



An artist's impression of one of the options for the fence line for the planned Ballarat East Zone Substation now subject to community consultation.

Ballarat East Zone Substation Electromagnetic Fields (EMF) Report

EMF outside the perimeter of the new Ballarat East Zone Substation will be negligible and well below what is considered safe health exposure limits. An independent analysis has found that EMF from the site will be lower than many common household items residents have and use in their homes every day.

During our community engagement, we've been asked about the EMF levels from the new Ballarat East Zone Substation. This fact sheet shares findings from our independent study on EMF emissions at the site, the safety measures at our substations, and how we encounter EMF in daily life.

We are committed to helping the community understand the facts about EMF and providing information from our independent EMF study on the Ballarat East Zone Substation project.

What are Electromagnetic Fields?

People have always been exposed to natural sources of EMF. The source we recognise most is the sun, which sends out waves that create electric and magnetic fields (EMFs) or radiation.

Electric fields are created by differences in voltage: the higher the voltage, the stronger the field. A good example of this in nature is the build-up in electric charges we feel in the air before a thunderstorm. What we call 'static electricity' is a form of EMF.

Magnetic fields are created when electric current flows: the greater the current, the stronger the magnetic field. In nature, the most well-known magnetic field is the type that causes a compass needle to orient to north or south.

Everyone is exposed to a mix of electric and magnetic fields at home, in communities and at workplaces. Importantly, these fields reduce in intensity with distance. The further you are from the source, the lower the field's intensity.

There are two types of EMF that we can be exposed to:

1. **Low-frequency:** Appliances like microwave ovens, mobile phones, and distribution-level powerlines send out this form of low-level EMF.
2. **High-frequency:** Examples of this are ultraviolet (UV) rays from the sun and X-rays from medical imaging machines.

It is not disputed that EMFs above certain high levels can trigger health effects. However, other than exposure to the sun, it is very unlikely that people are exposed to high-frequency EMFs in everyday life.

Safety central to our substations

Powercor zone substations are designed to meet EMF safety and environmental guidelines. We also build our network to reduce the potential for community members and our employees to be exposed to the low levels of EMF they create.

We use a Safety in Design process to include engineering controls that identify and minimise EMF emissions. This includes:

- Placing equipment up poles, well away from community members.
- Ensuring boundary fences around our zone substations are well away from transformers and other equipment that might emit EMF.
- Using sheet metal screens specifically designed to form a shield against EMF, when reduction cannot be achieved by distance.
- Establishing exclusion zones around our equipment and, where appropriate, posting signs advising of safe distances based on the low-frequency fields emitted.



EMF levels at the Ballarat East Zone Substation

To inform our design and planning of the new Ballarat East Zone Substation, we engaged an independent consultant, Magshield Products International, to study the proposed substation. The study assessed EMF emission levels from the zone substation outside its perimeter. In particular, the closest residential properties along the western boundary.

Magshield assessed the site’s layout, design features and proximity to properties, taking the highest possible estimate of the amount of electrical load at the site, as well as the shielding effectiveness of fences, trees and building materials.

Based on this study, Magshield confirmed the predicted EMF levels around the site would be well below the safe health exposure limits recommended by the International Commission on Non-Ionizing Radiation Protection’s (ICNIRP) guidelines. Additionally, the EMFs

are also below the levels that might affect electronic devices, such as radios and TVs, used in homes, businesses and light industry, as specified in the Australian Standard AS/NZS 61000.6.1:2006.

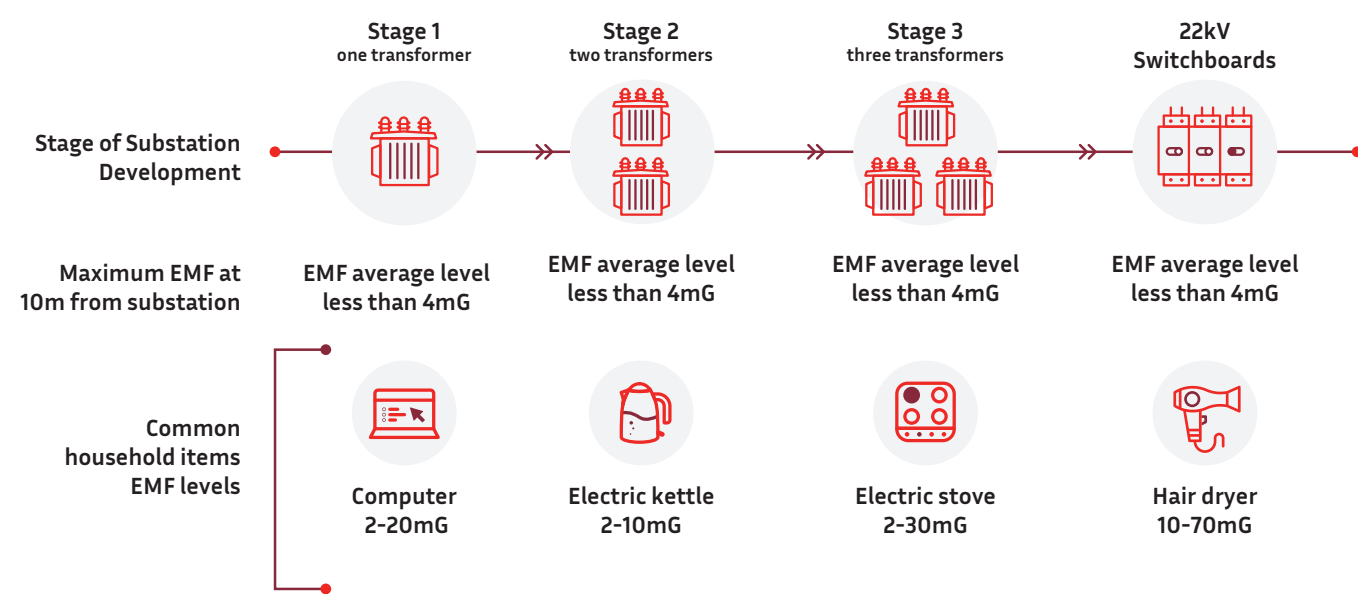
Specifically, the maximum average magnetic field level is predicted not to exceed 4 milligauss (mG) along the closest western perimeter fence. This level will continue to lower as it travels further away from the perimeter. In comparison, everyday household items such as your computer, kettle, stove and hairdryer can emit EMF at higher levels.

See the table below for these average household items and their approximate levels in mG, in comparison to the different stages of the zone substation development.

Once the zone substation is built, Powercor will monitor EMF levels at the site to verify the study’s predictions.

“EMF emissions from the Ballarat East Zone Substation will be extremely low and at safe levels for neighbouring residents. This is due to the physical distance to the equipment within the site and the effective shielding in the design.”

EMF levels comparison table



*Figures from ARPANSA, figures are approximate and can also vary depending on make and model of the product.