

GO Rail Network Electrification Transit Project Assessment Process

Study Summary: Electromagnetic Interference / Electromagnetic Fields Assessment (Appendix J)

Scope of the Study

The scope of the GO Rail Network Electrification Transit Project Assessment Process (TPAP) involves electrification of the following GO Transit rail corridors:

1. Union Station Rail Corridor – From UP Express Union Station to Don Yard Layover
2. Lakeshore West Corridor – From just west of Bathurst St (Mile 1.20) to Burlington
3. Kitchener Corridor – From UP Express Spur (at Highway 427) to Bramalea
4. Barrie Corridor – From Parkdale Junction (off Kitchener Corridor) to Allandale GO Station
5. Stouffville Corridor – From Scarborough Junction (off Lakeshore East Corridor) to Lincolnville GO Station
6. Lakeshore East Corridor – From Don Yard Layover to Oshawa GO Station

The Study Area encompasses the GO Transit rail corridors outlined above including the defined vegetation removal zone (i.e., an area extending 7m from the outermost electrified tracks on each side of the corridor), proposed locations for the Tap and Traction Power Facilities (TPFs), and electrical feeder routes.

The Electromagnetic Interference (EMI) and Electromagnetic Fields (EMF) Assessment for the GO Rail Network Electrification Project is composed of two parts: i) EMI/EMF Baseline Conditions Report and ii) EMF/EMI Impact Assessment Report. The purpose of the baseline conditions phase was to identify and collect information on potential EMI sensitive sites within the Study Area and establish present-day EMF baseline conditions along the GO Rail corridors and at TPF sites. Subsequently, an impact assessment study was undertaken to determine the potential EMI/EMF effects of implementing the electrified GO Transit system.

Approach/Methodology

The assessment of impacts related to EMI/EMF consisted of the following:

- Identification of neighbouring facilities along the corridor that are likely to have EMI-susceptible electrical equipment, such as hospitals and scientific research facilities;
- Identification of existing EMI-susceptible equipment within the Metrolinx rail right-of-way;
- Undertake EMI/EMF survey;
- Estimate and analyze the maximum background extremely low frequency (ELF)¹ electromagnetic fields at those facility locations and equipment by adding the estimated railway emissions to the baseline emissions; and
- Establish mitigation measures to minimize/mitigate EMI/EMF effects.

The EMI/EMF study analyzed/considered the following:

- Potential EMI impacts on sensitive equipment situated in the vicinity of the rail corridors/traction power facility sites;
- Review of EMF exposure limits for occupational, public and workers with medical implants in consideration of electrification of the GO network.

¹ ELF is a specific category of Electric and Magnetic Field (EMF). ELF is the ITU designation for electromagnetic radiation (radio waves) with frequencies from 3 to 30 Hz, and corresponding wavelengths from 100,000 to 10,000 kilometers.

Summary of Impact Assessment Results

Generally, the EMI/EMF Impact Assessment study concluded:

- No adverse EMI/EMF effects are anticipated due to operation of the electric rolling stock²
- No adverse EMI/EMF effects are anticipated due to installation/operation of the traction power facilities (TPFs).
- No adverse EMI/EMF effects are anticipated due to installation/operation of tap infrastructure (Tap facilities are the point at which electric power is 'tapped' from the existing Hydro One power source).

For additional more detailed information, please refer to the EMI/EMF Impact Assessment Report (which is organized by rail corridor for easy reference) contained in Appendix J.

Mitigation Recommendations

General

- Implementation of an Electromagnetic Compatibility (EMC) Control Plan, the objective of which is to facilitate and confirm formal qualification of the electrification system and all its components with respect to the required EMC standards;
- Additional EMI/EMF baseline measurements before and after system construction and operation.
- Use of Autotransformer Feed (ATF) power systems;
- Design and installation of the electrification system and all of its components using industry-standard practices, including:
 - Electrical grounds;
 - Shielding as required;
 - Physical separation and,
 - The installation of filters, capacitors, and inductors.

Rolling Stock, System-Wide

- Assessment of EMI while powered, unpowered, and moving past specific points, including selected stations and along corridor;
- Assessment of EMF while powered, unpowered, and moving past specific points, including selected stations and along corridor.

Rail Corridors & Taps/Traction Power Facilities

- Confirmation/verification of ELF EMF levels post-electrification;
- Re-assessment/verification of EMI levels post-electrification;
- As part of detailed design for the tap infrastructure, Hydro One will take EMF into account and minimize EMF where possible.

Next Steps/Future Work

In terms of the prevention and mitigation of electromagnetic fields and radiation on the GO Rail Network Electrification Project, several general strategies will be used. These strategies are listed directly below. These strategies address the need to continue to monitor and mitigate appropriately. They apply equally across all corridors and at each TPF, and across all rolling stock and include:

² Verification of EMI effects will be confirmed as part of detailed design once the electric rolling stock has been established.

- Industry-standard design, development, and implementation at each TPF site and throughout the corridor, following the general guidelines of the EMC Control Plan and existing Metrolinx documents, such as EPS-04000 Electromagnetic Compatibility and Interference;
- Re-assessment of EMI emissions and confirmation/re-assessment ELF at each TPF (and at previously identified sites) and comparison of those measurements with those shown in both this report and the EMI/EMF Baseline Conditions Report to verify that TPF construction specifically, and electrification generally, has not negatively affected the environment despite the use of industry-standard design, development, and implementation techniques;
- Verification of EMI and EMF levels generated by the rolling stock, both in passenger compartments and at trackside, including at typical station locations;
- Data review of the industry-mandated EMC reports for components used throughout the implementation and the measurements and studies conducted post-construction, to generate a final EMC Report for the project;
- Continue to consult with stakeholders such as NavCanada and Greater Toronto Airports Authority throughout detailed design to ensure technical/design requirements are satisfied as they relate to EMI and EMC;
- Metrolinx will prepare and implement Electromagnetic Compatibility (EMC) Control Plan, to communicate the design and development strategy for EMC (including both ELF and EMI) and to catalogue the types of electronics that will be installed.