



Hamilton

# INFORMATION REPORT

**CITY WIDE  
IMPLICATIONS**

<b>To:</b>	Mayor and Members Board of Health		
<b>From:</b>	Elizabeth Richardson, MD, MHSc, FRCP Medical Officer of Health Public Health Services	<b>Telephone:</b> <b>Facsimile:</b> <b>E-mail:</b>	(905) 546-2424 x3501 (905) 546-4075 erichard@hamilton.ca
<b>Date:</b>	June 10, 2008		
<b>Re:</b>	<b>Health Risk Associated with Cell Phone Towers - BOH08013 (City Wide)</b>		

## **Council Direction:**

That Public Health Services staff be directed to report back to the Board of Health on the potential health impacts that cell phone towers may pose to the public.

## **Information:**

### Wireless Communication Technology

Cell phones and personal communications service (PCS) devices, (eg. a Blackberry unit) rely on a network of fixed antennas, or cell towers, to relay information between users. The rapid proliferation of wireless communication technologies over the past decade has led to questions being raised about the potential health impacts of ubiquitous energy fields associated with these technologies. There are approximately 8,000 cell towers in all of Canada, where 40% of towers are located on existing structures (eg. buildings) and 60% are located on purpose-built towers. There are approximately 140 locations with cell towers in the City of Hamilton. It is expected that as new generation technology becomes available, the demand for service coverage will only increase as public reliance on wireless communications increases.

### Exposure to Radiofrequency Fields

Wireless communication devices use radio frequency (RF) energy to transmit data. RF energy is a form of non-ionizing energy, meaning that it is below visible light on the electromagnetic energy spectrum and is generally considered to be not harmful to humans. Ionizing forms of energy such as ultraviolet radiation and gamma and x-rays

are above visible light on the electromagnetic spectrum and are known to be harmful to humans.

It is important to recognize that in the City of Hamilton, the public is exposed to RF fields from a variety of sources. In addition to cellular communication towers, television, radio, emergency responders (police, fire, EMS), taxi companies, pager services, couriers, wireless local area networks (WLANs), all utilize RF energy to allow communication to occur. The World Health Organization points out that due to their lower frequency, at similar RF exposure levels, the body absorbs up to five times more of the signal from FM radio and television than from cell towers. Further, radio and television broadcast stations have been in operation for the past 50 or more years without any adverse health consequence being established.

RF energy is strongest at its source, and rapidly diminishes with distance. Recent surveys have indicated that RF exposures from cell towers and wireless technologies in publicly accessible areas (including schools and hospitals) are normally thousands of times below current safety standards. In 2002, Industry Canada conducted a study examining the level of RF energy in the City of Toronto, where the highest concentration of radio systems exists in Canada. The study took measurements at over 60 locations and found that on average, RF levels were 705 times less than Canadian federal safety standards (Safety Code 6) allow. The site with the highest radio frequency level was located between Metro Hall and Roy Thompson Hall and was still found to be 16 times less than the Safety Code 6 limit. Further analysis of the data determined that the ten sites classified as residential, were on average 7194 times less than the Safety Code 6 limit.

### Health concerns

A common concern about cell towers relates to the possible long-term health effects that whole-body exposure to RF signals may have. The World Health Organization reports that to date, the only health effect from RF fields identified in scientific reviews has been related to an increase in body temperature from exposure at very high field intensity found only in certain industrial facilities. The levels of RF exposure from cell towers and wireless networks are so low that the temperature increases are insignificant and do not affect human health.

It is not disputed that electromagnetic fields above certain levels can trigger biological effects. A biological effect occurs when a change can be measured in a biological system after an introduction of some type of stimuli (e.g. RF energy). However, the observation of a biological effect does not necessarily suggest the existence of a health effect. A biological effect only becomes a health hazard when it causes detectable impairment of health. Experiments with healthy volunteers indicate that short-term exposure to electromagnetic fields at the levels present in the environment or in the home do not cause any apparent detrimental effects. Exposures to higher levels that might be harmful are restricted by national and international guidelines. The current debate is centred on whether long-term low level exposure can evoke biological responses and influence people's well being.

Media or anecdotal reports of cancer clusters around cell towers have at times heightened public concern. It should be noted that geographically, cancers are unevenly distributed among any population. Given the widespread presence of cell towers in the environment, it is expected that possible cancer clusters will occur near cell towers merely by chance. Moreover, the reported cancers in these clusters are often a collection of different types of cancer with no common characteristics and hence unlikely to have a common cause. Scientific evidence on the distribution of cancer in the population can be obtained through carefully planned and executed epidemiological studies. Over the past 15 years, studies examining a potential relationship between RF transmitters and cancer have been published. These studies have not provided evidence that RF exposure from the transmitters increases the risk of cancer. Likewise, long-term animal studies have not established an increased risk of cancer from exposure to RF fields, even at levels that are much higher than produced by cell towers and wireless networks.

Some individuals have reported experiencing non-specific symptoms upon exposure to RF fields emitted from cell towers and other electromagnetic field devices. The World Health Organization describes these individuals as possessing "Electromagnetic Hypersensitivity" (EHS). Electromagnetic hypersensitivity (EHS) is characterized by a variety of non-specific symptoms that differ among individuals. Symptoms most commonly experienced include dermatological symptoms (redness, tingling, and burning sensations) as well as fatigue, tiredness, concentration difficulties, dizziness, nausea, heart palpitation, and digestive disturbances. The collection of symptoms is not part of any recognized syndrome. Although electromagnetic fields have not been shown to cause such symptoms, the symptoms are certainly real and can vary widely in their severity. Whatever its cause, EHS can be a disabling problem for the affected individual. EHS has no clear diagnostic criteria and there is no scientific basis to link EHS symptoms to electromagnetic field exposure. Further, EHS is not a medical diagnosis, nor is it clear that it represents any medical problem.

From all evidence accumulated so far, no adverse short or long-term health effects have been shown to occur from the RF signals produced by cell towers. Since wireless networks (WLAN's) produce generally lower RF signals than cell towers, no adverse health effects are expected from exposure to them.

#### Canadian Safety Standards

The legislative authority to regulate the siting and installation of cell towers is a matter of federal jurisdiction. Industry Canada is the federal agency responsible for regulating radio communication in Canada, which includes authorizing the installation of cell towers. Health Canada has developed a series of standards and guidelines regarding the operation and use of devices that emit electromagnetic fields. The guideline that applies to mobile phones, cell towers and all other RF transmitters is Safety Code 6 - *Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 KHZ to 300 GHZ.*

The limits specified in Safety Code 6 were established from the results of hundreds of studies over the past several decades where the effects of RF energy on biological organisms were examined, including peer-reviewed literature from reputable scientific journals, whose peer-review panels are experts in this subject area. Information published in non peer-reviewed journals or anecdotal reports posted on the internet carry much less weight because it is difficult to evaluate the quality of the work.

The limits established in Safety Code 6 are based on the lowest exposure level at which potential harmful effects to humans could occur. Safety factors were then incorporated to arrive at recommended exposure levels for protection of the general public and personnel working in the RF environment. These limits are similar to other national and international standards that are based on established effects, including the International Commission for Non-Ionizing Radiation Protection (ICNIRP).

### Other Jurisdictions

In November 2007, Toronto Public Health recommended a “prudent avoidance policy that RF waves from telecommunication towers and antennas be 100 times below Safety Code 6 in areas where people normally spend time”. The recommendation goes on to confirm that Industry Canada monitoring data shows that this safety level is readily met. Toronto Public Health cites concerns that current guidelines (Safety Code 6) may not be health protective for lifetime, continuous exposure, and that other jurisdictions, such as Italy and Switzerland, have adopted stricter limits than those defined by Safety Code 6.

Dr. Art Thansandote of Health Canada’s Consumer and Clinical Radiation Protection Bureau informed Hamilton Public Health Services staff that with respect to cellular tower emissions, precautionary steps to limit one’s exposure would appear to be unnecessary, given that worst case exposure levels are typically thousands of times below the Safety Code 6 limits as well as the common European standard (ICNIRP). These exposure levels would also be lower than a number of precautionary limits such as the one proposed by the Toronto Board of Health, Switzerland’s Installation Limit Value and the Italian Attention and Quality Goals.

Not all standards throughout the world have the same recommended exposure limits; some are more stringent than others. The variation between recommended limits may be attributed to differences in the philosophy, the methodology and the interpretation of scientific data used for standard development. However, recognized exposure standards that are based on established effects should be distinguished from some municipal and/or regional guidelines that are based on socio-political considerations.

There is no scientific basis to support a conclusion that individuals living in communities with more stringent exposure standards, than those in Safety Code 6, receive a greater level of protection.

### Future Research

Health Canada has been taking part in the International Electromagnetic Fields Project, coordinated by the World Health Organization. The goals of this project are to verify

reported biological effects from electromagnetic fields and to characterize any associated health risks to humans. The International EMF project recognizes the gaps in knowledge that exist surrounding health effects related to RF field exposure and has promoted research to fill these gaps. The International Agency for Research on Cancer (IARC) is expected to conduct a review of cancer risk from RF fields in 2006-2007 and the International EMF Project will then undertake an overall health risk assessment for RF fields in 2007-2008.

### Planning and Economic Development Considerations

Radiocommunication facilities are exclusively governed by Federal legislation and administered by Industry Canada. Provincial legislation such as the Ontario Building Code Act and the Planning Act including zoning by-laws and site plan control do not apply to these facilities.

Since amalgamation, the City of Hamilton has relied on an informal protocol with the three major wireless telecommunication service providers namely Bell Mobility, Telus and Roger's whereby they have all voluntarily agreed to follow the City's site plan approvals process and to obtain Building Permits. While the site plan control process is not subject to public notification or consultation, copies of all applications are circulated to the respective Ward Councilor for their review and identification of potential controversial sites.

Until now, staff has historically evaluated these facilities from a land use compatibility perspective and to minimize the potential visual impacts these facilities will have on abutting and future developments. At the same time, staff recognizes the need to balance the land use compatibility issue with the increasing public demand for consistent, reliable service and uniform coverage within our community. Inevitably, an increased number of installations are required to ensure that there is sufficient capacity in the network to meet this demand.

Last June, Industry Canada released a new procedure for the siting and approval of new Radiocommunication and Broadcasting Antenna Systems. These procedures came into effect on January 1, 2008. The new procedures were aimed at ensuring greater public consultation in the determination of new telecommunication systems across Canada. The main change involves a clearer process for public notification and consultation which was not part of the licensing process under the previous procedures. While the inclusion of a public consultation process affords the City with an opportunity to influence the location of telecommunication facilities, it does not give the municipality the right to regulate these installations.

Before a license is issued, proponents must now contact the municipality unless their proposal is exempted under certain criteria. If not, the proponent must follow the municipality's public consultation process if one exists. If not, the proponent must follow the new process under Industry Canada's Default Public Consultation Process. Since the City of Hamilton does not have an established and documented public consultation process for telecommunication facilities, the default process would apply.

While Industry Canada's process incorporates some key elements of Hamilton's Public Participation Policy, it does not adequately ensure that the proponents adhere to our site plan process, including the payment of processing fees, obtaining Building Permits and specifically excludes matters related to public safety (Safety Code 6), impact on property taxes or questions concerning the validity of Industry Canada's Default Process. Beyond these concerns, Industry Canada also expects all land use consultation will be completed within 120 days from the proponent's initial formal contact with the municipality.

Regardless of which public consultation process is followed, all decisions may be appealed to Industry Canada and they will determine an appropriate course of action.

Staff from Planning and Economic Development has informed PHS staff that a detailed report regarding public consultation process options and the siting of radio-communication structures will be submitted to the Economic Development and Planning Committee in the future.

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Medical Officer of Health  
Public Health Services



Hamilton

**Health Risk and Cell Towers**

**BOH08013**

**July 9, 2008**

# Wireless Communication Technology

- 140 Cellular base stations (“Cell Towers”) identified in Hamilton
- Cellular base stations may be placed on existing structures or on purpose-built towers.













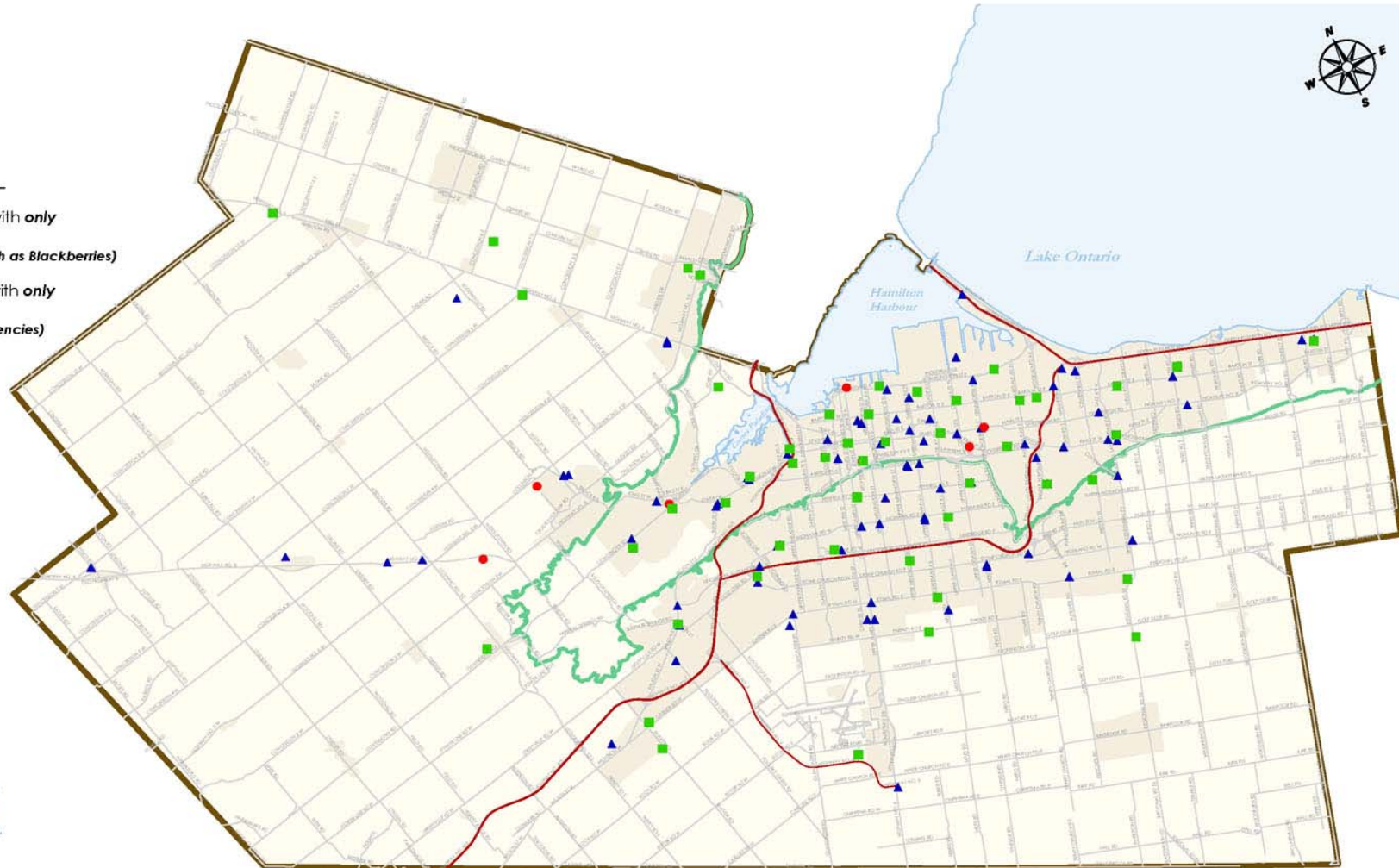
Hamilton

# Environmental Health

## Radio Tower locations in the City of Hamilton

### LEGEND

-  Radio tower locations with **only** 1930 - 1990 MHz (82) (typically PCS devices, such as Blackberries)
-  Radio tower locations with **only** 830 - 890 MHz (7) (standard cell phone frequencies)
-  Radio tower locations with **both** 830 - 890 MHz and 1930 - 1990 MHz frequency ranges (51)
-  Major highways
-  Major roads
-  Escarpment
-  Urban area
-  City boundary



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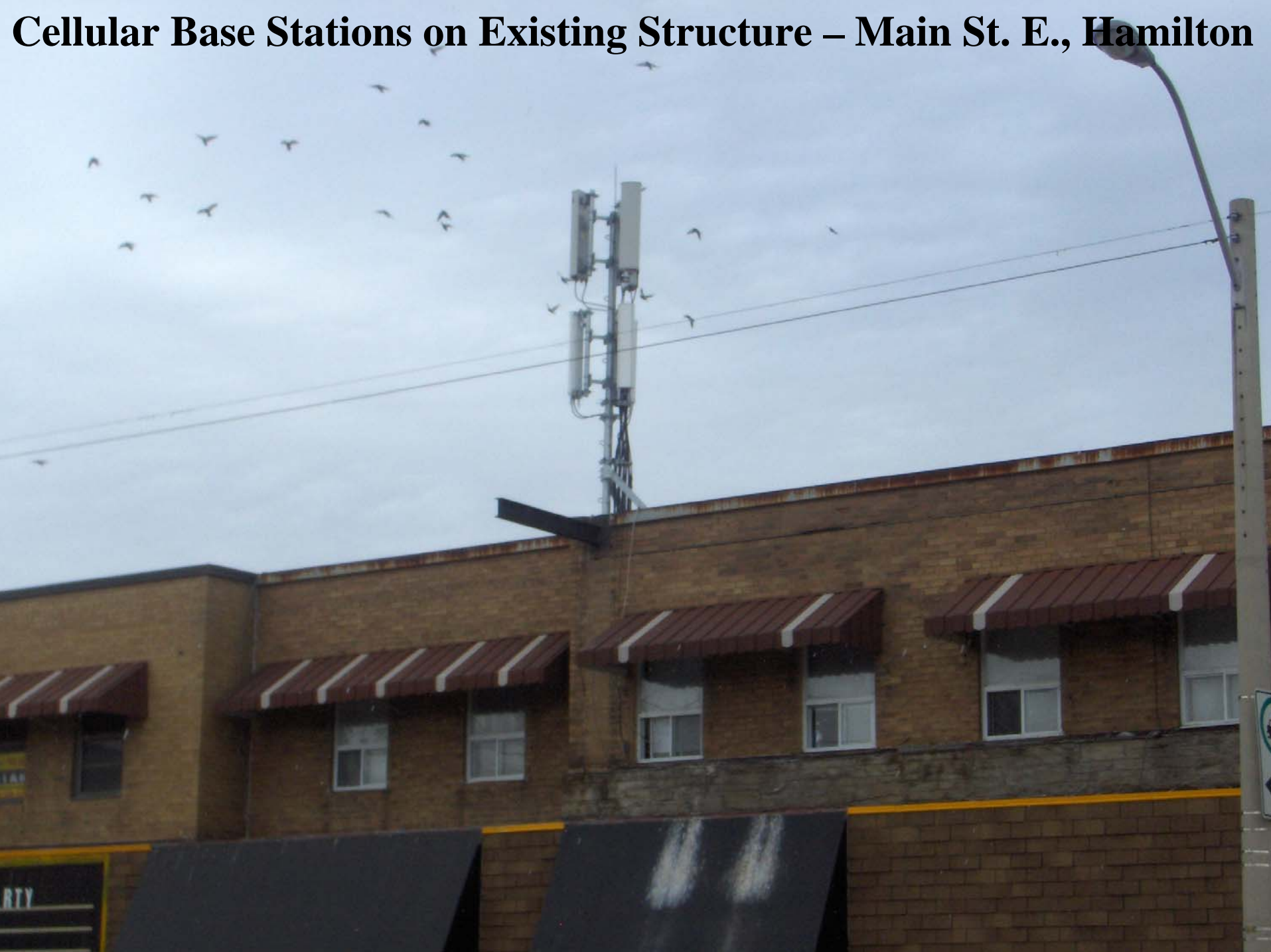
# Cellular Base Stations on a Purpose-Built Tower – Frid St., Hamilton



# Cellular Base Stations on a Purpose-Built Tower – Oliver St., Hamilton



# Cellular Base Stations on Existing Structure – Main St. E., Hamilton

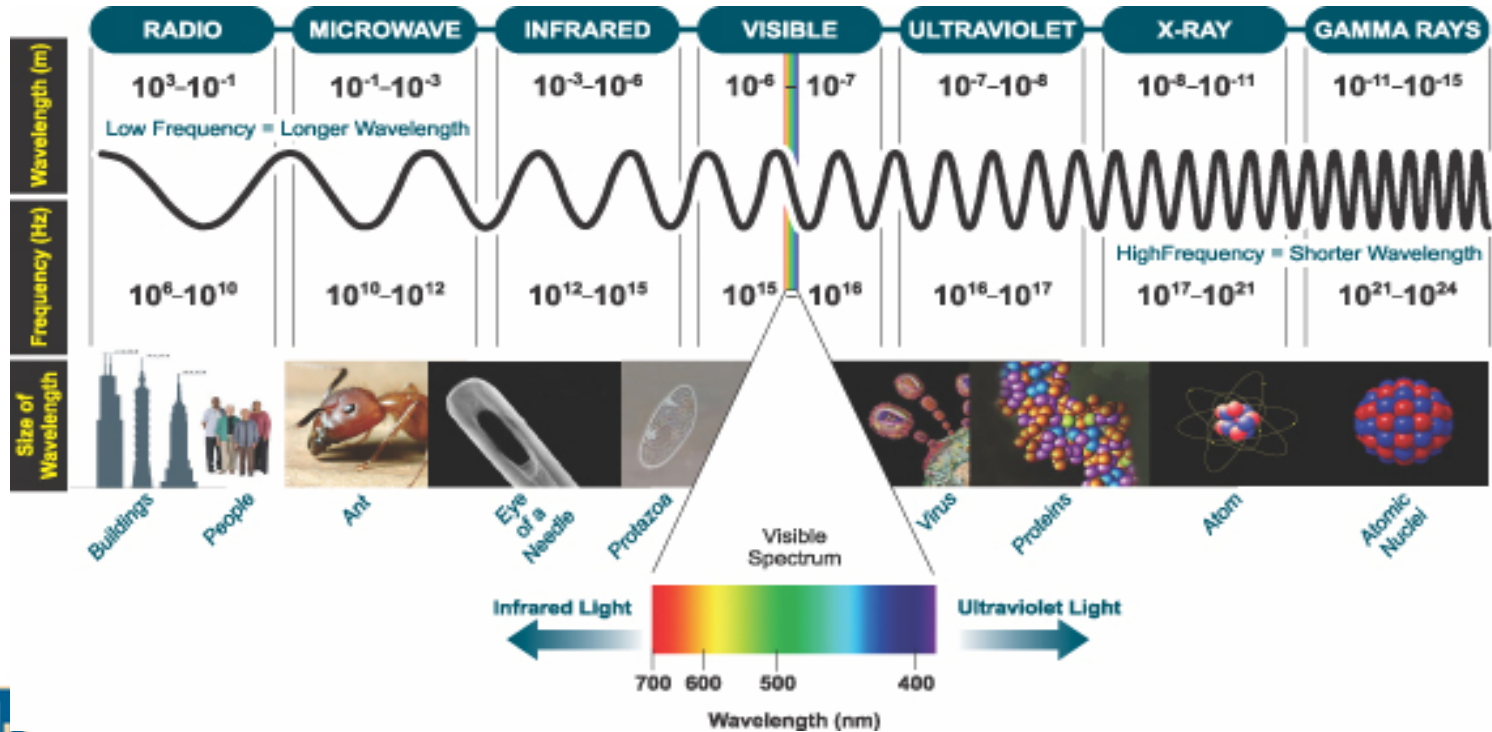


# Exposure to Radio Frequency Energy

- Wireless communication occurs when information is relayed using Radio Frequency (RF) energy
- RF energy has a lower frequency than visible light (meaning it has less energy)
- RF energy is a form of “non-ionizing” energy
- Non-ionizing energy is generally regarded as being non-injurious to human health



# Exposure to Radio Frequency Energy



# Exposure to Radio Frequency Energy

- In addition to cell towers, RF Energy is also used by Emergency Responders (police, fire, EMS), media broadcasting (television, radio) taxi companies, couriers, and wireless internet antennae
- RF energy is strongest at its source, and rapidly diminishes with distance



# Health Effects

- Biological Effect VS. Health Effect
- RF energy may stimulate a biological response that does not necessarily represent a health effect
- The World Health Organization reports that *“No study has shown adverse health effects from radio frequency exposure levels below international guideline limits”*



# Health Effects

- Some individuals report experiencing non-specific symptoms (e.g., headache, fatigue, skin irritation) from being exposed to RF energy
- These individuals are characterized as having “Electromagnetic Hypersensitivity” (EHS)
- EHS is not a medical diagnosis, nor is it understood to represent any medical problem



# Health Effects

- Most public concern surrounding exposure to RF energy is related to potential long-term effects
- International EMF Project conducts ongoing research and scientific reviews to identify potential health impacts
- *“No recent review of research concludes that exposure to RF energy causes any adverse health consequence”*



# Canadian Jurisdiction and Safety Standards

- Health Canada has developed “Safety Code 6” which sets limits for RF energy exposure to humans
- Industry Canada is responsible for regulating cell tower installations in Canada
- Industry Canada has made compliance with Safety Code 6 mandatory as a condition of licensing

