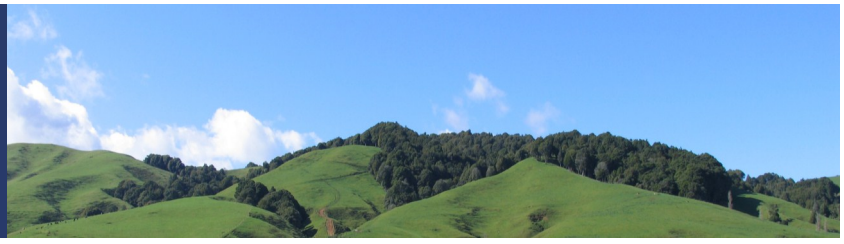


Electromagnetic Fields and Noise

Electric and magnetic fields and where they are found

Electric and magnetic fields (EMFs) occur naturally in the earth and our atmosphere, so are a part of the natural environment. EMFs are also produced whenever electricity or electrical equipment is in use – including in our homes, offices and worksites.

For example, EMFs can be found near:

- All electrical wiring in our streets and homes
- Electric tools, such as power saws, grinders, drills, electric welders
- Electrical appliances, such as hair dryers, electric blankets, clock radios, computers and cell phones

Electric fields are measured in units of V / m (volts / metre) and magnetic fields are measured in units of Teslas (T) or microteslas (μT).

How EMFs occur and behave

The strength of electric fields emitted from a transmission conductor (line / wires) is influenced by its voltage, which generally stays constant. The strength of the magnetic field relates to the amount of electric current that is flowing through the conductor. The strength of both fields reduces and ceases to exist with distance from the conductor. Objects like buildings and metal roofs also reduce or shield the fields.

EMFs and health concerns

Some people have questions and concerns about EMFs and how they relate to our health. In New Zealand, the National Radiation Laboratory (NRL) reviews research from New Zealand and overseas that relates to EMFs and health. The NRL has developed an information booklet called Electric and Magnetic Fields and your Health, which is available from the NRL website www.nrl.moh.govt.nz.

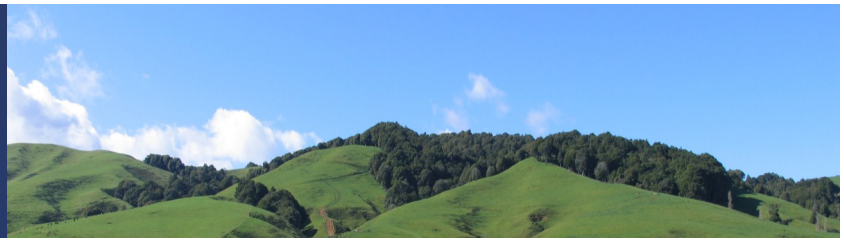
EMFs levels produced by electricity network lines and substations

Common household appliances produce EMF levels that are comparable with Waipa Network's electricity equipment. *For example:*

High voltage transmission lines	Directly beneath line: Electric fields: 0.3 – 3kV/m Magnetic fields: 0.5 - 5μT
High voltage transmission lines	40 metres from line: Electric fields: 0.01 – 1kV / m Magnetic fields: 0.1 - 1μT
Substations	Electric fields: generally less than 0.1kV/m, except near where overhead supply lines enter or leave the substation Magnetic fields: generally decrease to around 0.1μT within 5m of equipment, except near where supply lines enter or leave the substation.
Near household appliances	Electric fields: 0.01 – 0.05kV/m Magnetic fields: 300mm away: 0.05 - 5μT 1m away: 0.05 – 0.3μT
Above an electric blanket	Electric fields: 0.06 – 0.6kV/m Magnetic fields: 0.02 – 0.5μT
Recommended safety limits	Electric fields: 5kV/m Magnetic fields: 200μT

These comparisons have been taken from the Ministry of Health's National Radiation Laboratory (NRL) information booklet Electric and Magnetic Fields and your Health. Please refer to this booklet for more detailed information.

WAIPA NETWORKS



As radiation is a health concern to some people it is important to note that EMFs at the frequency of mains electricity are not the same as radiation and that there is no significant radiation from transmission lines.

Safe level of exposure to magnetic fields

The New Zealand guideline used for acceptable exposure levels is the Ministry of Health National Radiation Laboratory (NRL) Guideline, which in turn refers to the International Commission on Non-Ionising Radiation Protection (ICNIRP).

In New Zealand, the recommended safe continuous exposure limit for magnetic fields for the general public is 200μT (microTeslas). This exposure limit is the same specified in Australia, Germany, Switzerland and the United Kingdom. The New Zealand recommended safe continuous exposure limit for electric fields is 5kV/m.

EMFs relating to the proposed transmission line

Waipa Networks ensures that EMF levels are kept below the Ministry of Health's guidelines for electric and magnetic field levels. This is done through the engineering design of distribution lines, transmission lines, switching stations and substations.

Transmission lines are designed to ensure that, at all times, EMF levels at ground level will fall below the guidelines set by ICNIRP and endorsed by the Ministry of Health.

Waipa Networks has taken EMFs into consideration in the design of the new Te Awamutu transmission line and other related network installations.

For example:

- Where possible, the transmission line route and related network installations have been designed to avoid as many existing buildings and structures as possible.
- The transmission lines have been designed to achieve the ICNIRP and Ministry of Health guideline minimum clearance above ground at all times, including times of high load when the line may sag from heat and expansion.
- Waipa Networks is seeking an easement on both sides of the transmission line that will restrict the activities allowed to occur within the easement area.

Expert advice and industry guidelines on EMFs

More detailed information is available from:

- The New Zealand Ministry of Health's National Radiation Laboratory (NRL) www.nrl.moh.govt.nz See their publication Electric and Magnetic Fields and your Health.
- The World Health Organisation (WHO) http://www.who.int See their report on the health effects of exposures to extremely low frequency (ELF) electric and magnetic fields (EMFs), their fact sheet and full report.
- The International Commission on Non-Ionising Radiation Protection (ICNIRP) www.icnirp.de
- The Australian Government Agency ARPANSA www.arpansa.gov.au See their report on Extremely Low Frequency Magnetic Fields.
- The UK Health Protection Authority (HPA) www.hpa.org.uk

Noise

There are three types of noise associated with transmission lines:

Aeolian noise

'Wind in the wires' noise that may be present when the wind blows hard. Aeolian noise may be caused by regular air fluctuations across the conductor (line), structures and the fittings on the structures. Aeolian noise can be largely eliminated through engineering design practices that modify the airflow. Aeolian noise is rarely a problem in practice.

Corona noise

Corona is generally only audible under conditions of high humidity, such as rain and fog. It can occur around the conductor (line) and insulator. Corona occurs when there are localised electrical discharges caused by humidity, producing a hiss or a crackle noise. If Corona occurs, there may also be radio interference present.

Radio Interference

Radio interference, or static interference, may occur and this is when you can hear a crackle noise on some appliances, like a radio or your telephone. A similar example is when an electric fence interferes with your telephone.

Waipa Networks ensures that all its electricity installations meet the New Zealand standard for acceptable noise levels.

The design of the transmission line and related network installations, and the easement will achieve an audible electrical noise level that is within acceptable limits and complies with New Zealand standards.

For further information

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