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Tuesday 18th June 2019

The Project Manager
Lighthouse Projects Group
56 Berry Street
North Sydney NSW 2060

Attn: Michael Stanton

DAP Woodland – 26 Whistler Street, Manly

To whom it may concern,

We have reviewed the DA Submission dated 07 June 2019 for the site at 26 Whistler Street, Manly to determine if there may be electromagnetic effects from the adjacent Manly Zone Sub-station No. 15009.

Detailed electromagnetic field measurements were taken on the existing site on 24th May 2018 and are recorded in the attached report to DA Properties.

Sub-stations, background:

Electricity sub-stations are used to gather a few incoming high voltage cables and redistribute them at lower voltages to local customers. For this sub-station both the incoming and outgoing cables are run underground and there are no aerial connections. Cables keep the conductors in close proximity to each other and result in lower magnetic fields.

Within the sub-station the cables are separated into separate phase conductors and by various transformations, connections and switching are redistributed to external customers at a lower voltage. The action of splitting the cables into their respective phases results in a significantly higher magnetic field. Also for the same power, at lower voltages, the currents are higher with consequently higher magnetic fields.

Within the sub-station the magnetic fields will be substantially higher than outside. The field decreases significantly with distance so that the fields on the outside walls can be considerably lower. This is particularly the case with older sub-stations where the internal dimensions and spaces are much larger than would be experienced with a modern sub-station.

The Manly zone sub-station is quite old and is more spacious than if it had been built in recent years. Consequently adjacent properties are subjected to much lower magnetic fields.

Measurements:

Detailed measurements are shown in the attached report, which should be read first. Levels 1 and 2 are the only levels affected in any way by the magnetic fields emanating from the sub-station. Readings on the northern wall were taken as close as practicable to the sub-station wall. Allowing for property separations, 20mm, wall thickness of 250mm, and furniture clearance of 100 mm, the nearest anyone could get to the source of fields emitted would be 370mm. For magnetic fields of say 4 milligauss (mG) the field experienced would be approximately 3 mG.

Level 1: The highest readings were along the North boundary of the proposed development, (the South wall of the sub-station). At the Western edge, at floor level, the fields were 4.5 to 3.7 (mG) and at those locations a balcony and stairwell are planned. Travelling further East to Bed 2 the measured level was 3.0 mG reducing to 2.6 and 2.1 mG at waist and head heights respectively. The fields are expected to be slightly less than measured due to increased height of the floor of level 1 and thickness of the dividing wall. Similarly at Bed 1, further east along the wall the fields are 2.3, 2.6 and 2.5 mG. The location of Bed 1 is beyond the rear of the sub-station and any fields are originating from the local area and/or the existing property.

Level 2: Bedroom 1 is located in the same position as Bedroom 1 on Level 1 but is at a higher level above the sub-station and the underground electricity cables in Whistler Street. It will therefore be subjected to lower magnetic fields than level 1 and can be expected to be less than 2 mG.

At the eastern end of the northern wall there were two locations with fields within the range of 7 to 9 mG. These are probably coming from the adjacent building, or wiring to the existing carpark areas, and do not infringe on any habitable area of the proposed development.

General wiring:

Normal wiring practice will ensure there are no excessive fields from internal wiring. The most important advice is to keep the active conductors always running beside the neutral of that circuit. Any separation of actives and neutrals by more than a couple of cm can result in excessive magnetic fields. This is particularly important when sets of lights are controlled by two separate switches, and when supply cables are running between floors.

Wire-wound transformers and ballasts for fluorescent lights can result in high localised fields generally felt on the floor above. Solid state ballasts, which are mainly used now, do not create this problem.

The main electricity distribution board needs to be located away from habitable areas that may exist above.

Electric fields have not been considered a problem for this development. They were checked in the original measurements and were found to be negligible. Electric fields dissipate to earth very quickly and are not an issue in normal wiring. When power outlets are placed on either side of a bedhead, however, elevated electric fields can exist. In that case, make the connecting wires run at some level other than pillow height. (Floor level, or vertical drops. In all other cases no action is necessary.

Conclusion.

The architectural design of the proposed development has ensured that all habitable areas, where people may spend extended times, are located away from the few areas where moderately high levels of field may exist. Measurements were all taken during the highest loadings of the day and are expected to drop by at least 30% during the evening and night when people are sleeping. We are informed there are no plans to expand the capacity of the Manly electricity sub-station and we can assume there will be no significant changes in output of the sub-station in the future.

Yours sincerely

A handwritten signature in black ink, appearing to read 'WJ Lincoln', is centered on a light blue rectangular background.

WJ Lincoln B.E. Elect.

Attachments:

Report to DA Properties dated 24 May 2018
Sketch 1, measured fields at Ground Level
Sketch 2, measured fields at Level 1



www.emrsurveys.com.au
24 May 2018

DA Properties
PO Box 329
Manly NSW 1655

Attn: David Allen

Dear David

26 Whistler Street, Manly NSW

Thank you for the opportunity to conduct an electromagnetic survey at 26 Whistler Street Manly.

In this survey, we have measured the magnetic fields from the adjoining electricity sub-station (Manly Zone No. 15009), underground cables external to the property, and local wiring within the existing car-parking area, at ground level and the residential open space, on the 1st level..

These measurements are provided, together with relevant recommendations on attached sheets.

Power frequency electromagnetic fields (ELF)

Power frequency electromagnetic fields are emitted by electrical wiring and equipment such as power lines, household 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 line. It is measured in units of milligauss (mG) and is present whenever an appliance is turned on.

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). There were no significant electric fields measured and these have not been recorded.

Safe levels.

The International Commission for Non-Ionising Radiation and Protection Guidelines (ICNIRP) endorsed by World Health Organisation allow general public exposure to magnetic fields of 2000 milligauss (mG) and electric fields of 5000 Volts/metre (V/m) for short-term exposure. The Australian guidelines of the National Health and Medical Research Council (NHMRC) allow general public exposure to 1000 mG and 5000 V/m for short-term exposure.

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. In my experience over more than 25 years, some adverse health effects may be observed after continuous daily exposure of six to eight hours per day, every day, for at least a year in the case of children, and many more years in the case of adults.

We would recommend spot day-time levels be not more than 3 milligauss for continuous exposure in living and frequently habited areas. Levels above 5 milligauss would require investigation and rectification.

Test method.

Magnetic fields were measured at all accessible locations on the ground and first floors taking particular notice at the electricity sub-station boundaries.

The magnetic fields were measured with a magnetic field meter at floor level, 1 metre and 2 metre heights.

Measurements were taken in the middle of the afternoon when electricity for commercial areas would be at maximum useage.

Results.

ELF (power frequency).

The highest magnetic field levels were measured external to 26 Whistler Street at the footpath outside the front of the sub-station and on Whistler Street roadway adjacent to the footpath. Those fields would be generated by underground cables feeding to or from the electricity sub-station. The fields decreased by a factor of ten moving towards the property boundary of 26 Whistler Street.

Measurements taken within the existing car-park at ground level, showed moderately elevated fields along the boundary wall of the sub-station decreasing in strength proceeding away from the wall. At 5 metres from the sub-station wall the level of magnetic fields was insignificant.

At level 1 of the existing residential level, the magnetic fields were even lower, with one exception. At approximately the centre of the sub-station wall the magnetic fields at a single location, were 12.4 milligauss, however these also decreased to insignificant levels within the proposed residential area of the property.

Comments.

Despite the proximity to the electricity sub-station there were no significant magnetic fields measured within the area of the proposed development. It was only possible to take measurements up to the height of the existing sub-station, level 1, whereas the proposed property will extend to 7 levels. Any fields, at distance, decrease with approximately the square of the distance. There is therefore no possibility the sub-station fields will have any effect at levels two to six.

At ground and level one, there were a few locations where the magnetic fields were in excess of 3 milligauss and those areas would be quite suitable for car-parking as planned.

The sub-station is an early design where there was sufficient space to keep the electric currents, and therefore the resultant fields, away from external walls. There are much higher fields on the roadway away from the sub-station.

Yours sincerely



WJ Lincoln B.E. Elect.

EMR Surveys Pty Ltd.

Magnetic field measurements at 26 Whistler Street, Manly.

All measurements on the attached sketches are in milligauss.

Key:



