



www.emrsurveys.com.au
27 Nov 2017

IPM Holdings Pty Ltd
PO Box 42
Balmain NSW 2041

Attn: Alek Novakovic <anovakovic@ipmpl.com.au>

Dear Alek,

Proposed Development at 9 – 15 Lawrence Street, Freshwater

Thank you for the opportunity to conduct an electromagnetic survey at the proposed development in Freshwater

In this survey, we have measured the electric and magnetic fields from the adjacent electricity sub-station and other miscellaneous sources.

These measurements are provided, on attached sheets.

Power frequency electromagnetic fields (ELF)

Power frequency electromagnetic fields are emitted by electrical wiring and equipment such as power lines, office wiring, and electrical appliances which operate at frequencies of 50 Hertz (Hz). That frequency is within the range of extra low frequencies (ELF). It consists of both an electric field and a magnetic field.

The magnetic field is created by electric current flowing along a conductor such as a power circuit. It is measured in units of milligauss (mG) and is present whenever an appliance is turned on or a transmission line is active.

The electric field is created by voltage on an active line, irrespective of whether current is flowing or not. It is measured in units of Volts per metre (V/m).

Safe levels.

Standards endorsed by World Health Organisation allow general public exposure to magnetic fields of 2000 mG and electric fields of 5000 V/m for short-term exposure. The Australian guidelines of the National Health and Medical Research Council allow general public exposure to 1000 mG and 5000 V/m for short-term exposure. The NHMRC Guidelines have now expired and reference is now made to International Commission of Non-ionising Radiation Protection (ICNIRP).

However, many studies have found increased risks of childhood leukaemia at exposures of 4 milligauss and above, and the International Agency for Research on Cancer (IARC) has classified power frequency magnetic fields as possible carcinogens.

We would recommend spot day-time levels be below 3 milligauss for continuous exposure. Levels above 5 miligauss would require investigation and rectification.

Test method.

Readings of both ELF electric and magnetic fields at ground level, waist height (1 metre above ground level) and head height (2 metres above ground level), at 22 locations across the area of the proposed development.

The time of each measurement was noted. Ausgrid provided load currents at 5 minute intervals for the duration of the testing. They also provided median and maximum currents for the sub-station. The measured fields were then compared in time with the measured currents and average daily fields and maximum possible fields were then calculated for each location.

Equipment.

Magnetic ELF fields were measured with a Narda B-field meter EFA-300, P/N 2245/30, Serial No. K-0019 Calibrated on 8 Sep 2016.

Electric ELF fields were measured using an E-Field Unit P/N 2245/90.31 S/N H-0010 calibrated on 9 Sep 2016

Calibration certificates are available.

Results.

ELF (power frequency).

There were no significant electric or magnetic fields measured.

The electric fields were less than 0.0004% of the ICNIRP Safe Levels for Public exposure and less than 10% of precautionary levels..

The maximum magnetic field measured was actually on the footpath of Lawrence Street well away from the electricity sub-station and is caused by neutral currents flowing along the water pipes. This commonly occurs and can be easily corrected in your development by inserting a short length of plastic in the water line as per attached instructions. Nevertheless the levels are less than 1% of the International Guidelines, although there is some concern within the community of such levels in sleeping areas. This does not apply to your development.

Magnetic fields over the rest of the property were less than 0.1% of the ICNIRP Safe Levels for Public exposure. They were also less than the most precautionary levels preferred by the community.

Recommended actions

There are no actions recommended for reducing any electromagnetic fields. All fields comply with Australian and International Standards.

Yours sincerely

A handwritten signature in black ink, appearing to read 'WJ Lincoln', is centered below the text 'Yours sincerely'. The signature is written in a cursive style with a small flourish at the end.

WJ Lincoln B.E. Elect.

EMR Surveys Pty Ltd.

Attachments.

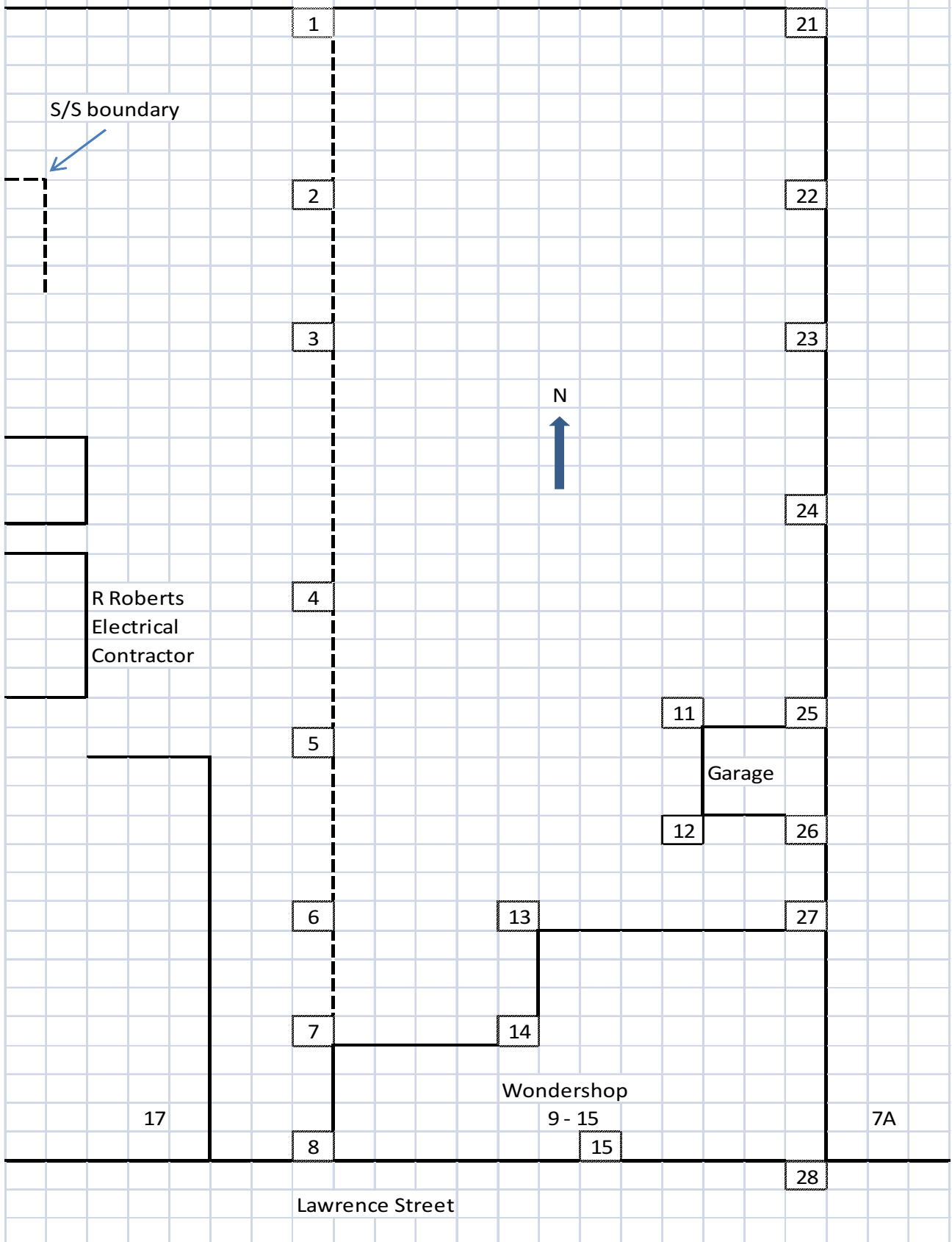
CV WJ Lincoln

Measurement locations

Electromagnetic field measurements. (separate file)

Measurement locations

9 - 15 Lawrence Street, Freshwater



CURRICULUM VITAE

John Lincoln

Qualifications

Bachelor of Engineering (Electrical),
University of Canterbury, New Zealand

Present position

Director of EMR Surveys Pty. Ltd.

Areas of Expertise/ Special Interests

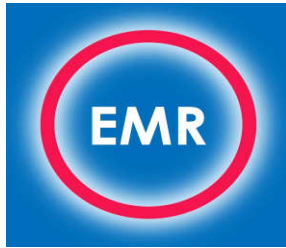
I have had many years experience in electrical engineering design involving electromagnetic fields. In the process i observed occasions where people were being affected after prolonged exposure to electromagnetic fields significantly lower than what was considered, by standards setting authorities, as safe.

EMR Surveys was formed in 1995 and I recorded many more instances of health effects after exposure to quite low fields from both power and radiofrequency sources. Methods were initiated to reduce or eliminate the fields and many adverse health symptoms disappeared. The methods used were frequently quite simple involving minimum cost. I was included in the standards setting working groups for both radiofrequency and power frequency standards. The power frequency standard is presently in draft form and may be issued as a guideline. The radiofrequency Standard RP{S 3 was published by ARPANSA in 2002

Affiliations

I frequently give public talks on electromagnetic fields and the simple steps that can be taken to avoid undue risks.

- Member ELF Working Group – ARPANSA
- Member RF Working Group – ARPANSA
- Member TE7 Working Group – Standards Association of Australia
- Member EME committee – Federal Govt.
- Past Director EMR Association of Australia
- Member working group, SAA Standards for low voltage switchgear and circuit breakers.



Earth connections

Plumbing and electrical

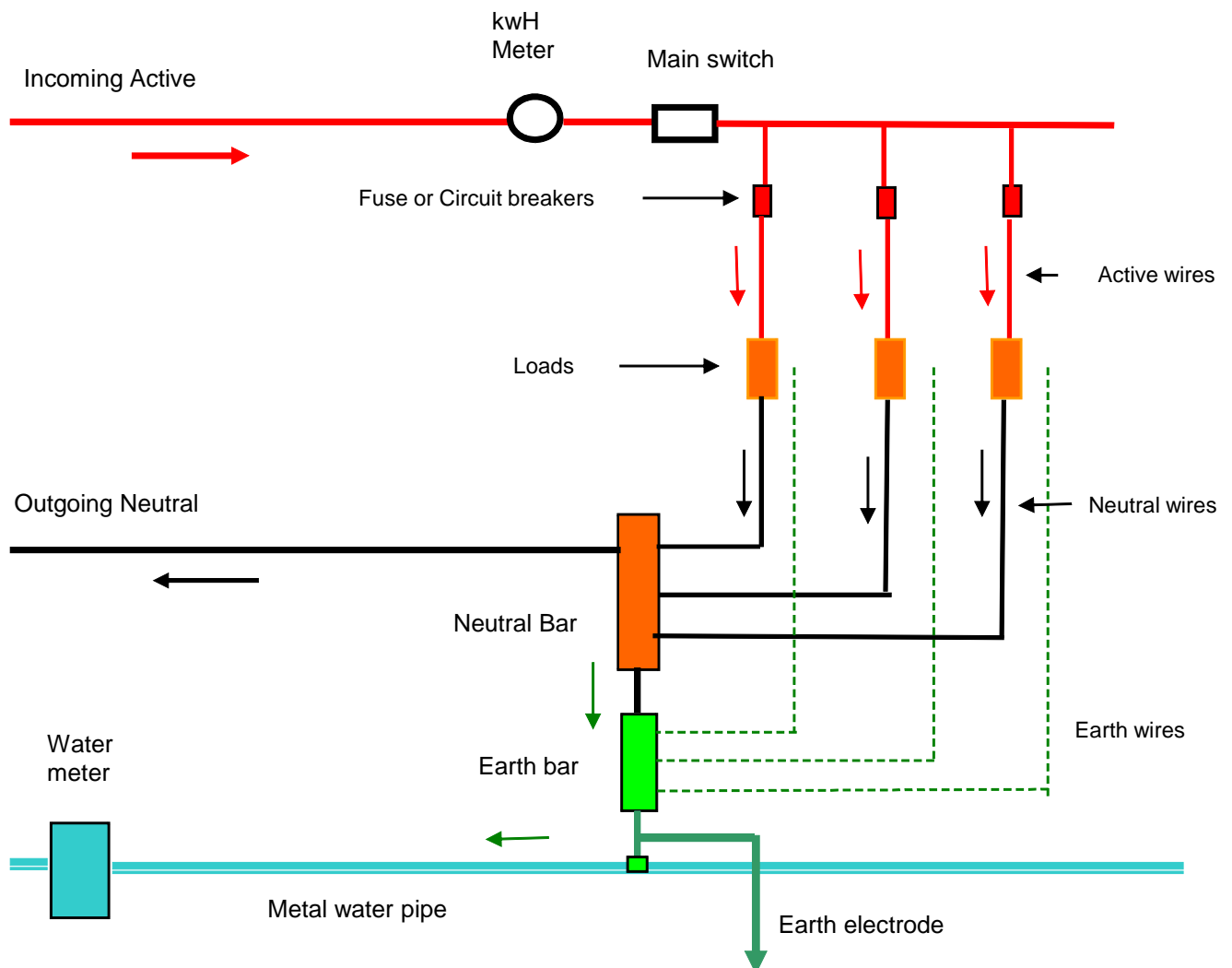
instructions

Electricity is connected to most domestic dwellings by two wires, an ACTIVE and a NEUTRAL. For commercial, industrial, and a few domestic dwellings there are four wires, three ACTIVE and one NEUTRAL.

The active wire(s) is (are) first connected to the kWh (Kilowatt-hour) meter, then to a Main switch, then to fuses or circuit breakers for each load circuit. As an absolute minimum there will be one power and one light circuit. There may be separate circuits

Some domestic dwellings may have as many as 12 or more circuits, commercial buildings may have hundreds..

After each fuse or circuit breaker the Active wire is connected to a control switch (not shown) and then to the load, which may be a light, a power outlet connected to a washing machine, heater, computer etc. The other side of the load is wired back to a N



Under normal circumstances the value of the Active and Neutral currents will be equal and travelling in opposite directions. The magnetic fields created will also be equal and opposite. When the wires are close together the fields will almost cancel each other. This is particularly the case when the insulated active and neutral wires are twisted together or bound closely together in the same plastic covering.

When the active and neutral wires are not close together the fields do not cancel and very high fields may be experienced. This situation will always occur near a kWh meter, as not only are the two wires separated, but the active forms a coil inside the meter and a multiplication of the fields occurs.

The strength of the magnetic field is directly proportional to the current flowing. In many cases this is not a problem unless people are sleeping or working near the meter box. They can then be exposed to high magnetic fields whenever large loads such as water heaters or ovens are turned on.

To minimise the risk of electrocution, all exposed metal parts of appliances are connected to an Earth wire. The Earth wires for all circuits are brought back to an Earth terminal in the switchboard, or meter box. The Earth terminal is then connected to a point making good connection with the earth. This can be via a suitable metal stake driven into the ground, or for older premises, this may be to the water pipe only.

Should an Active wire ever touch the external case of an appliance the earth connection ensures electrocution can not occur. As an additional safety feature the Neutral terminal (or bar) is bonded to the earth connection ensuring that the neutral never becomes live under any circumstances...the earth connections serve a very important role.

With the bonding of the Neutral and Earth together it is not unusual for a significant part of the Neutral current to travel along the water pipe rather than the Neutral wire. We then have a situation where the Active and neutral currents are no longer equal and in addition, the water pipe is carrying current. The water pipe will then have a surrounding magnetic field and the unbalanced active and neutral wires will radiate a similar field.

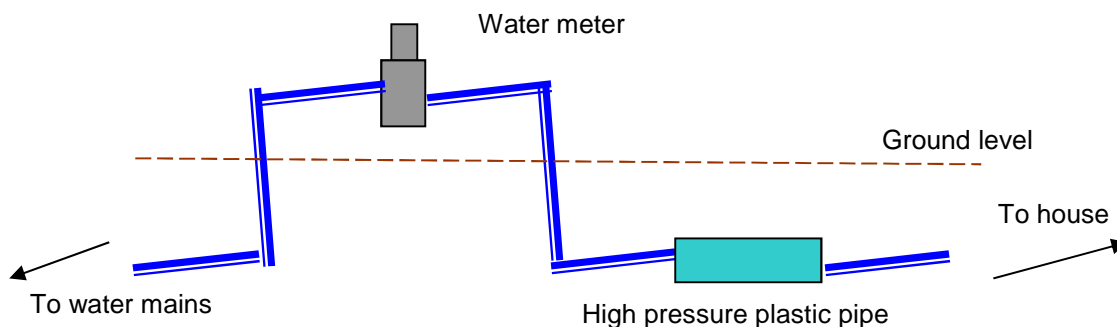
Important !!

This can be corrected by:

- (a) Making a good connection from the earth connection in the switchboard (meter box) to an approved and effective Earth stake.
- (b) Cutting the water pipe near the Water Meter and inserting a short length of high pressure plastic pipe in the line.

It is essential that (a) is performed before (b) and that the cut in the water pipe is made as far from the building as possible. Generally, just before the Water Meter is the best position. The length of the high pressure plastic pipe is not critical but it must be located such that it is not possible to bridge the connection with bare hands. This is imperative. Under some conditions it is possible for lethal voltage to exist across the join.

It is therefore wise to bury the joints under the ground where accidental contact is not possible.



All electrical work must be carried out by a qualified electrician and all plumbing by a registered plumber. Do NOT attempt this work yourself. There are serious legal and safety implications.

With this correction implemented the neutral current will return via the Neutral wire, there will be no current in the water pipe, and the magnetic fields will be considerably reduced. When (a) and (b) are completed the earth connection to the water pipe must remain and not be disconnected. From an electrical safety point of view it is essential to leave it there.

Electricians please note:

1. Check all Neutral connections for effectiveness. If there are any inadequate connections they may overheat once the plastic is inserted in the water pipe.
2. For each installation, ensure there is only one earthing and bonding point. Where sub-boards exist it is quite possible for circulating currents to exist in the water pipes even when the water pipe is electrically separate from the water mains. The earth from sub-boards must be wired back to the main switchboard and then to the single earthing and bonding point.

