

HumeLink Environmental Impact Statement

Electric and Magnetic Fields (EMF)

AUGUST 2023

What is an Environmental Impact Statement (EIS)

The HumeLink project has been classified by the NSW Government as Critical State Significant Infrastructure (CSSI). All CSSI development applications must be accompanied by an Environmental Impact Statement (EIS). The purpose of the EIS is to identify and assess the potential environmental, economic and social impacts of the project to help government agencies, relevant authorities, community and stakeholders make an informed decision or provide an informed submission on the merits of the project.

EIS project footprint

The [HumeLink project](#) extends from the existing Wagga Wagga 330 kV substation to the existing Bannaby 500 kV substation and the future Maragle 500 kV substation.

The EIS footprint is based on an indicative 200 metre corridor and is defined as the area directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation. The final location of all proposed infrastructure will be confirmed during detailed design.

HumeLink planning approvals and EIS

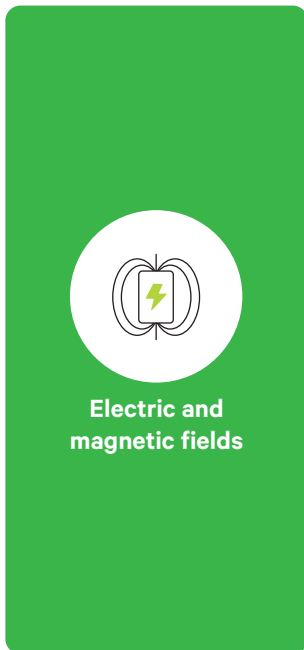
As part of the planning approval process for HumeLink, Transgrid is preparing an EIS in accordance with the [Secretary's Environmental Assessment Requirements \(SEARs\)](#). The SEARs identify matters, which must be addressed in the EIS and essentially form its terms of reference. It includes the requirements from both the NSW and Commonwealth Governments.

A series of detailed technical studies and reports are completed as part of the EIS. This includes the EMF topic covered in this factsheet.

Can I provide feedback?

Once the EIS is finalised, the NSW Department of Planning and Environment (DPE) will place it on exhibition and call for public submissions. Feedback on the EIS can be provided directly to the DPE during this public display period.

To learn more about the HumeLink EIS, please visit the [EIS Frequently Asked Questions](#) on our website.



HumeLink Environmental Impact Statement Specialist Studies

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|---------------------|--|----------------------------------|
| Aboriginal heritage | Electric and magnetic fields | Social |
| Agricultural land | Greenhouse gas and climate change risk | Soils, geology and contamination |
| Air quality | Historic heritage | Surface water and groundwater |
| Aviation safety | Hydrology and flooding | Sustainability |
| Biodiversity | Landscape character and visual amenity | Traffic and transport |
| Bushfire risk | Land use and property | |
| Economic | Noise and vibration | |



Electric and Magnetic Fields

What are electric and magnetic fields?

EMF are both naturally occurring and found wherever there is electricity. Natural occurrences include from lightning, solar activity and the earth itself. All living organisms produce EMF. Wherever electricity is flowing or there is an electrical force, EMF are produced.

The presence of EMF is an essential part of the electricity process. EMF are not the same as the electromagnetic radiation (EMR) associated with radio waves, microwaves and x-rays. EMF cause energy to be transferred along electric wires whereas EMR causes energy to be radiated away from the source and can be detected at a great distance.

Internationally, there have been almost 3,000 studies carried out in relation to EMF.

Leading health bodies such as the World Health Organisation (WHO), the US National Institute of Environmental and Health Sciences and the UK National Radiological Protection Board have evaluated the research to assess the likelihood of health effects associated with exposure to EMF. Transgrid is guided by the advice from the WHO and Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), the responsible agency in Australia for advising on exposure limits to EMF.

The equipment used for the transmission of electricity for HumeLink would operate at a frequency of 50 Hertz (Hz), which falls into a range referred to as extremely low frequency (ELF) EMF. While there is currently no scientific evidence or research that confirms exposure to ELF EMF causes any health effects, Transgrid takes a precautionary approach of 'prudent avoidance'.

More information on EMF is provided on the [Transgrid website](#).

Electric fields

An electric field occurs around any area where electric charges experience a force. The strength of this force is related to the voltage: the higher the force/voltage, the stronger the electric field. The level of electric fields is measured in thousands of volts per metre (kV/m).

Electric fields are strongest closest to the source but reduce quickly with distance. In addition, most materials act as a barrier to electric fields.

Magnetic fields

A magnetic field occurs around any area where magnetic materials experience a force. Magnetic fields are produced by the flow of an electric current: the higher the current (measured in amps), the greater the magnetic

field. The strength of magnetic fields is measured in milliGauss (mG).

Like electric fields, magnetic fields are highest closest to the source but also reduce quickly with distance.

Unlike electric fields, magnetic fields are only present when an electric current is flowing. As most materials will not act as a shield or barrier to magnetic fields, this is a reason why research into EMF and health generally focuses on magnetic fields.

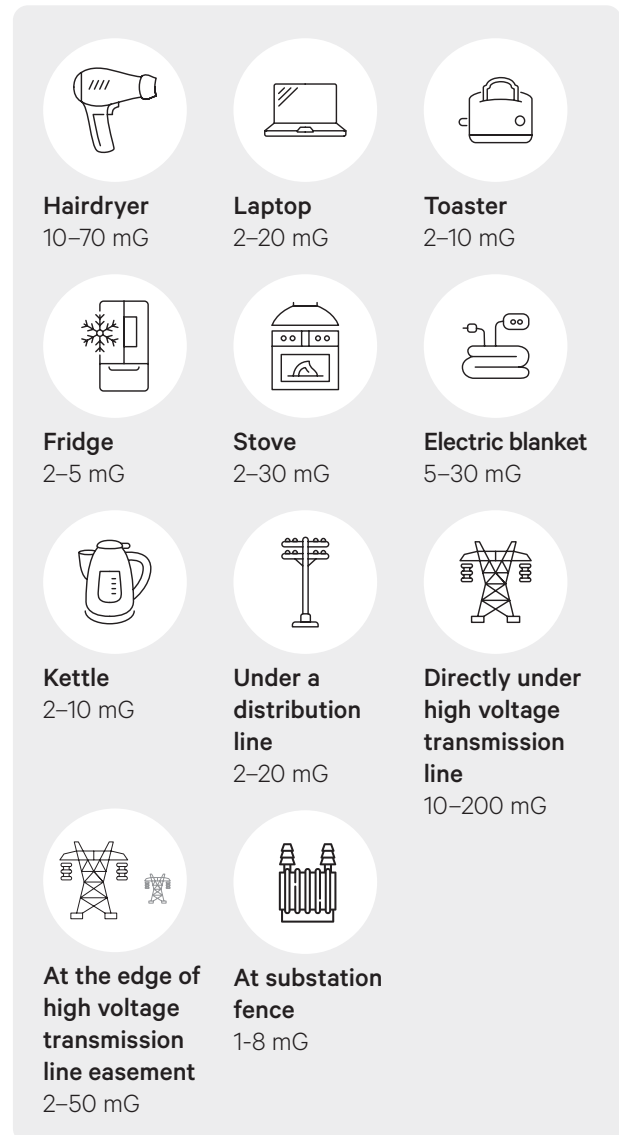


Figure 1: Typical values of magnetic fields measured near various appliances and powerlines.

International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guideline Reference Level for Human public exposure is 2,000 mG.

Source: ARPANSA, Measuring magnetic fields, <http://www.arpansa.gov.au/>



EMF study for HumeLink

EMF are considered in the planning, design and location of all Transgrid's assets. Transgrid has adopted an approach of 'prudent avoidance' in accordance with good engineering and risk minimisation practice, guidance from Energy Networks Australia (ENA) and WHO. Under this approach, the owners of electrical infrastructure should design their facilities to reduce the intensity of the EMF where prolonged exposure is possible.

ARPANSA has adopted the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines¹ for limiting human exposure to EMF, published in 2010. The ICNIRP guidelines are based on a conservative approach and outline the 'Basic Restrictions' or principles for protection against EMF exposure. Transgrid's position on EMF exposure is to comply with these ICNIRP guidelines.

An EMF study was undertaken as part of the HumeLink concept design development. This information was used to inform the hazards and risk chapter within the EIS. The EMF study involved assessing the anticipated EMF levels for the proposed transmission line and substations against the relevant criteria for magnetic and electric fields.

What does this study assess?

The EMF assessment included modelling of different sections of the transmission lines as well as where the transmission lines would intersect or parallel other existing transmission lines. A separate assessment of EMF at the substations was also completed.

Transmission lines

The amount of current being carried by the transmission lines (its 'load'), contributes to the magnetic fields produced. Given these levels vary depending on the conditions, Transgrid assessed magnetic field levels under different transmission line load conditions, including typical conditions, normal peak load (maximum current allowed during normal operation) and emergency conditions (higher currents allowed for a brief period of time).

¹ Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz – 100 kHz) (ICNIRP, 2010)

The study found that whether in isolation or in combination with the existing 132 kV and 330 kV transmission lines, the contribution of the proposed 500 kV lines to the magnetic field environment is expected to be well below the ICNIRP Guideline Reference Level of 2,000 mG for public exposure. This includes both directly under the transmission line and at the edge of the easement.

The assessment found that under the worst-case scenario conditions (emergency conditions directly beneath the transmission line) the highest predicted magnetic fields are less than 19% of the ICNIRP Guidelines Reference Level.

Based on the assessment, for all locations, under all conditions, the electric fields directly below the transmission lines would comply with the Basic Restrictions under the ICNIRP guidelines.

Substations

The proposed Gugaa 500 kV substation would be designed to ensure that the EMF complies with the relevant ICNIRP guidelines. The proposed Gugaa 500 kV substation would be enclosed by a security fence and access to the substation would be controlled to authorised persons only. EMF levels outside the substation fence line where the general public can access would be below the ICNIRP General Public Guideline Reference Levels.

Modifications to the existing Wagga 330 kV and Bannaby 500 kV substations would be designed to ensure EMF levels are also below the adopted criteria.



Pictured: EMF are produced wherever electricity is flowing.



How will EMF be managed?

The electricity infrastructure associated with HumeLink will be designed to reduce the intensity of the electric and magnetic fields they generate, and where possible located away from houses to minimise ongoing public exposure to the fields.

Effect of EMF on livestock

Previous studies on the possible effects of EMF emissions on various animals including cows, sheep, pigs and horses found no detectable effect of EMF emissions on health, milk production, fertility, behaviour or carcass quality.

The United Kingdom National Policy Statement for Electricity Networks Infrastructure states that there is little evidence that exposure of crops, farm animals or natural ecosystems to transmission line emissions has any agriculturally significant consequences.



Pictured: Studies have found no detectable effect from EMF emissions from transmission lines on crops, farm animals or natural ecosystems.

Effect of EMF on a certified organic operator status

There are a number of organic status certification bodies across Australia, and we recommended to consult with your preferred certification organisation to receive specific advice based on your operation and circumstances. Transgrid has engaged with Australian certification organisations on this matter and does not believe that the physical presence of our transmission lines on properties or the low levels of EMF that are produced by the electricity transmission infrastructure have the potential to put the ability to gain or maintain organic certification at risk.

More information

Australian Radiation Protection and Nuclear Safety Agency

ARPANSA maintains continual oversight of emerging research into the potential health effects of EMF from powerlines and other electrical sources in order to provide accurate and up-to-date advice.

For more information visit www.arpansa.gov.au

World Health Organisation

In response to public and governmental concern, WHO established the International Electromagnetic Fields (EMF) Project in 1996 to assess the scientific evidence of possible adverse health effects from electromagnetic fields.

For more information visit www.who.int

Energy Networks Australia

The electricity industry in Australia has an active management program on the issue of Electric and Magnetic Fields at power frequencies (50 Hz) which has been in place for many years.

The Energy Networks Australia website provides some useful information on EMF-related issues.

For more information visit www.energynetworks.com.au

Connect with us

Transgrid is committed to working with landowners and communities through the development of HumeLink. Please connect with us for more information.



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