. Computer-based modelling also enabled the researchers to combine the predicted noise data from the Te Ahi o Maui project with the existing noise locally, such as the mills and the other geothermal energy plants, as well as the ambient noise, which is the natural background noise from the surrounding area. The computer model took into account the topography, meteorological effects, such as humidity, and wind direction and strength and is accurate to ± 3 dBA.

In the worst-case scenario, the noise from the plant during normal operations will be the same or less than current ambient noise in Kawerau. It can be compared to sitting in a quiet room with a modern refrigerator – a background hum of about 40 dBA (Decibels Ambient).

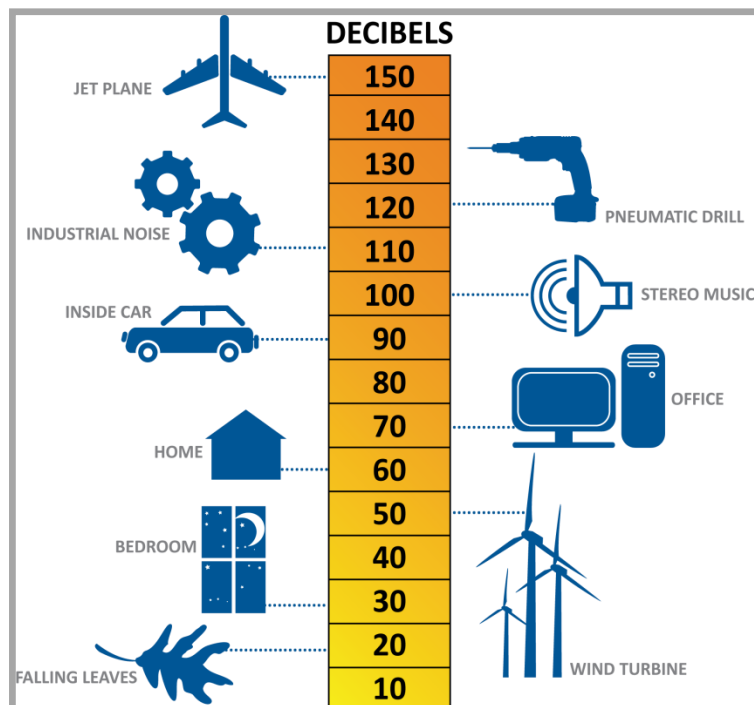


Fig 1 - Decibel levels (dBA) associated with everyday noise sources

At all times during the construction and operation of the Te Ahi o Maui project, the noise levels will comply with New Zealand standards and the limits set out in the Kawerau and Whakatāne District Plans. Due to the location of the site, much of the noise will be screened by the natural terrain – the hills and mountain ranges that surround the Kawerau area.

Noise emission levels will be more or less constant throughout the life of the Te Ahi o Maui geothermal power plant, which is expected to operate for as long as 35 years.

Construction

Construction is expected to take approximately 24 months. In the early stages of site preparation, noise-producing activities will include heavy earth-moving vehicles doing earthworks.

Once the site preparation work is completed, heavy vehicles will transport building materials and equipment onsite, construction of the power generating plant will begin and drilling equipment will be assembled and erected. Construction activities are predicted to result in sound levels of less than LAeq 55 dB/LAm_{ax} 65 dB at the closest noise-sensitive site.



Well drilling phase

In order to extract the geothermal resource from below the earth's surface, production wells must be drilled. Wells are also drilled for reinjecting the geothermal fluid, which is piped back into the geothermal reservoir after it has been used in the geothermal energy generation process.

Up to six production wells may be drilled over the 35 year lifespan of the project and each will take from 35 to 45 days to complete. A typical drill rig will operate 24 hours a day and generate noise of around 112 dBA at the source, which is approximately equivalent to the noise generated by a jackhammer. There is also noise associated with the preparation of the drill pad and the drill rig assembly of around 102 dBA. The noise will be constant, with no high or low pitches or changes in volume, and from the Kawerau township and the mill sites it will sound a little like wind rustling through the treetops.

The Te Ahi o Maui project will further reduce the noise from well drilling through careful design of the drill site and the use of acoustic mufflers around the loudest equipment.

Well testing

Once the wells are drilled, a brief vertical discharge of high pressure steam and geothermal fluid may take place. This discharge will clear the wells of any residual debris prior to production testing of the well. This generally happens once in the life of a well and results in extremely high levels of noise for a brief period of time, not more than a few hours, during daytime hours.

During a vertical discharge, expected noise levels on site will exceed 120 dBA at source, which is louder than a 747 jet taking off. Because of the potential debris in the high pressure steam and fluid, there is no noise reducing technology that can be placed on the well head to reduce the noise.

In Kawerau and at the nearby industrial area, this will result in a sound level measuring about 40-42 dBA, which is equivalent to the sound you would expect in a quiet living room (with no external noise such as your neighbour's lawnmower) and so may not be audible over the existing background industrial noise.

Production testing of the wells is carried out over longer periods of time, sometimes several weeks, but portable

steam vent silencers are used to suppress the noise. Also, the saturated steam characteristic of this stage is self-silencing when venting structures are used. This is due to the interaction between sound and the minute water droplets in the saturated steam.

Operation – 35 years

Te Ahi o Maui project is considering three different options for power plant design, and the predicted noise emission levels during typical operation have been assessed for each option. The three options are:

- a conventional geothermal steam turbine system
- an organic Rankine cycle (ORC)
- a combination of both.

You can read more about these three options in the *Te Ahi o Maui Fact Sheet 7 – Geothermal Energy Generation*.

Sensitive sites

There are key sites on the A8D land listed in the table below where people live or often visit. At these sites, the sound level of the operating power plant is predicted to be between 30 and 32 dBA – this is equivalent to the sounds heard in a quiet rural setting.

Predicted sound pressure level at noise sensitive noise monitoring sites	Option 1 Conventional steam turbine (LA eq)	Option 2 Organic Rankin Binary (LA eq)	Option 3 Combination of options 1 and 2 (LA eq)
Tohia o Te Rangī Marae	32 dB	30 dB	30 dB
Dwelling near Tohia o Te Rangī Marae	32 dB	30 dB	30 dB

Fig 2 – Key sites on the A8D land and the predicted sound levels

Questions? Please contact us

The Te Ahi o Maui Geothermal Project is a partnership between Eastland Group Limited and Kawerau A8D Ahu Whenua Trust.

For more information:

Visit www.teahiomaui.co.nz or call 07 308 2574

