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**Report No. 50816**

**Electromagnetic Radiation Survey  
of the  
Minto Urban Renewal Project**

**for  
Landcom**

**by**

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**Signed :**



9/09/2005

**NATA Signatory**

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# Electromagnetic Radiation Survey of the Minto Urban Renewal Project

## 1. INTRODUCTION

A study of the electromagnetic environment on existing residential and rural land at Minto was performed to determine the impact on the Minto urban development proposed by Landcom.

The electromagnetic radiation (EMR) levels over the entire redevelopment site emanating from the Mobile Phone Base Transceiver Site (BTS) on the adjacent Sydney Water land, Eagleview Road, Minto and all other fixed radio transmitter installations in the vicinity of the development area were measured. The power flux densities were calculated and the cumulative power flux density due to all base station transmitters at each measurement location was determined.

An assessment of the likely impact of these EMR levels within the terms of the Campbelltown City Council Development Control Plan No. 107 (Siting of Communication Facilities, Telecommunication towers) Part 1, paragraph 12 – Electromagnetic Radiation was determined.

## 2. SUMMARY

***The combined EMR of all existing radiocommunications transmitters at selected measured locations within the Minto urban development project were less than 30% of the Campbelltown City Council Development Control Plan No. 107 requirements for siting of communication facilities. These levels also comply with the ACAs regulations on human exposure to radiofrequency electromagnetic energy.***

## 3. SCOPE

### 3.1 *Locale and Requirements*

The proposed Minto urban development is a major renewal of the suburb of Minto, this includes the development of land previously not built upon. The main BTS of concern is located on the Sydney Water Reservoir Site, Eagleview Road, Minto situated between proposed development sites S3a and S3b. A comprehensive survey was also to be conducted to determine whether other RF sources existed in or near the proposed development that would impact upon it.

Measurements were to be performed at various locations covering the entire Minto urban development infrastructure where the highest emissions would occur.

### 3.2 *Campbelltown City Council Requirements - Electromagnetic Radiation*

Campbelltown City Council Development Control Plan No. 107 "Siting of Communication Facilities (telecommunication Towers)" Part 1 paragraph 12 Electromagnetic Radiation states:

Communication facilities should meet the following precautionary siting requirements:

- not within 300 metres from any residential dwelling unless the annual average exposure at the nearest residential dwelling is less than  $0.2 \text{ uW/cm}^2$
- not within 300 metres from any school, childcare centre, hospital or aged care centre and the annual average exposure at these land uses must be less than  $0.2 \text{ uW/cm}^2$



The measure of power flux density is a cumulative measure of emissions from all facilities on a site. Siting should also take into account likely future adjoining land uses.

#### 4. POTENTIALLY IMPACTING RF SOURCES

A survey of the area and a search of records was undertaken to identify all radiocommunication transmitters in the vicinity, both existing and proposed which could potentially impact on the development site. Seven sites were identified, all were of mobile phone transmitters colloquially known as base transceiver sites (BTSs), six of these are recorded on the Radio Frequency National Site Archive and are listed below:

<b>NSA* Site No.</b>	<b>Address</b>
<u>2566001</u>	20-21 Airds Road MINTO (no facility established as yet)
<u>2566002</u>	20 Sweettenham Road MINTO (under construction - not operational)
<u>2566003</u>	METALCORP (Optus Tower) 56 Somerset Street MINTO
<u>2566005</u>	Cnr Alderney Street and Townson Way MINTO (not active)
<u>2566006</u>	Eagleview Road MINTO
<u>2566007</u>	1 Reaghs Farm Road MINTO (not operational)

\* The Radio Frequency National Site Archive is maintained by the Mobile Carriers Forum

Of these sites the Optus GSM site, S1422 'Minto South', a Guyed mast located within the State Emergency Services Compound at the corner of Alderney Street & Townson Way was determined to have the greatest potential to impact on the development area. This site was to be established in December 2004 but may not have become operational. Optus has since decided to relocate this facility to local Factory Outlets, 1 Reaghs Farm Road MINTO, where the impact will be far less. At the present time, the SES site is inactive and should remain inactive as there is no physical infrastructure on site. The impact of the Optus site located in the Integral Energy property in Sark Grove on the proposed redevelopment has been included in our assessment. This site however was not listed in the National Site Archive.

Of the remaining sites, the greatest impact is expected to come from the transmissions of the Optus and Telstra transmitters on a tower in the Sydney Water reserve located in Eagleview Road with the Telstra transmitters being the greater. Transmissions from all of the above operational sites will contribute to the overall electromagnetic radiation (EMR) that will be incident at any one location within the development area. The contributions from all these transmitters to the ambient electromagnetic field at key locations was measured and are given in Table 1. Those sites which are not operational will be required by Council to meet the requirements of its Development Control Plan in due course and have been disregarded for the purposes of this report. Those sites classified as Low Impact under Federal Legislation and which do not require a Development Application, are not compelled to satisfy Council's requirements. No information was available on which of the proposed sites would fall into this latter category.

Figure 3 shows the locations of the above sites that are operational, under construction and proposed.



## 5. DATE AND LOCATION OF MEASUREMENTS

Measurements were taken at selected locations covering the entire Minto urban development site where it was determined the EMR levels produced would be highest.

The tests were performed on the 19<sup>th</sup> and 31<sup>st</sup> of August 2005 at the locations shown in Figure 2. All measurements were made at a height of 1.5 metres above ground level and at positions where there was line of sight to the base station and therefore least obstruction to emissions.

## 6. MEASUREMENT METHODOLOGY

Detailed measurements were performed over the range of 800 to 960 MHz and 1800 to 2100 MHz, the frequency bands in which the mobile phone transmitters were operating. The highest level at each site was recorded. In each case, this was the peak field strength reading observed over several minutes. At the time of the measurements, not all GSM transmitters in each sector were operational (see Note below).

The highest field strength reading of those transmitters operational at the time were used to calculate the maximum and average power flux density that may be expected when all transmitters are operating at their full capacity, from this figure the annual average was deduced.

### *Note:*

*Mobile phone base station transmitters operate at a power proportional to the number of calls being directed through the base station. The peak periods occur during the morning and evening vehicular traffic peaks, at other times the power transmitted is comparatively low especially in the late evening and early morning.*

*The transmissions from each BTS are usually distributed over three sectors (typically 0-120, 120-270 and 270-360 degrees in azimuth). Each sector has one or more transmitters which are brought into operation as required to meet the variations in demand.*

*The RF power radiated from GSM transmitters is proportional to the number of channels in use (that is the number of calls being made) and is directly related to demand. A control channel is transmitted continuously in each sector at full power which is measured and used to determine the worst case scenario and by extrapolation the expected average power.*

*CDMA transmitters vary their power transmitted in a similar manner, however the maximum is not as readily determined. In practice it is necessary to choose those periods of the day when usage is greater to gauge a typical transmitted power. It has been found that a measurement of the power transmitted during business hours provides a figure which is a conservative estimate of the average. As this approach gives an over estimate, the resulting figure has become acceptable for determining compliance with Councils Guidelines.*

## 7. EQUIPMENT USED

For EMR measurements, a RF spectrum analyser and associated antennas were used, these equipments are listed below.

- Spectrum analyzer MS 2711A
- Dipole antennas MP 651B

The calibration of the above equipment was currently valid. The uncertainty of the measurements performed was estimated not to exceed  $\pm 3$  dB.



## 8. MEASUREMENT RESULTS

### *Cumulative Levels of all BTS's*

The measured power flux densities produced by all BTS's is given in Table 1. The highest annual average measured level was  $0.06 \text{ uW/cm}^2$  taken within S3b to the north of the existing BTS within the Sydney Water Reservoir site (Location 2).

## 9. ASSESSMENT OF THE MEASUREMENTS

The dominant radio frequency fields throughout the area were of GSM and CDMA mobile phone base station emissions. The existing levels of the radio frequency radiated fields at 1.5 metres above ground all measurement locations was below the maximum annual average exposure set down in Campbelltown City Council Development Control Plan No. 107. The highest cumulative power flux density of  $0.06 \text{ uW/cm}^2$  is 30% of the allowable limit and therefore complies with the Campbelltown City Council Development Control Plan No. 107 regulations on human exposure to radiofrequency electromagnetic energy.

*Note: For the purposes of this report, the annual average for the GSM emissions measured was taken to be 40% of the peak power or the maximum average power, the actual annual average will be less. The CDMA measurements were taken at a time of typical activity and are expected to be a reasonable representation of the annual average. The cumulative annual average given herein is the sum of these two levels. At all locations the measured levels of CDMA were substantially less than the GSM 'annual average'.*



**Table 1**

**Measured Annual Average EMR  
due to all BTS's within the  
Minto Urban Renewal Project**

<b>No.</b>	<b>Total Annual Average (<math>\mu\text{W}/\text{cm}^2</math>)<sup>(2)</sup></b>	<b>% of Campbelltown Council DCP 107<sup>(3)</sup></b>
<b>1</b>	0.0067	<b>3.4</b>
<b>2</b>	0.06	<b>30</b>
<b>3</b>	0.0012	<b>0.6</b>
<b>4</b>	0.019	<b>9.5</b>
<b>5</b>	0.019	<b>9.5</b>
<b>6</b>	0.017	<b>8.5</b>
<b>7</b>	0.00000012	<b>0.00006</b>
<b>8</b>	0.000044	<b>0.022</b>
<b>9</b>	0.000008	<b>0.004</b>
<b>10</b>	0.000084	<b>0.042</b>
<b>11</b>	0.0011	<b>0.55</b>
<b>12</b>	0.000088	<b>0.044</b>
<b>13</b>	0.00069	<b>0.35</b>
<b>14</b>	0.0064	<b>3.2</b>
<b>15</b>	0.017	<b>8.5</b>

- Notes:
1. Where the values are small, rounding to 1 or 2 significant digits has been applied for ease of reading.
  2. "Watts per square Metre" -  $\text{W}/\text{m}^2$  are the International (SI) and legal units of power flux density. Some users prefer the superseded CGS units of "milliwatts per square centimetre" -  $\text{mW}/\text{cm}^2$ , or "microwatts per square centimetre"  $\mu\text{W}/\text{cm}^2$ .
  3. Annual Average expressed as a percentage of the Campbelltown City Council Development Control Plan No. 107 limit of  $0.2 \mu\text{W}/\text{cm}^2$ .





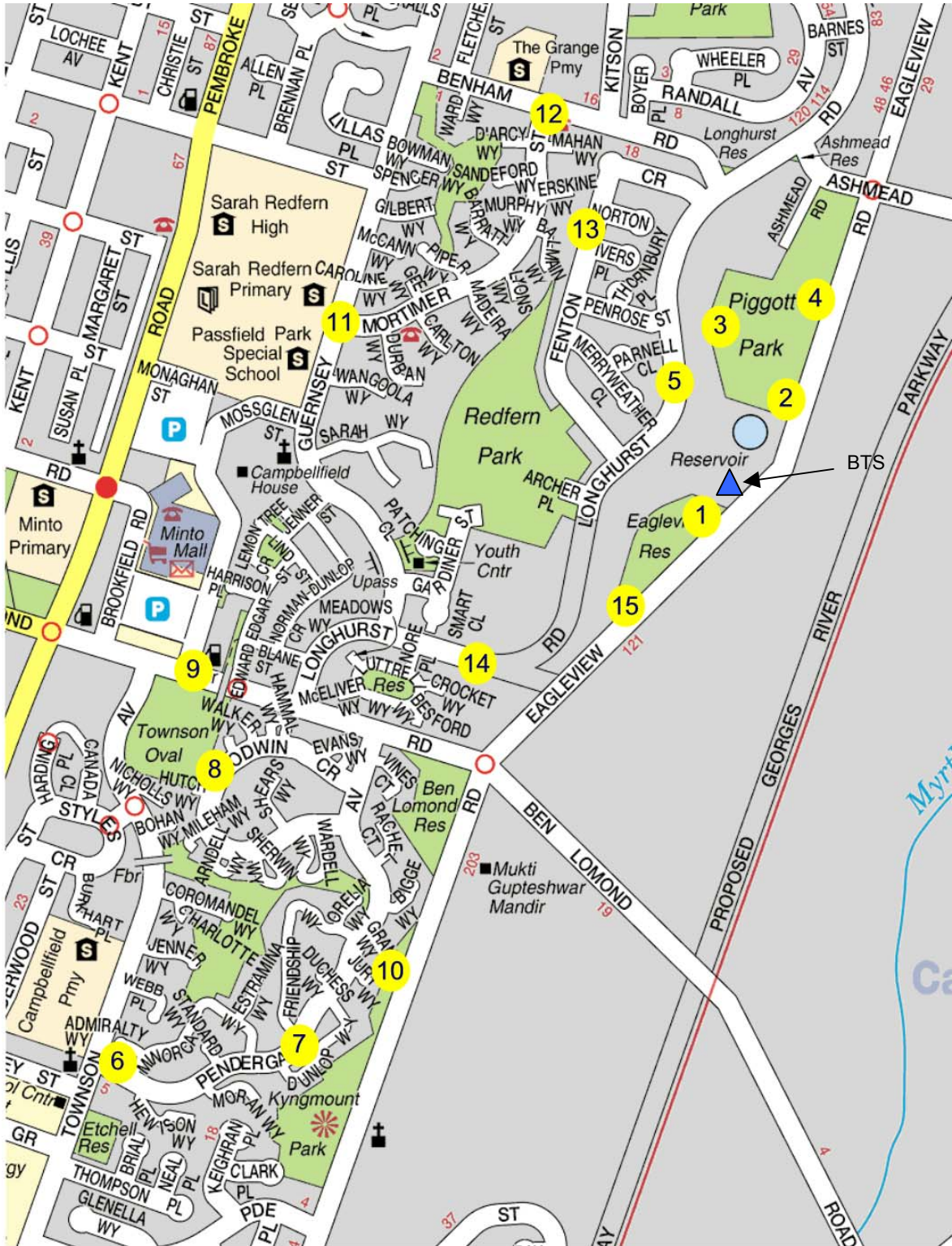


Figure 2.

Measurement Locations within Minto Urban Renewal Project



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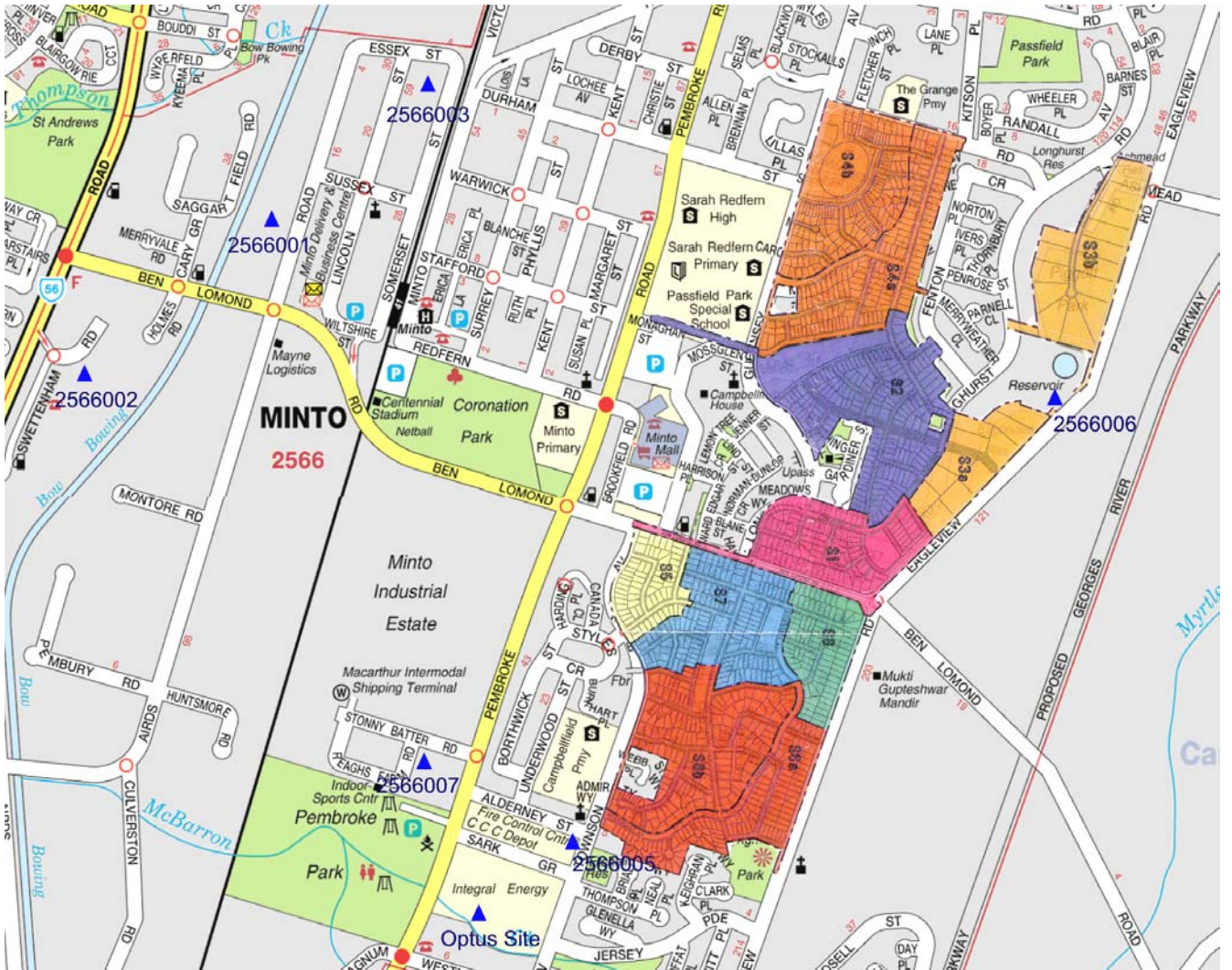


Figure 3.

**Mobile Phone Base Station Locations in the vicinity of the Minto Urban Renewal Project**

