



Appendix 8F

Natural Environmental Impacts

December 2010



METROLINX

An agency of the Government of Ontario

APPENDIX 8F

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December 2010

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NATURAL ENVIRONMENTAL IMPACTS
TABLE OF CONTENTS

OVERVIEW.....	ii
DOCUMENT DEFINITIONS AND GLOSSARY OF TERMS	iv
1. Introduction	1
2. Overview of Considerations.....	1
2.1. Objectives.....	1
2.2. Assumptions.....	1
2.3. Criteria, Indicators and Data Sources.....	2
2.4. Considerations for Synthesis of Findings	3
3. Assessment of Electrification Options	4
3.1. Terrestrial Ecosystems.....	7
3.2. Aquatic Ecosystems.....	7
3.3. Description of Assumptions	7
3.4. Summary of Findings.....	11
4. Conclusions	15

FIGURES

Figure 1 - Electrification Options	5
Figure 2 - Electrification Options	6

TABLES

Table 1. Summary of Natural Heritage Criteria, Rationale, Indicators and Data Sources.....	2
Table 2. Summary of Bridge and Tunnel Replacements Required for Electrification	9
Table 3. Summary of Assessment – Terrestrial Ecosystem	11
Table 4. Summary of Assessment – Aquatic Ecosystem.....	13

EXECUTIVE SUMMARY

OVERVIEW

The purpose of this white paper is to provide an overview of the methodology, and the assessment of the proposed electrification options. The white paper provides a summary of the considerations, objectives, assumptions and the criteria, indicators and data sources and the findings of the assessment of the electrification options for each natural heritage sub-category: terrestrial ecology and aquatic ecology.

The purpose of this assessment is to compare electrification facilities/infrastructure alternatives based on the number, type, area and significance of natural heritage features/areas that may be lost or disturbed. The objectives of this study related to the natural heritage discipline include the following:

- to avoid/minimize/mitigate the loss of provincially, regionally and locally significant natural heritage features/areas; and,
- to avoid/minimize/mitigate disturbance to provincially, regionally and locally significant natural heritage features/areas.

The natural heritage discipline will identify potential impacts to natural heritage features/areas designated by the Ministry of Natural Resources, Municipalities and/or Conservation Authorities. A summary of the criteria, indicators and data sources that will be used to determine potential impacts on natural heritage features/areas are described in **Table 1**. Indicators will be used, where appropriate, to measure the number, area, type and significance of natural heritage features/areas. The evaluation of the electrification infrastructure/facility alternatives will feed into the multi-criteria evaluation of all disciplines.

A high level assessment of the electrification options illustrated in **Figures 1A** and **1B** has been undertaken. In order to assess each option, it was assumed that the overall footprint of the railway lines and associated electrification infrastructure would not increase substantially and that impacts outside the existing footprint of the railway would be limited to replacement of infrastructure (e.g., bridges, tunnels and other overhead restrictions), and the construction of new infrastructure (e.g. additional sub-stations).

Each option was assessed to determine the anticipated impacts to the terrestrial and aquatic ecosystems. Given that the bridge replacements and tunnel replacement proposed are located within highly urbanized environments, with disturbed vegetation communities, minor impacts are anticipated to the terrestrial ecosystem. Also, given the presence of existing overhead wires associated with power distribution located in urban, developed areas and given the adaptation of local avian species to the presence of this infrastructure, the additional catenary overhead wires required to power GO trains will have no significant impact on avian species. Final locations for the proposed sub-stations are not yet available for review. Therefore, it is not possible to screen these sites for environmental constraints. However, it is anticipated

that significant natural heritage features will be avoided and impacts to existing vegetation and wildlife will be mitigated using appropriate environmental protection mitigation measures and monitoring.

It is anticipated that overall, impacts to aquatic ecosystems can be avoided or mitigated. While bridge replacements are required over the Don River, it is anticipated that the construction methods and structural design will avoid in-water work during construction. Further work should be undertaken to ensure that impacts to the Don River are avoided, if the Lakeshore East railway line is electrified.

A summary of the assessment for each natural heritage sub-category is presented in **Table 2** (terrestrial ecology) and **Table 3** (aquatic ecology). A quantitative assessment of the impacts for each option may be further defined upon availability of more detailed site-specific information.

DOCUMENT DEFINITIONS AND GLOSSARY OF TERMS

Term	Definition
Areas of Natural and Scientific Interest	Areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education (PPS 2005).
Endangered Species	A species that is regulated as 'Endangered' under the Ontario <i>Endangered Species Act</i> and/or the Canada <i>Species at Risk Act</i> .
Environmentally Sensitive Areas	Areas of land and water containing natural features or ecological functions that are considered of local significance and warrant protection. These areas are usually identified by Conservation Authorities.
Fish Habitat	As defined in the <i>Fisheries Act</i> , c.F-14, means spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes (PPS 2005).
Natural Heritage Features and Areas	Features and areas, including significant wetlands, significant coastal wetlands, fish habitat, significant woodlands south and east of the Canadian Shield, significant habitat of endangered species and threatened species, significant wildlife habitat, and significant areas of natural and scientific interest, which are important for their environmental and social values as a legacy of the natural landscapes of an area (PPS 2005).
Provincially Significant Wetlands	An area identified as provincially significant by the Ontario Ministry of Natural Resources using evaluation procedures, as amended from time to time (PPS 2005).
Significant Woodlands	An area that is ecologically important in terms of features such as species

	<p>composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history (PPS 2005).</p>
<p>Threatened Species</p>	<p>A species that is regulated as 'Threatened' under the Ontario <i>Endangered Species Act</i> and/or the Canada <i>Species at Risk Act</i>.</p>

NOTE: Use hereafter of the terms “we”, “our” or similar means “Delcan/Arup Joint Venture team”.

1. INTRODUCTION

Metrolinx is undertaking an Electrification Study to evaluate potential electrification technologies for the GO Transit rail system. The study area for the project includes the GO Transit rail system. This report documents the objectives, assumptions, criteria and assessment of the electrification options.

2. OVERVIEW OF CONSIDERATIONS

A review of the natural heritage features within the study area will be undertaken to determine opportunities and constraints for the electrification technologies. The natural heritage discipline will identify potential impacts to natural heritage features/areas including areas of natural and scientific interest, provincially significant wetlands, environmentally sensitive areas, habitat for endangered and threatened species, significant woodlands, fish habitat and other natural heritage features/areas located within and adjacent to the footprint of electrification facilities/infrastructure.

The purpose of this assessment is to compare electrification facilities/infrastructure alternatives based on the number, type, area and significance of natural heritage features/areas that may be lost or disturbed.

2.1. Objectives

The objectives of this study related to the natural heritage discipline include the following:

- to avoid/minimize/mitigate the loss of provincially, regionally and locally significant natural heritage features/areas; and,
- to avoid/minimize/mitigate disturbance to provincially, regionally and locally significant natural heritage features/areas.

2.2. Assumptions

The following assumptions have been made that are specific to the natural heritage discipline:

- impacts to birds as a result of additional wires being added to electrify the rail lines are not considered significant;
- the natural heritage assessment will be conducted using secondary sources of information only. No surveys of natural heritage features/areas will be performed;
- the data sources available through secondary sources, including the Land Information Ontario database will provide accurate and up-to-date information regarding designated natural heritage features; and,
- the MNR Natural Heritage Information Centre data is accessible, accurate and up-to-date.

2.3. Criteria, Indicators and Data Sources

Criteria, indicators and data sources that will be used to assess the potential impact of electrification facilities/infrastructure alternatives on natural heritage features/areas are presented in **Table 1**.

Table 1. Summary of Natural Heritage Criteria, Rationale, Indicators and Data Sources

Criteria	Rationale	Indicators	Data Sources
Compare potential loss of designated/regulated natural heritage features/areas located within the footprint of electrification infrastructure/facilities.	The quality of and ecological function provided by such features can be impacted by the removal of and/or disruption to natural heritage features.	Number, area, type and significance of designated/regulated natural heritage features/areas located within the footprint of electrification infrastructure/facilities.	Land Information Ontario Data Sets MNR Natural Heritage Information Centre Natural Area Records Conservation Authority floodplain and regulation limit data, where available Upper and lower tier municipal official plans
Compare potential disturbance to designated/regulated natural heritage features/areas located on lands adjacent to electrification infrastructure/facilities.	The quality of and ecological function provided by such features can be impacted by the removal of and/or disruption to natural heritage features.	Number, area, type and significance of designated/ regulated natural heritage features/areas located within lands adjacent to electrification infrastructure/facilities.	Land Information Ontario Data Sets MNR Natural Heritage Information Centre Natural Area Records Conservation Authority floodplain and regulation limit data, where available Upper and lower tier municipal official plans

2.4. Considerations for Synthesis of Findings

In order to make conclusions regarding the natural heritage discipline, the following methodology will be used to identify natural heritage constraints.

Indicators will be used, where appropriate, to measure the number, area, type and significance of natural heritage features/areas. An arithmetic evaluation will be conducted using the simple additive weighting method. Weights will be assigned to criteria and indicators to reflect their level of importance. The results of the arithmetic evaluation will be reviewed against the original data to ensure that the numerical results can be supported through reasoned argument. The evaluation of the electrification infrastructure/facility alternatives will feed into the multi-criteria evaluation of all disciplines.

3. ASSESSMENT OF ELECTRIFICATION OPTIONS

A series of options for the electrification of the GO Transit rail system have been identified and are presented in **Figures 1A** and **1B**. These options consist of different combinations of rail lines proposed for electrification, or to remain as diesel operated.

The criteria outlined in **Table 1** of this Report was intended to compare the total area of impact to designated/regulated natural heritage features/areas impacted by the electrification technologies, in order to identify impacts to natural heritage. At this time, detailed information regarding the total impact areas and locations is not available in order to provide a quantitative analysis of the criteria. The assessment of options for terrestrial ecosystems and aquatic ecosystems has been undertaken at a high level, based upon a number of assumptions that are outlined in **Section 3.3**.

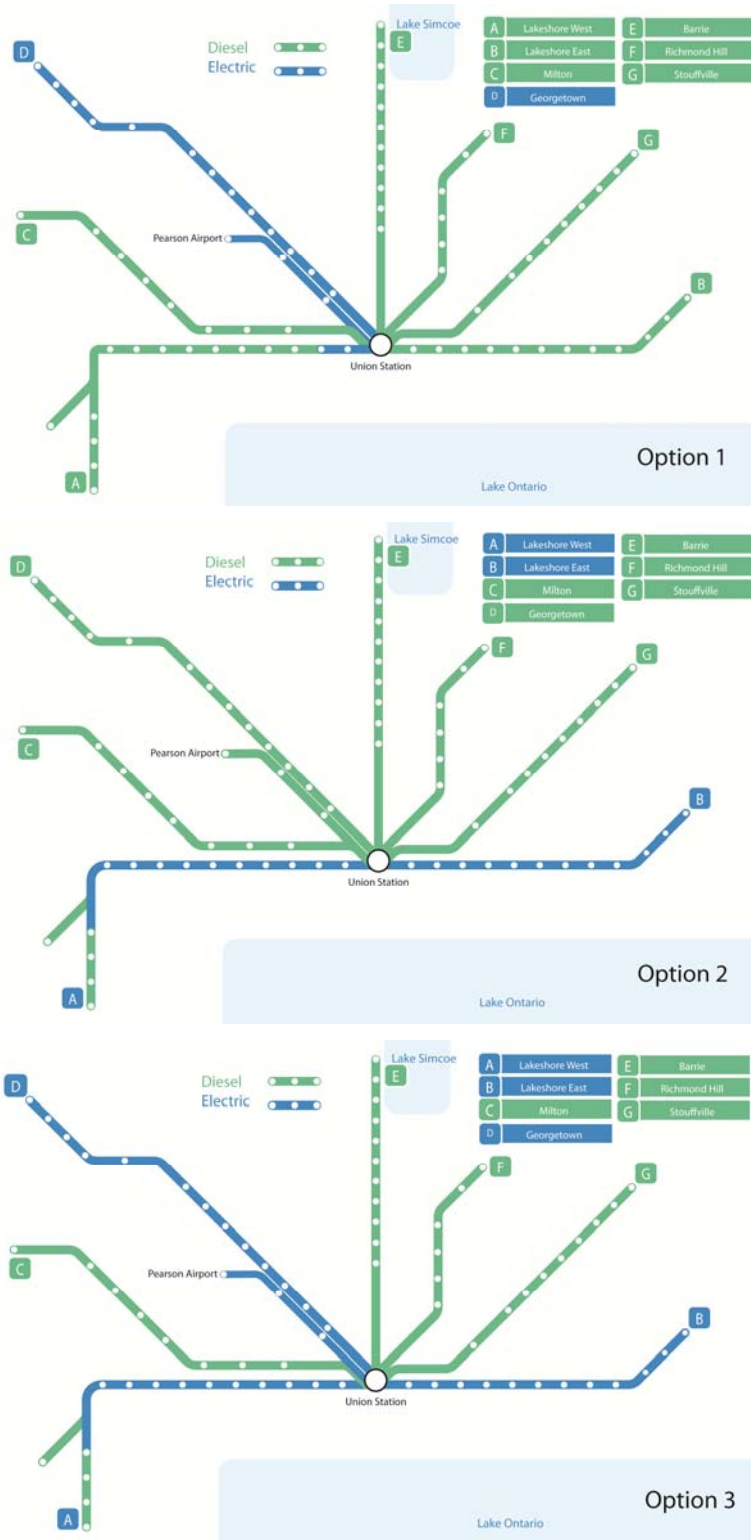


Figure 1 - Electrification Options

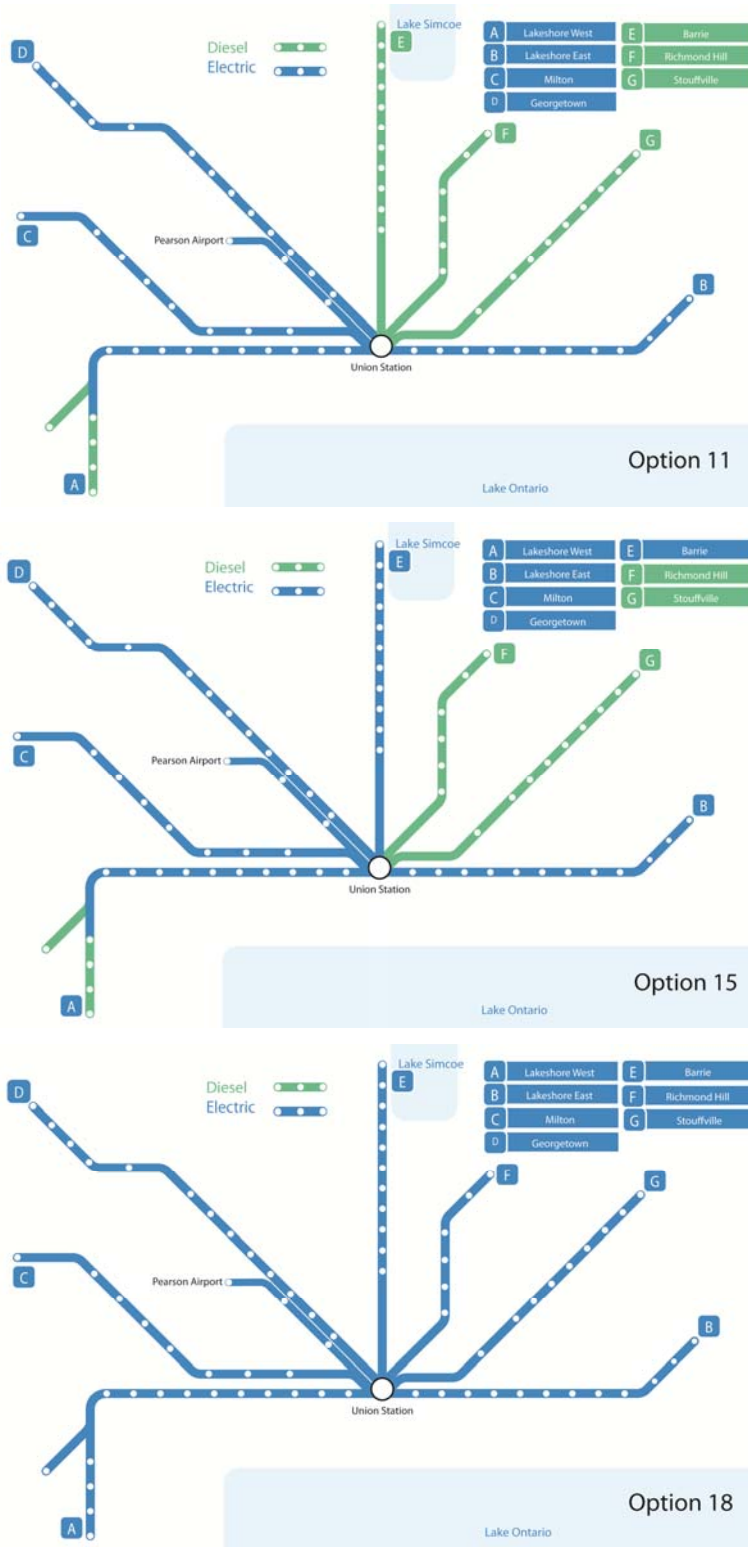


Figure 2 - Electrification Options

3.1. Terrestrial Ecosystems

The terrestrial ecosystem is defined as the vegetation, wildlife and natural communities that occupy terrestrial (land) environments. These species and their habitats are a critical part of the natural heritage systems across Ontario, that provide benefits including carbon uptake, and filtration of air and water. In determining the feasibility of electrification of all GO Transit railway lines, it is important to assess impacts to the terrestrial environment, to minimize reductions in the quality and function of existing natural areas.

Potential impacts to the terrestrial ecosystem associated with the electrification of railway lines include:

- removal of vegetation outside the existing footprint of the GO Transit lines;
- increased disturbance to vegetation and/or wildlife habitat outside the existing footprint of the GO Transit lines;
- removal of, or disturbance to, plant species at risk and/or wildlife species at risk habitat; and,
- removal of any portions of, and/or disturbance to, designated natural areas.

Since detailed information regarding the footprint of the facilities required to accommodate the electrification technologies is not yet available, a general assessment of impacts to the terrestrial environment has been undertaken based upon the assumptions described in **Section 3.3**.

3.2. Aquatic Ecosystems

The aquatic ecosystem is defined as the system of waters, including wetlands, that provide habitat for communities of fish, other aquatic organisms, and natural vegetation. These species and their habitats are a critical part of the natural systems that contribute to the quality of water and aquatic species diversity in Ontario. In determining the feasibility of electrification of all GO Transit railway lines, it is important to assess impacts to the aquatic environment, to ensure that aquatic species and habitat are not impacted by the electrification options.

Potential impacts to the aquatic ecosystem associated with the electrification of railway lines include:

- construction works that will result in the creation of a harmful alteration, disruption and destruction (HADD) of fish habitat;
- disturbance to aquatic species at risk and their habitats; and,
- erosion and sedimentation of materials during construction and operations into watercourses that provide fish habitat.

Since detailed information regarding the footprint of the facilities required to accommodate the electrification technologies is not yet available, a general assessment of impacts to the aquatic environment has been undertaken based upon the assumptions described in **Section 3.3**.

3.3. Description of Assumptions

In determining the overall impact of each of the electrification options, a number of assumptions were made. It was assumed that the overall footprint of the GO Transit railway lines and associated electrification infrastructure would not increase substantially and that impacts outside the existing footprint of the railway would be limited to replacement of infrastructure (e.g., bridges, tunnels and other overhead restrictions), and the construction of new infrastructure (e.g. additional sub-stations).

A total of eleven potential bridge replacement locations were reviewed for environmental constraints, which are listed in **Table 2**. The majority of bridge replacements proposed are located within highly urbanized areas, and minor impacts to the terrestrial and aquatic environments are expected. However, two bridges cross the Don River and will require further assessment to avoid and/or mitigate for any impacts to the terrestrial and aquatic environments. An existing tunnel in the City of Hamilton will need to be replaced for one of the electrification options. The land uses surrounding this tunnel are primarily urban, and natural vegetation is limited to boulevard planted trees and manicured planted areas. Impacts to natural heritage features can be addressed through appropriate environmental avoidance, mitigation and restoration measures.

Table 2. Summary of Bridge and Tunnel Replacements Required for Electrification

GO Line	Subdivision	Crossing Type	Crossing Description	Option
Lakeshore East	Kingston	Overhead Bridge	Birchmount Road	Applicable to Options 2, 3, 11, 15 and 18
Lakeshore West	Oakville	Overhead Bridge	Dunn Ave.	Applicable to all Options
Lakeshore West	Oakville	Overhead Bridge	Jameson Ave.	Applicable to all Options
Lakeshore West	Oakville	Overhead Bridge	Dowling Ave.	Applicable to all Options
Lakeshore West	Hamilton	Overhead Bridge	Main Street West	Applicable to Option 18
Lakeshore West	Hamilton	Overhead Bridge	Dunduryn Street South	Applicable to Option 18
Lakeshore West	Hamilton	Overhead Bridge	Locke Street	Applicable to Option 18
Lakeshore West	Hamilton	Overhead Bridge	Pearl Street	Applicable to Option 18
Lakeshore West	Hamilton	Tunnel	Hunter Street Tunnel, North Portal Queen Street, Hamilton	Applicable to Option 18
Lakeshore West	Hamilton	Tunnel	Hunter Street Tunnel, South Portal Queen Street, Hamilton	Applicable to Option 18
Richmond Hill	Bala	Overhead Bridge	Queen Street East	Applicable to Option 18

Since information on the final locations of new sub-stations is not available, it is anticipated that sites will be selected in areas with minimal natural heritage features, and that any potential impacts to the terrestrial

ecosystem will be avoided or mitigated. A screening will be undertaken at the appropriate stage to determine environmental constraints at the sub-station sites.

The potential environmental impacts associated with the additional overhead wires were assessed. Given that the existing overhead wires associated with power distribution are located in urban, developed areas and given the adaptation of local avian species to the presence of this infrastructure, the additional catenary overhead wires required to power GO trains will have no significant impact on avian species.

3.4. Summary of Findings

Terrestrial Ecosystem

It is anticipated that overall, impacts to terrestrial ecosystems will be minor and that environmental mitigation measures can be implemented to minimize impacts to the terrestrial environment. Impacts to the terrestrial ecosystem may occur where bridge replacements are undertaken, and at the sites of new sub-stations. The results of the assessment of impacts to terrestrial ecosystems is presented in **Table 3**.

The eleven bridge replacements that have been reviewed are all located along the Lakeshore West, Lakeshore East and Richmond Hill railway lines, and therefore, all options have a slight potential for impacts to the terrestrial ecosystem (Option 1, 2, 3, 11, 15, 18). In most cases, impacts would be limited to highly disturbed vegetation communities adjacent to the railway corridor. It is unlikely that significant vegetation communities or species at risk are present within these lands; however, the vegetation communities and species composition will need to be determined on a site-specific basis, after selection of the preferred option. Appropriate environmental mitigation measures and monitoring requirements will be determined to minimize impacts to the terrestrial ecosystem.

As described in **Section 3.3**, the locations of the sub-stations are unknown at this time. Therefore, a screening of the environmental constraints at these sites has not been conducted. It is assumed that the sites will be selected based on proximity to the railway lines in urbanized settings, and that significant natural heritage features will be avoided (e.g., Areas of Natural and Scientific Interest, Provincially Significant Wetlands). In some cases, the sites may contain vegetation communities that will be impacted by the footprint of the sub-station. An assessment of the impact of the sub-station on the terrestrial ecosystem should be undertaken during the site selection and design phase to minimize impacts to existing vegetation and wildlife. Appropriate environmental mitigation measures and monitoring requirements will be determined to minimize impacts to the terrestrial ecosystem.

Table 3. Summary of Assessment – Terrestrial Ecosystem

Shortlist Option	Commentary	Summary Assessment
Option 1	Bridge replacements are required on the Lakeshore West and East GO Transit lines. This is anticipated to have a low impact on the terrestrial environment, as these bridges are located in previously disturbed, urban areas. There may be minor impacts to the terrestrial ecosystem associated with the construction of the sub-station(s) required on the electrified lines. The additional overhead wires required to supply electricity to the trains will have no significant impacts on avian wildlife.	Slight Negative

Shortlist Option	Commentary	Summary Assessment
Option 2	Bridge replacements are required on the Lakeshore West and East GO Transit lines. This is anticipated to have a low impact on the terrestrial ecosystem, as these bridges are located in previously disturbed, urban areas. There may be minor impacts to the terrestrial ecosystem associated with the construction of the sub-station(s) required on the electrified lines. The additional overhead wires required to supply electricity to the trains will have no significant impacts on avian wildlife.	Slight Negative
Option 3	Bridge replacements are required on the Lakeshore West and East GO Transit lines. This is anticipated to have a low impact on the terrestrial ecosystem, as these bridges are located in previously disturbed, urban areas. There may be minor impacts to the terrestrial ecosystem associated with the construction of the sub-station(s) required on the electrified lines. The additional overhead wires required to supply electricity to the trains will have no significant impacts on avian wildlife.	Slight Negative
Option 11	Bridge replacements are required on the Lakeshore West and East GO Transit lines. This is anticipated to have a low impact on the terrestrial ecosystem, as these bridges are located in previously disturbed, urban areas. There may be minor impacts to the terrestrial ecosystem associated with the construction of the sub-station(s) required on the electrified lines. The additional overhead wires required to supply electricity to the trains will have no significant impacts on avian wildlife.	Slight Negative
Option 15	Bridge replacements are required on the Lakeshore West and East GO Transit lines. This is anticipated to have a low impact on the terrestrial ecosystem, as these bridges are located in previously disturbed, urban areas. There may be minor impacts to the terrestrial ecosystem associated with the construction of the sub-station(s) required on the electrified lines. The additional overhead wires required to supply electricity to the trains will have no significant impacts on avian wildlife.	Slight Negative
Option 18	Bridge replacements are required on the Richmond Hill, Lakeshore West and East GO Transit lines. This is anticipated to have a low impact on the terrestrial ecosystem, as these bridges are located in previously disturbed, urban areas. There may be minor impacts to the terrestrial ecosystem associated with the construction of the sub-station(s) required on the electrified lines. The additional overhead wires required to supply electricity to the trains will have no significant impacts on avian wildlife.	Slight Negative

Aquatic Ecosystem

It is anticipated that overall, impacts to aquatic ecosystems can be avoided or mitigated. While bridge replacements are required over the Don River for electrification of the Lakeshore East and Richmond Hill railway lines, it is anticipated that the construction methods and structural design will avoid in-water work during construction. Further assessment should be undertaken to ensure that impacts to the Don River are avoided, if these railway lines are electrified. The results of the assessment of impacts to aquatic ecosystems is presented in **Table 4**.

As described in the assumptions, the locations of the sub-stations are unknown at this time. Therefore, a screening of the environmental constraints at these sites has not been conducted. It is assumed that the sites will be selected based on proximity to the railway lines in urbanized settings, and that significant watercourses will be avoided. An assessment of the impact of the sub-station on the aquatic ecosystem should be undertaken during the site selection and design phase to minimize impacts to existing natural features. Appropriate environmental mitigation measures and monitoring requirements will be determined to minimize impacts to the aquatic ecosystem.

Table 4. Summary of Assessment – Aquatic Ecosystem

Shortlist Option	Commentary	Summary Assessment
Option 1	Bridge replacements are required on the Lakeshore West GO Transit line. This is anticipated to have no impact on the aquatic ecosystem, as these bridges do not cross watercourses. It is anticipated that the construction of the sub-stations will avoid impacts to the aquatic environment.	Neutral/No Impact
Option 2	Bridge replacements are required on the Lakeshore West and East GO Transit lines. This is anticipated to have no impact on the aquatic ecosystem, as these bridges do not cross watercourses. It is anticipated that the construction of the sub-stations will avoid impacts to the aquatic environment.	Neutral/No Impact
Option 3	Bridge replacements are required on the Lakeshore West and East GO Transit lines. This is anticipated to have no impact on the aquatic ecosystem, as these bridges do not cross watercourses. It is anticipated that the construction of the sub-stations will avoid impacts to the aquatic environment.	Neutral/No Impact
Option 11	Bridge replacements are required on the Lakeshore West and East GO Transit lines. This is anticipated to have no impact on the aquatic ecosystem, as these bridges do not cross watercourses. It is anticipated that the construction of the sub-stations will avoid impacts to the aquatic environment.	Neutral/No Impact

Shortlist Option	Commentary	Summary Assessment
Option 15	Bridge replacements are required on the Lakeshore West and East GO Transit lines. This is anticipated to have no impact on the aquatic ecosystem, as these bridges do not cross watercourses. It is anticipated that the construction of the sub-stations will avoid impacts to the aquatic environment.	Neutral/No Impact
Option 18	Bridge replacements are required on the Lakeshore West, Lakeshore East and Richmond Hill GO Transit lines. This is anticipated to have a slight negative impact on the aquatic ecosystem as the Richmond Hill GO Transit line includes a bridge that crosses the Don River in Toronto. Impacts to this watercourse will need to be assessed in further detail at a later stage but it is anticipated that in-water work will not be required. It is anticipated that the construction of the sub-stations will avoid impacts to the aquatic environment.	Slight Negative

4. CONCLUSIONS

An assessment of the proposed electrification options has been undertaken to determine impacts to natural heritage, including terrestrial and aquatic ecosystems. Based upon the information available at this time, impacts are anticipated to be minor provided that a more detailed assessment is undertaken to assess impacts to terrestrial and aquatic ecosystems. There are no significant differences among the alternatives. Where impacts will occur, appropriate environmental mitigation measures and monitoring should be implemented prior to and during construction of the selected option.