

February 17, 2017

Jessica McDonald
BC Hydro, President & CEO
Via e-mail: Jessica.McDonald@bchydro.com

Sadhu Johnston, City Manager
City of Vancouver
Via e-mail: Sadhu.Johnston@vancouver.ca

Scott Robinson, Superintendent of Schools
Vancouver School Board
Via e-mail: smrobinson@vsb.bc.ca

Malcolm Bromley, General Manager
Vancouver Board of Parks and Recreation
Via e-mail: pbgmo@vancouver.ca

Dear Ms. McDonald,
Mr. Johnston,
Mr. Robinson,
Mr. Bromley:

RE: BC Hydro seed project

I am writing to share with you the findings from the independent assessment which my office undertook regarding the proposed BC Hydro **seed** project. Towards the end of January 2017, my office was asked to comment on the proposed project by both BC Hydro and the City of Vancouver. Given that the proposal is likely to raise public interest and concern, I directed my staff to assess the proposal under section 73(3)(a) of the BC Public Health Act, which obligates the Medical Health Officer to “advise, in an independent manner, authorities and local governments within the designated area on public health issues, including health promotion and health protection”. In addition, one of my team of Medical Health Officers is the designated School Medical Officer for the Vancouver School Board in accordance to section 89 of the School Act. Further, section 90 of the School Act requires the School Medical Officer to ascertain whether a school building or its surrounding may put the students’ health and safety at risk. With this context in mind, we offer our comments and recommendations below.

Overall Impressions

The information that BC Hydro provided to us and the public is conceptual in nature. Our assessment is therefore about the feasibility of the **seed** project as a concept from a public health perspective. Our sources of information on the proposal are the public engagement discussion guide, and the commissioned Stantec report and appendices.

- The BC Hydro **seed** concept is an innovative approach to investing in infrastructure upgrade in a densely populated city centre, with minimal above ground footprint while at the same time offering opportunities to upgrade other important infrastructures (e.g. schools and parks) in the city.
- The **seed** concept can be accomplished in principle without significant negative public health impact. Decisions on design details and construction phasing will be critical in order to minimize the negative and maximize the positive health impacts.
- While minimizing the public's exposure to the electromagnetic field (EMF) will be important, there are also other important population health considerations. For example ensuring that the final built environments from this project facilitate healthy living for the surrounding residents and park users.
- Continued meaningful public engagement throughout the project stages is not only best practice but will be key to the project's success.
- Post construction monitoring and evaluation will be important to confirm the adequacy of mitigation strategies. They will also provide valuable background information should similar projects be contemplated elsewhere in BC.

Electromagnetic Fields (EMF)

The generation, transmission and distribution of electricity produces electromagnetic fields (EMF). Time varying (alternating) electric and magnetic fields in the frequency range generally used for electrical power (power frequency) are known to cause nerve and muscle stimulation in the human body. These are acute short term effects that may be harmful at levels well above what are found normally in people's living environment. The International Commission on Non-Ionizing Radiation (ICNIRP) has established guidelines for limiting human exposure to power frequency EMF based on the well-established short term effects. There are no national guidelines in Canada limiting exposure of the public to power-frequency EMFs.

Because today's society is dependent on electricity, there is a background level of power frequency EMF in our environment. Over the past 40 years, the health effects from long term exposure to the magnetic field component of power frequency EMF have been the focus of research, concern and controversy. In 2002, the World Health Organization (WHO) International Agency for Research on Cancer (IARC) classified extremely low frequency (including power frequency) magnetic fields as a possible carcinogen (group 2B; <http://monographs.iarc.fr/ENG/Monographs/vol80/index.php>). This classification is based on weak evidence associating long term exposure to power frequency magnetic fields with childhood leukemia. Evidence from research published since the IARC classification has not strengthened the link; it remains weak. The current body of evidence as a whole does not support a causal relationship for this and other chronic health impacts. This conclusion is supported by Health Canada (<https://www.canada.ca/en/health-canada/services/home-garden-safety/electric-magnetic-fields-power-lines-electrical-appliances.html>), the ICNIRP (<http://www.icnirp.org/en/frequencies/low-frequency/index.html>), and the WHO (<http://www.who.int/peh-emf/about/WhatIsEMF/en/>). After a detailed review of the evidence, the WHO in 2007 recommended that health risks, if any, from long term (chronic) exposure to power frequency magnetic fields are most appropriately managed by limiting exposure to the public through little cost or no cost strategies, while at the same time not compromising the essential health, social and economic benefits of electrical power (Environmental Health

Criteria No. 238; http://www.who.int/peh-emf/publications/elf_ehc/en/). We agree with this assessment.

Based on the current plans for the proposed substations we did an assessment of the possible changes in the public's magnetic field exposure as a result of the project. In addition to consulting the literature we measured magnetic field levels above the current Cathedral Square underground substation and background levels at Nelson and Emery Barnes parks. Similar to BC Hydro, at Cathedral Square we found that the areas directly above the transmission (230 kV) cables entering the substation have the highest magnetic field levels. However all of these levels were well below the current ICNIRP guideline of 200 μ T for known acute effects from exposures to power frequency magnetic fields.

It is our understanding that the proposed substations will be similar in design to that at Cathedral Square. However the planned substations, including the 230kV switchgear, will be buried much deeper; about twice the depth. The cables will be buried at a similar depth (1 – 2 meters) to those at Cathedral Square. Given the depths at which the proposed substations will be, their contribution to magnetic field levels on the grounds above them will be very minor. The highest magnetic field levels at the new sites are expected to be on top of the underground transmission cables with levels decreasing as distance from the cables increases.

The proposed new Lord Roberts Annex is to be adjacent to the substation (not on top) and at the opposite end of the substation site to where the underground transmission (230 kV) cables will be routed. Given the distance between the proposed new school building site and the underground transmission cables (70 meters), it is our assessment that the magnetic field levels at the new school site will be similar to the existing background. At other points in Nelson Park and the school property, the magnetic field levels will be somewhere between current background and what would be on top of the buried transmission line cables. Using appropriate engineering designs it is likely possible to make most areas of the park and school property, other than in the vicinity of the underground cables, to have magnetic field levels not much different from the existing background. This will be similar for Emery Barnes Park.

By necessity underground transmission cables will run under the two downtown parks to feed the respective substations. While the footprints of the underground cable corridors are relatively small and no harm is expected, it is important that there be public acceptance if the positive community wellness aspects of the **seed** project are to be realized. We therefore believe that measures to further reduce magnetic field levels in the public spaces above the transmission cables feeding the proposed substations are warranted. We recommend:

1. Use low-cost engineering approaches to further reduce the magnetic fields from the underground transmission cables. As outlined by BC Hydro in the Stantec report, there are a number of engineering options to reduce magnetic field levels from underground transmission cables. These options need to be explored further to determine the best fit for this project.
2. Maximize distance between the transmission cables and the proposed Lord Roberts Annex (already done) and playfield.
3. If necessary, strategically locate highly used park features away from the underground transmission cables, as well as use innovative landscape designs as barriers.

4. Model magnetic field levels around the parks and school property once the detailed substation design and underground cable layout are certain. This includes testing the effectiveness of engineering methods to reduce magnetic fields and assessing the drop off of the fields as distance from the cables increases. After the project has been completed magnetic field levels should be measured to confirm the effectiveness of the engineering approaches. In addition to public assurance, this post construction monitoring will inform the design of future projects of this type. A comparison with measurements from other BC Hydro infrastructure would also be informative.

Other Public Health Considerations

We are pleased to see the City of Vancouver's Healthy City Strategy referenced in the Stantec report. Vancouver Coastal Health was a partner in developing this strategy. Alongside the City Manager, the Chief Medical Health Officer co-chaired the City's Healthy City for All Leadership Table that guided the strategy's development. The **seed** project can potentially contribute positively to the Healthy City Strategy, through improvement and creation of park and social shared space, new schools, and increased opportunity for social interaction. However, the project may bring substantial and long-lasting change to the neighbourhoods, which could also negatively impact residents' overall health and wellness. To maximize the likelihood of positive impacts, we recommend the project planners access the neighborhood level health and wellness data available at myhealthmycommunity.org for baseline population health information, and work with City planners to consider strategies to address population health and wellness. Such considerations include:

- **Greenspace and tree canopy:** Access to greenspace and natural environments is beneficial for physical and mental health. The Stantec report suggests that there may be a net loss of greenspace as well as removal of several trees from all sites to complete the proposed works. Park space is already limited in the two neighborhoods. Careful redesign of the greenspaces will be required so that they can best serve all users in the neighborhoods. As well, shade trees are important to offset urban heat island effects. In addition to the Stantec report recommendations on green space and tree canopy, we recommend the following:
 - Maximize the space left for greenspace (as opposed to paved areas)
 - Work with stakeholders to design greenspaces that are considered "quality" greenspace
 - Consider tree selection in re-planting in order to achieve similar canopy cover
 - If canopy cover cannot be replaced via re-planting, shade structures should be designed and installed
- **Noise and air quality during construction:** As stated in the Stantec report, construction often contributes to substantial noise and air quality concerns. Similar to other projects, noise complaints would be expected during heavy construction. Many of the noise and air quality mitigation measures noted in the Stantec report are often unrealistic in practice, particularly those measures heavily reliant on human behaviour changes. In addition to the mitigation measures recommended by Stantec, we recommend the following:

- Consider innovative mitigation strategies, such as conditions on construction permits to address noise and air quality concerns
 - Limit noise to hours and levels confined within the City of Vancouver Noise Bylaw to minimize complaints and disruption
 - Explore whether noisy activities can be confined to least disruptive periods of time
- **Noise post-construction:** Noise can be a nuisance, causes disruption, decreases the quality of life, and angers residents. The Stantec report suggests that at both Emery Park and Nelson Park the noise levels from the ventilation openings will be close to the night time noise limits set by the City of Vancouver Noise Bylaw for their respective zones. This may be problematic for nearby residents, particularly in the summer time when windows are left open. Nelson Park is in a designated quiet zone. We agree with the Stantec recommendation of more detailed study of the current background noise levels particularly for night time. We also recommend further investigation of noise mitigation measures in the design of the substation ventilation system. The final structure must at least meet the City of Vancouver Noise Bylaw requirements.
 - **Construction phasing in relation to students' learning environment:** Should the project go forward, students attending the Lord Roberts Annex will need to be relocated for five years - the estimated construction period. We recommend that the students' learning environment be considered with respect to the timing of construction commencement as well as the choice for relocation. We support the current preferred option as reported by Stantec: building a new school in Coal Harbour first, and moving the students to the new school. This is the least disruptive approach with respect to the children's learning environment.

In conclusion, it is our assessment that the **seed** concept can be accomplished in principle without significant negative public health impact. Decisions on design details and construction phasing will be critical in order to minimize the negative and maximize the positive health impacts. Should the project go forward, my office is prepared to continue to assess the detailed designs and plans from a public health perspective.

Yours sincerely,



Patricia Daly MD, FRCPC
Vice-President, Public Health and Chief Medical Health Officer
Vancouver Coastal Health

Cc: Dr. Perry Kendall, Provincial Health Officer

