Volume 2: Technical Reports

March 2017

Halton Municipalities' Sufficiency Review

Regional Municipality of Halton
Corporation of the City of Burlington
Corporation of the Town of Halton Hills
Corporation of the Town of Milton
Corporation of the Town of Oakville

CEAA Panel Review of the CN Milton Logistics Hub Project CEAA Registry No. 80100

Regional Municipality of Halton
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CAO: Jane MacCaskill

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Mayor: Rick Goldring
City Manager: James Ridge

Corporation of the Town of Halton Hills
Mayor: Rick Bonnette
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Milton CN Intermodal Logistics Hub Development Project
Review of Environmental Impact Statement
and Supporting Documents

Intermodal Transport

Submitted to:
Region of Halton

Prepared by:
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March 10, 2017

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1.0 INTRODUCTION

1.1 Executive Summary

CN proposes to construct and operate a new satellite intermodal terminal (the “Terminal”) including the realignment and extension of existing mainline tracks, referred to as the Milton Logistics Hub (the “Project” or the “MIT Project” or “MIT”).

CN’s Environmental Impact Statement (“CN EIS”) and supporting documentation (collectively the “CN EIS Documents”) provided in support of the MIT Project does not include:

1. all of the technical information and data required by the Canadian Environmental Assessment Agency “Guidelines for the Preparation of an Environmental Impact Statement,” dated July 2015 pursuant to the *Canadian Environmental Assessment Act, 2012* (“CEAA”) (the “EIS Guidelines”); nor

2. sufficient Project information and data to assess:

    a) the “purpose” of the MIT Project;

    b) the “alternative means” of carrying out the MIT Project;

    c) the terminal design, construction activities and operations of the MIT Project; nor

    d) the “requirements for railway operations and services” under section 98(2) of the *Canada Transportation Act* (the “CTA”).

Additional information and data is needed to properly assess the proposed MIT Project. Accordingly, I have set out 45 information requests that I suggest be made to CN with respect to MIT.

1.2 Purpose of Review and Scope of Report

I was retained by the Regional Municipality of Halton, the City of Burlington, the Town of Halton Hills, the Town of Milton and the Town of Oakville (the “Halton Municipalities”) to provide an expert opinion on the sufficiency of the CN EIS Documents with regards to the proposed MIT Project’s purpose/rationale, siting, intermodal terminal planning, design, construction, proposed intermodal terminal operations and alternative means for carrying out the MIT Project.

In relation to the above categories, I have been asked to answer the following questions relative to my area of expertise:

- Do the CN EIS Documents provide the technical information and data required by the EIS Guidelines?”

- Do the CN EIS Documents provide sufficient Project information and data to assess: (1) the purpose of the MIT Project; (2) the alternative means for carrying out the MIT Project; (3) the terminal design, construction activities and operations of the MIT Project; and (4) the requirements for railway operations and services as set out under Section 98(2) of the CTA?

If the CN EIS Documents are not sufficient, relative to the above questions, I have been asked to describe the required additional information and data needed in order to properly assess:

- the purpose of the MIT Project;
- the alternative means for carrying out the MIT Project;
- terminal design, construction activities and operations of the MIT Project; and
- whether the location of the railway line is reasonable under Section 98(2) of the CTA.

1.3 Qualifications and Related Professional Experience

I am the President of Vickerman & Associates, LLC, a firm specializing in the development planning and design of port, intermodal rail and freight logistics facilities worldwide. I have worked on major port and intermodal rail terminal projects throughout North America and the world for more than 40 years. I was the Principal-In-Charge and/or Project Manager for 67 of the 90 North American deep-water general cargo container port and intermodal rail terminal development strategic master plans. The majority of North American container ports have included intermodal rail terminal development in their strategic port master plans. North American Ports have included “on-dock,” “near-dock,” or “far-dock” intermodal rail terminals to support, complement, and take advantage the international movement of container goods through gateway container ports.

My port and intermodal rail terminal development strategic planning experience includes work for major Canadian Ports, the Ports of Rotterdam and Hong Kong, the intermodal freight analysis for the Eurotunnel (the Chunnel between England and France), as well as port and intermodal strategic master planning projects in Panama, Australia, Brazil, and China. In Canada, I have planned and analyzed the need for port and intermodal rail terminal development in Canada’s two largest port complexes on both coasts. My experience with port and intermodal terminal planning has included many Great Lakes ports and proposed associated intermodal rail terminals.

I completed two terms as the Chairman of the Intermodal Freight Terminal Design and Operations Committee under the purview of the US Transportation Research Board (TRB)/National Research Council (NRC) and the National Academy of Science. I have served on many national policy committees for the TRB including organizing and facilitating TRB’s first national conference on the emerging intermodal rail terminal industry including concepts, methodologies, and design techniques for modern intermodal rail terminal operations.

Under contract to the US Department of Transportation, Federal Highway Administration (FHWA), I was the “Principal Investigator” chosen to prepare the USDOT first intermodal landside access technical manual/workbook titled “Landside Access For Intermodal Facilities Manual and Workshop Participant Workbook” published by the USDOT/FHWA, National Highway Institute (NHI), Course No. 15264, Publication No. FHWA-HI-95-043. This manual accompanied a technical three day training course where I was the principal presenter on designing modern intermodal facilities North American wide and at various US State Department of Transportation (State DOT) locations.

I am both a licensed professional civil engineer and registered architect in 23 states. I hold a Master of Science Degree in Structural Engineering and Structural Mechanics from the University of California, Berkeley, with Honors, and a Bachelor of Science Degree in Architectural Engineering from California Polytechnic State University in San Luis Obispo, California, with Honors.

I retired as a Captain in the Civil Engineer Corps of the United States Naval Reserve after 38 years of continuous service primarily focusing on US Navy facility planning and design projects.

My detailed project experience resume is attached as **Appendix A** to this report.

1.4 Documents Reviewed

The analysis, findings and conclusions presented in this report are based on my own professional analysis work to date, and my personal evaluation of the materials and information referred to in **Appendix B** to this report.

2.0 INTERMODAL RAIL TERMINAL PLANNING AND DEVELOPMENT: BACKGROUND AND CONTEXT

Before beginning my assessment of the CN EIS Documents, it is important to introduce the first principles of intermodal terminal planning, which include consideration of: (1) the function of an intermodal terminal; and (2) the rationale for an intermodal terminal.

2.1 Function of an Intermodal Terminal

Intermodal transportation can be defined as the movements of passengers or freight from one mode of transport to another, commonly taking place at a terminal specifically designed for such a purpose. In North America, the term “intermodal rail” is also used to refer specifically to containerized rail cargo transportation. Thus, intermodal transportation in the literal sense refers to an exchange of passengers or freight between two transportation modes. Intermodal rail terminals in North America have become more commonly used to strictly relate to international and domestic container cargo shipping transport. For the purposes of this report, I will only discuss containerized freight transport and goods movement intermodalism.

Intermodal freight goods movement transport involves the conveyance of containerized cargo typically in International Standards Organization (“ISO”) intermodal containers, using multiple modes of transportation (rail, ship, and truck) without direct handling of the freight cargo itself within the ISO container when changing modes.

Intermodal freight can also be defined as the movement of containerized cargo goods from Origin to Destination (“O/D”) by several modes of transport with each transport mode having a different transport provider or entity responsible for the container movement, each with its own independent transport contract. Thus, during the single O/D journey multiple transport carriers are involved with the containerized cargo movement during the journey.

2.2 Rationale for an Intermodal Terminal

Intermodal terminal development planning is generally intended to increase the operational efficiency and throughput capacity of an intermodal transport facility or intermodal system to enable it to handle anticipated business market growth and forecasted cargo demand for the intermodal terminal or the intermodal transport system.

The following simple cargo demand market-driven formula is what I use to determine "Justifiable Terminal Need":

$$F - C = N$$

"Cargo **F**orecasted Demand **minus** Current Terminal **C**apacity **equals** Justifiable Terminal **N**eed"

Each of the elements of this equation will be discussed in more detail in the following sub-paragraphs.

2.2.1 F: Cargo Forecasted Market Demand

Intermodal terminal development planning typically involves the preparation of a market driven cargo demand forecast (which can also be referred to as a "market assessment" or "market demand forecast").

The process of preparing a market-driven cargo demand forecast is not a single distinct event, but rather a continuing strategic business planning function typically accomplished on an annual ongoing basis which should adapt to dynamic changes in the competitive marketplace.

Strategic development planning for modern intermodal rail facilities today in North America almost always includes a fairly refined upfront "market-driven" mandate for the intermodal terminal development program. Today's intermodal terminal owner/operator will typically prepare in-house or commission a detailed market assessment or an econometric cargo demand forecast providing the terminal planners and designers with projected terminal container cargo volumes at five year increments out to the terminal planning horizon, whatever that might be.

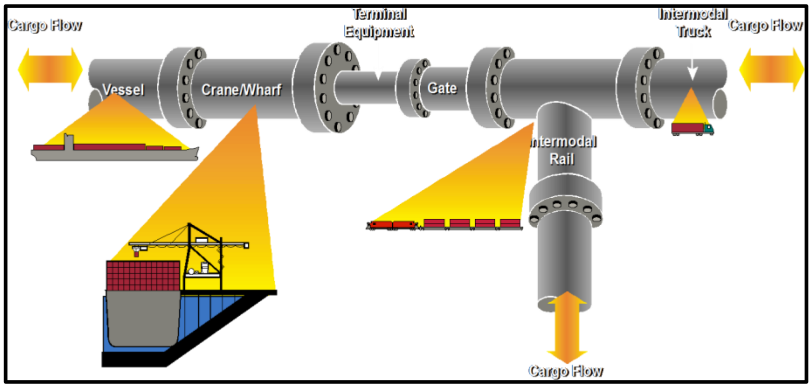
In today's corporate environment, this future cargo forecast determination is an integral part of the strategic business planning processes in today's Class I railroad transport corporations. Frequently, corporate shareholders will mandate that a market demand study be prepared as a prerequisite for development of any new intermodal facility development within the railroad's network. Typically, in North America, an intermodal terminal development program needs assessment will be predicated on a detailed containerized cargo market forecast with a planning horizon of at least 5 to 10, and more typically 15 to 20, years.

In addition, a return-on-investment ("ROI") analysis and a terminal cost benefit assessments are frequently prepared to satisfy the public and/or the private sector intermodal terminal owners and operators, as well as involved public-private-partnerships, of the soundness of the financial or financial bonding transaction contemplated for the intermodal terminal investment.

2.2.2 C: Terminal Capacity

Considering the current or future throughput capacity of the intermodal rail terminal is an important consideration. Changes in terminal equipment modes and terminal operating equipment can dramatically increase the overall intermodal throughput capacity of the intermodal terminal and the region it serves.[1]

The determination of the capacity of a modern intermodal rail terminal is a complex assembly of various terminal contributing components that may vary over the year and from year to year. My model for conceptualizing marine and intermodal rail terminal throughput capacity is one of an analogous "pipeline" as illustrated below, wherein the least diameter pipe segment represents the most restrictive flow of cargo through an intermodal port or rail terminal.



The originating basis for this approach can be found in the 1986 publication: "Improving Productivity in U.S. Marine Container Terminals" produced by the NRC and published by the National Academy Press. This publication was prepared under the guidance of the US DOT, Maritime Administration (MARAD) and the National Academy of Science and describes the basic methodology for assessing the productivity of various terminal components. Today this analogous approach to capacity modeling of marine and intermodal rail terminal throughput and operational capacity analysis has been generally adopted by many port and intermodal rail terminals throughout North America.

Taking the above analogy into account, the process for improvement of an intermodal rail terminal's productivity would be one of improving the most restrictive terminal characteristics /

[1] A "**TEU"** is a unit of measurement that is an approximate measure of container cargo capacity often used to describe the capacity of container ships as well as port and intermodal container terminals. Aggregate container capacity is often expressed in twenty-foot equivalent units (TEUs) which is a unit of capacity equal to one standard 20 × 8 ft. (6.10 × 2.44 m) (length × width) container. Because the TEU is an approximate measurement unit, it cannot be converted precisely into other units of measure. Most containers are manufactured according to specifications from the International Standards Organization (ISO) and are suitable for multiple transportation modes including intermodal terminals.
An intermodal rail terminal **"Container Lift"** is defined as a single pick of an ISO container (dry, refrigerated (reefer), import, export, 40 foot or 20 foot) by an intermodal yard crane either on or off a one container high container train or a double stacked container train. In North America, the typical ratio between TEUs and Lifts is a factor of 1.7 (1.7 TEUs = 1 Lift). This ratio is generally dependent on the percentage of 40 foot and 20 foot ISO containers and does not vary widely.

components in a one-after-another iterative process until the entire intermodal terminal throughput has reached its maximum practical capacity. The "maximum diameter pipe sections" in this analogy, therefore, represents the intermodal rail terminal's future potential capability and future maximum value from an operating standpoint as viewed by an intermodal terminal owner or operator.

Lowering intermodal terminal container dwell times (the time the container remains within the terminal boundary) is an operational goal and strategy for many intermodal rail terminal operations. The lower the overall terminal container dwell time the more productive the intermodal rail terminal operation.

Today in the North American intermodal container industry, the average container dwell time in a container terminal is approximately 5 to 8 days for ports and marine facilities and approximately 1.5 to 2 days for modern intermodal rail terminals, both for import and export container loads. Reducing the intermodal terminal container dwell times by half could approximately double the capacity of the overall intermodal container terminal. Thus, container dwell time reduction is a key strategic operating goal for intermodal container terminal operators.

2.2.3 N: Justifiable Terminal Need

As stated above, justifiable terminal need is the result of market demand forecast minus existing or current terminal capacity. However, throughout the planning process, where a justifiable need for an intermodal system may be demonstrated, further design and equipment considerations related to capacity can be considered, which can, in some cases eliminate or reduce the justifiable terminal need requirements, as will be described in sub-section 3.2.2.1 of my report.

3.0 ASSESSMENT OF CN EIS DOCUMENTS AND CTA APPLICATION

3.1 Methodology of Review

This assessment report provides my expert opinion regarding the following key questions relative to my area of expertise.

I reviewed the CN EIS Documents referring to the technical validity of information, methods and analysis used and conclusions made, in order to answer the following questions:

- Do the CN EIS Documents provide the technical information required by the EIS Guidelines?
- Do the CN EIS Documents provide sufficient information and data to assess: (1) the purpose of the MIT Project; (2) the alternative means of carrying out the MIT Project; (3) the terminal design, construction activities and operations of the MIT Project; and (4) the impact on railway operations and services as set out in Section 98(2) of the CTA.

With respect to understanding the "technical information" required by the EIS Guidelines, I am primarily guided by Part 1, Section 4.2 "Study strategy and methodology" and Part 1, Section 4.3.3 "Existing information", which requires the proponent to adhere to the following guidelines, summarized below:

i. document how scientific, engineering, traditional and local knowledge were used to reach conclusions (4.2);

ii. clearly identify and justify assumptions (4.2);

iii. document all data, models and studies so they are transparent and reproducible (4.2);

iv. specify all data collection methods (4.2);

v. indicate the uncertainty, reliability and sensitivity of models used to reach conclusions (4.2);

vi. identify significant gaps in knowledge and understanding related to key conclusions and the steps taken to address these gaps (4.2);

vii. describe modelling methods and equations, including calculations of margins of error or other relevant statistical information, used for baseline data that has been extrapolated or otherwise manipulated to depict environmental conditions in the study areas (4.2); and

viii. when relying on existing information to meet requirements of the EIS Guidelines, include the information directly in the EIS or clearly direct the reader to where it may obtain the information (i.e., through cross-referencing) and comment on how the data was applied to the project, separate factual lines of evidence from inference, and state any limitations on the inferences or conclusions that can be drawn from the existing information (4.3).

Where CN has not adhered to the above requirements, the rationale for my information requests will be referred to as a "technical information deficiency."

3.2 Categories of Review

I have reviewed the entire CN EIS and all relevant supporting documents given to me to determine the technical validity of the information presented and completeness of the information and data from my expertise. I have evaluated the methods and analysis used in the CN EIS Documents and have evaluated the conclusions reached.

The following categories constitute the outline of this CN EIS assessment review:

3.2.1 Purpose/Rationale for the Project
3.2.2 Alternative Means of Carrying Out the Project
3.3.3 Design Information
3.3.4 Construction Information
3.3.5 Operations Information
3.3.6 Requirements for Railway Operations and Services

3.2.1 Purpose/Rationale for the Project:

With respect to the "Purpose of the Project", Part 2, Section 2.1 of the EIS Guidelines states that the CN EIS will: "describe the purpose of the project by providing the rationale for the project, explaining the background, the problems or opportunities that the project is intended to satisfy and the stated objectives from the perspective of the proponent."

The Operational Policy Statement Addressing "*Purpose of" and "Alternative Means" under the Canadian Environmental Assessment Act of 2012* (March 2015) ("OPS 2015") indicates that the purpose of the designated project is defined as the rationale or reasons for which the designated project would be carried out from the proponent's perspective. It conveys what the proponent intends to achieve by carrying out the designated project. OPS 2015 states that "Purpose of" is often described concisely in terms of a number of considerations, including "the problems that the project is intended to address…or any other objectives of the proponent in carrying out the project".

As part of its discussion of "Purpose", the CN EIS addresses the problems that the project is intended to address by referencing throughout the document: (1) the need for a satellite terminal prompted by growing demand; and (2) limited expansion at Brampton Intermodal Terminal ("BIT"). These two factors are addressed throughout the CN EIS and CN EIS Documents, as outlined further below.

3.2.1.1 Market Demand and Rationale for an Intermodal Terminal

The following excerpts from the CN EIS Documents found in the table below are representative of CN excerpts discussing the rationale for increasing intermodal capacity based on "**need**" and "**growing demand**" (bolded terms are mine):

Table 1: Growing Demand

Document (Collectively, the "Table 1 Documents")	Section Reference	Quote
CN EIS	Executive Summary	To address the **need** to support **long-term growth**, CN made a strategic decision to move forward with plans to develop a satellite intermodal terminal in the western portion of the GTHA, where **CN's growing customer base** is located.
CN EIS	1.2	The proposed project will accommodate the **growing demand** for intermodal services and ensure service fluidity through the Greater Toronto and Hamilton Area (GTHA) as the Brampton Intermodal (BIT) approaches capacity with limited land available for expansion.
CN EIS	2.1	The purpose of the Project is to construct and operate a satellite intermodal terminal to meet CN's **growing operational and commercial needs**. Given that the economy, including transportation and warehousing, has grown by 20% between 2001 and 2011 (Hemson Consulting Ltd. 2012), the Project positions CN to serve the **growing demand** for logistics support in the GTHA and western Ontario markets (Strategic Projections Inc. 2013).
CN EIS	2.1	To address the need to support **long-term growth**, CN made a decision to move forward with plans to develop a satellite intermodal terminal in the western portion of the GTHA, where CN's **growing customer base** is locating.
CN EIS	3.1	Since 2010, the rail industry has seen **significant growth in demand** for intermodal services rather than rail-serviced industrial sites.

Document (Collectively, the "Table 1 Documents")	Section Reference	Quote
CN EIS	3.1	The location and design of the Terminal is based on an iterative planning process that has been undertaken by CN to address **market demand** for intermodal service.
CN Project Description Report ("CN PDR")	Executive Summary	The purpose of the hub is to handle intermodal containers between trucks and railcars to meet the **growing demand** of the movement of goods within the Greater Toronto and Hamilton Area.
CN PDR	2.1.1	The proposed project with accommodate the **growing demand** for intermodal services and ensure service and fluidity through the GTHA as the Brampton Intermodal Terminal approaches capacity with limited land available for expansion.
CN PDR	2.1.2	To meet **growing demand** for intermodal services, CN's strategy has evolved to a two-facility concept for the GTHA.
CN EIS, App. E.12 – Technical Data Report, Socio-Economic Baseline (SEB)	1.1	To accommodate the **growing demand** for intermodal services and ensure service and fluidity through the Greater Toronto and Hamilton Area (GTHA), CN proposes to construct and operate the Project, which consists of a new satellite intermodal terminal (the Terminal) and the realignment and extension of the existing mainline. The **need** for a satellite intermodal terminal is prompted by **market growth** in the Western GTHA and the limited expansion opportunities at the existing Brampton Intermodal Terminal.
CN Site Selection Study (Appendix F)	1.1	The terminal will support BIT by facilitating the **growing demand** for intermodal shipping in an area of the GTHA with the greatest opportunity for growth, as seen through the Province of Ontario's Growth Plan for the Greater Golden Horseshoe (Ministry of Infrastructure consolidated 2013). A satellite intermodal terminal within the GTHA will meet CN's **intermodal operational and commercial needs** and position CN to continue to efficiently serve the **future needs** of the GTHA.
CN Site Selection Study (Appendix F)	3.4	C&W [*Cushman & Wakefield – Valuation & Advisory June 2015. Land Availability Review for Satellite Intermodal Terminal Facility*] examined the land availability of sections along the mainline that may be suitable to host a satellite intermodal terminal that could address the **needs** of the **growing customer base** served by BIT.
CN Site Selection Study (Appendix F)	6.0	An intermodal terminal in the western half of the GTHA is required to meet CN's and its customer **current and future intermodal commercial needs**.
Planning Justification Report In Support of a Logistics Hub Planned in Southwest Milton	2. & 2.1	The following technical reports were prepared to explain the **need** for additional intermodal capacity in the GTA and the process followed in the selection of the preferred site in south Milton… 2.1 STRATEGIC PROJECTIONS INC. REPORT (SEPTEMBER 2013) In September 2013, Strategic Projections produced a report entitled "The Need for an Intermodal Facility on CN's Lands in Milton" (the "SPI Report")….In terms of **need**, the SPI Report [Strategic Projections Inc. Report September 2013], concludes that

Document (Collectively, the "Table 1 Documents")	**Section Reference**	**Quote**
(Appendix 11) ("CN PJR")		the GTA will require a doubling of its intermodal facility capacity over the next three decades in order to meet this **growing demand**.
CN PJR	5.0	(iii) In this circumstance, while the Logistics Hub will result in a relatively small reduction in the planned twenty year inventory of future employment lands in Milton, there is also a clearly identified need for infrastructure in order to meet the **growing demand** for additional capacity to handle the movement of goods in the GTA.

In most cases, CN does not clearly identify the source its information, including substantive background studies or reports that quantify the "growing demand" for intermodal services or that provide justification for additional intermodal capacity.

The CN EIS Documents do not reference a Greater Toronto and Hamilton Area ("GTHA") regional or MIT intermodal containerized trade market assessment, cargo demand econometric study or intermodal containerized cargo demand forecast providing estimates for future container cargo volumes for the GTHA region at large (BIT plus MIT) or for the planning and design of a particular intermodal rail terminal (BIT expansion or MIT).

The CN EIS Documents do not provide sufficient current and future container volume market cargo forecast data to properly plan, design, construct and operate MIT.

Although CN has publicly indicated that the GTHA region experienced a "68 percent growth increase in intermodal rail volume from 2009 to 2014" which substantially exceeded previous CN intermodal cargo anticipated growth rates,[2] no statement in the CN EIS Documents has substantiated this dramatic intermodal container growth.

A container cargo demand forecast can analyze, evaluate, and quantify the regional container market forecast for containerized cargo demand and the specific rationale for proposing a satellite intermodal hub facility (MIT) operating in conjunction with CN's largest North American Intermodal Terminal Hub, BIT.

Section 2.1 of the CN EIS states that the GTHA and its western expansion is the fastest growing area in Canada. Understanding the market-driven containerized intermodal growth forecast requirements for cargo freight movement (container volumes) in this region is vital and indeed essential to understanding intermodal rail development requirements for this region into the future.

OPS 2015 directs that the information regarding the "Purpose of the Project" should be sufficient to provide context for public and technical comment periods during the environmental assessment, and ultimately to allow the decision maker to understand the purpose of the designated project. In my opinion, without a container market forecast, or a definitive intermodal terminal capacity analysis

[2] Marie-Therese Houde, CN's former Director of Corporate Development, referenced this growth increase during her presentation regarding the proposed MIT Project to Halton Regional Council on May 27, 2015: video available online at: https://www.youtube.com/watch?v=_E3A5EU1OdI.

for BIT, the true purpose of MIT remains unclear.

Where CN has referred to a relevant background study in the CN EIS Documents in relation to defining the purpose of MIT, it has not provided us with the relevant study. Specifically, CN has not provided the following documents: (i) *Strategic Projections Inc 2013: The Need for an Intermodal Facility on CN's Lands in Milton. Prepared for the Canadian National Railway Company, September 2013 ("Strategic Projections Inc. 2013")*; and (ii) *Cushman & Wakefield – Valuation & Advisory June 2015. Land Availability Review for Satellite Intermodal Terminal Facility. Prepared for the Canadian National Railway Company ("Cushman & Wakefield – Valuation and Advisory June 2015")*.

As a result, I propose the following information requests, which would help explain CN's statement of purpose of the MIT Project as required under the EIS Guidelines:

Information Requests:

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Purpose: Market Demand for an Intermodal Terminal EIS Guidelines, Part 2, Section 2.1 OPS 2015	CN EIS, Section 2.1 & Table 1 Documents	**IT.1** **Market Demand Information** Please provide any reports, analyses, data, studies or assessments to support the CN EIS statements, in the form of current and future container volume market cargo forecasts that quantify the "growing demand" for intermodal services, provide justification for additional intermodal capacity and support the conclusion that "additional capacity is required to enable CN to continue to support the growing demand for intermodal services in the GTHA"	Technical information deficiency. Further, It is not clear what market demand MIT will serve. This information is required in order to understand the Purpose of MIT.
Purpose: Market Demand for an Intermodal Terminal EIS Guidelines, Part 2, Section 2.1 OPS 2015	CN EIS, Section 2.1 & Table 1 Documents	**IT.2** **Missing Referenced Document** Please provide the following document: *Strategic Projections Inc 2013: The Need for an Intermodal Facility on CN's Lands in Milton. Prepared for the Canadian National Railway Company, September 2013*	Technical information deficiency. Further, CN references this report to explain the purpose and rationale for MIT, but does not provide it as part of the CN EIS Documents. This information is required in order to understand the Purpose of MIT.
Purpose: Market Demand for an Intermodal Terminal	CN EIS, Section 2.1 & Table 1 Documents	**IT.3** **Missing Referenced Document** Please provide the following document: *Cushman & Wakefield –*	Technical information deficiency. Further, CN references this report to explain the needs of growing customer base at BIT, that the potential for future growth around

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
EIS Guidelines, Part 2, Section 2.1 OPS 2015		*Valuation & Advisory June 2015. Land Availability Review for Satellite Intermodal Terminal Facility. Prepared for the Canadian National Railway Company*	BIT is limited and to explain the site selection process. However, CN does not provide the report as part of the CN EIS Documents. This information is required in order to understand the purpose of MIT.

3.2.1.2 BIT Capacity and Expansion Limitations

As part of its discussion of the "Purpose of the Project", the CN EIS Documents state that MIT is required because BIT is nearing capacity. The following excerpts from the CN EIS Documents found in the table below are representative of CN statements regarding BIT nearing capacity and limited expansion available at BIT (bolded terms are mine):

Table 2: BIT Capacity and Expansion Limitations

Document (Collectively, the "Table 2 Documents")	Section Reference	Quote
CN EIS	Executive Summary	**BIT is nearing capacity** and in order for CN to meet customer demand and maintain its competitiveness, additional capacity is required. To address the need to support long-term growth, CN made a strategic decision to move forward with plans to develop a satellite intermodal terminal in the western portion of the GTHA, where CN's growing customer base is located.
CN EIS	1.2	The proposed Project will accommodate the growing demand for intermodal services and ensure service and fluidity through the Greater Toronto and Hamilton Area (GTHA) as the **Brampton Intermodal Terminal (BIT) approaches capacity with limited land available for expansion**.
CN EIS	2.1	Expansion projects and productivity initiatives at BIT deferred the immediate requirement to develop the land for intermodal use. After investing over $50 million to support the growing volumes at BIT, **this facility is now approaching capacity with limited opportunities for significant expansion**. A land review confirmed that sufficient and suitable land could not be acquired around BIT (*Cushman & Wakefield – Valuation & Advisory June 2015*).
CN EIS	3.1	CN's intermodal terminal in Brampton is **now reaching capacity and cannot be easily expanded due to a lack of available land**. Therefore, its ability to accommodate the anticipated growth is limited, despite the investments made between 2001 and 2014.
CN PDR	2.1.2	The Brampton Intermodal Terminal handled close to 1 million containers in 2014. However, **further expansion of this existing terminal is limited by the distribution centers and other logistics facilities** that have grown significantly in

Document (Collectively, the "Table 2 Documents")	**Section Reference**	**Quote**
		the area.
CN Site Selection Study (Appendix F)	1.1	At present, **BIT is nearing capacity and additional capacity is required** to expand CN intermodal services and to maintain CN's competitiveness. In order to determine the practical ability to expand BIT, CN retained Blake, Cassels & Graydon LLP who commissioned Cushman & Wakefield – Valuation & Advisory (C&W) to review and evaluate the availability of surrounding land required for the expansion of BIT. C&W determined that **BIT is landlocked and that sufficient and suitable lands to meet the requirements of CN are not available around BIT**. This study confirmed that the **potential for further expansion around BIT is limited and does not represent a long-term growth solution** (C&W 2015). An alternate location to construct and operate a new satellite intermodal terminal is required.
CN PJR	1.1	By 2014, the **capacity limitations at Brampton had become all too visible** and the need for a relief facility undeniable. As discussed below, certain studies had been commissioned by CN, and more would follow.
CN EIS, App. E.12 – SEB (SEB)	1.1	The need for a satellite intermodal terminal is prompted by market growth in the Western GTHA and the **limited expansion opportunities at the existing Brampton Intermodal Terminal.**
CN EIS, App. E.12 – SEB	5.3.5.4	Although operating rates are not available for all intermodal facilities, CN's **Brampton Intermodal Terminal was operating at 82% capacity in 2012 and was expected to reach 100% of its capacity by 2018** (*Strategic Projections 2013*).
Application for an Order Pursuant to section 98(2) for Authorizing Construction, CN, January 22, 2016	Para. 97	Such growth in CN's intermodal traffic originating in or destined to the region has led to a situation of **very tight capacity at BIT**. In spite of continuous efforts to improve the productivity of the operations at BIT during the last five years and given market expansion towards the GTHA, CN now finds itself in a position where it must establish new intermodal terminal capacity in the western Toronto area.

Despite stating that BIT is reaching capacity, the CN EIS Documents provide very little background information regarding BIT and do not provide the studies CN references or the underlying data behind those studies, including: (i) *Strategic Projections Inc. 2013*[3]; and (ii) *Cushman & Wakefield – Valuation and Advisory June 2015"*.[4]

The CN EIS Documents also reference $50 million spent on projects at BIT in order to increase

[3] Please see IT.2 above for mu information request for *Strategic Projections Inc. 2013*.
[4] Please see IT.3 above for my information request for *Cushman & Wakefield – Valuation & Advisory June 2015*.

capacity, but provide no details with respect to those investments, nor does CN discuss whether it considered alternatives such as upgrading equipment at BIT as part of increasing capacity in order to eliminate or reduce justifiable terminal need for a new intermodal facility, as is outlined in Section 2.2.3 of my report. We are not told anything about the description of the projects to improve capacity at BIT.

I propose the following information requests, which would help explain the purpose of the MIT Project as required under the EIS Guidelines:

Information Requests:

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Purpose: **BIT Capacity and Expansion Limitations** EIS Guidelines, Part 2, Section 2.1 OPS 2015	CN EIS, Section 2.1 & Table 2 Documents	**IT.4** **BIT Capacity and Expansion Limitations Information** Please provide any reports, analyses, data, studies or assessments to support the CN EIS conclusion that the BIT is "approaching capacity with limited opportunities for significant expansion".	Technical information deficiency. Further, CN states that BIT is approaching capacity, but has not provided sufficient information with respect to how it came to this conclusion. This information is required in order to understand the Purpose of MIT.
Purpose: BIT Expansion and Expansion Limitations EIS Guidelines, Part 2, Section 2.1 OPS 2015	CN EIS, Section 2.1 & Table 2 Documents	**IT.5** **Particulars of Expansion Project** Please provide Particulars of the "expansion projects", "productivity initiatives" and the $50 million investment at BIT which had deferred the immediate need for the development of MIT.	Technical information deficiency. Further, CN states that BIT is approaching capacity, but has not provided sufficient information with respect to the options CN has explored in order to prevent BIT from reaching capacity and defer the need for a satellite intermodal. This information is required in order to understand the Purpose of MIT.

3.2.1.3 Meaning of a Satellite Terminal for this Project

CN states that MIT is intended to function as a "satellite" terminal to BIT. However, CN does not provide information regarding the rationale behind choosing a satellite terminal over a separate terminal and the differences between the two options in their operations. It refers to the MIT Project as a "two-facility concept" but does not provide any further information on what that concept means. In fact, there is conflicting information on whether MIT is considered an expansion of BIT, where CN has specifically stated in Section 2.3.3 of the CN PDR that "[t]his Project is not an expansion of an existing hub."

The following excerpts from the CN EIS Documents found in the table below are representative of CN statements referencing MIT as a satellite terminal (bolded terms are mine):

Table 3: Meaning of a Satellite Terminal

Document (Collectively, the "Table 3 Documents")	Section Reference	Quote
CN EIS	1.2	The Project consists of the construction and operation of [a **new satellite intermodal terminal**] and the realignment / extension of the existing mainline tracks in the Town of Milton. The proposed Project will accommodate the growing demand for intermodal services and ensure service and fluidity through the Greater Toronto and Hamilton Area (GTHA) as the Brampton Intermodal Terminal (BIT) approaches capacity with limited land available for expansion.
CN EIS	3.1	CN's intermodal terminal in Brampton is now reaching capacity and cannot be easily expanded due to a lack of available land. Therefore, its ability to accommodate the anticipated growth is limited, despite the investments made between 2001 and 2014. CN has determined that a **satellite intermodal terminal is required** to accommodate western GTHA intermodal market growth (Strategic Projections Inc. 2013).
SEB	1.1	The need for a **satellite intermodal terminal** is prompted by market growth in the western GTHA and the limited expansion opportunities at the existing Brampton Intermodal Terminal.
CN PJR	2.12	To meet growing demand for intermodal services, CN's strategy has evolved to a **two-facility concept** for the GTHA.
CN Site Selection Study (App. F)	3.1	Principle 1 was developed to ensure that potential sites considered to host the intermodal terminal would be able to adequately service CN's principal market within the western half of the GTHA and could **act as a satellite facility to BIT**
CN Site Selection Study (App. F)	3.4	C&W [*Cushman & Wakefield – Valuation & Advisory June 2015. Land Availability Review for Satellite Intermodal Terminal Facility*] examined the land availability of sections along the mainline that may be suitable to host a **satellite intermodal terminal** that could address the needs of the growing customer base served by BIT.

In order to understand whether CN provides sufficient information to assess the purpose of the MIT Project, MIT must be more clearly defined as either a new standalone intermodal rail logistics hub or a satellite facility to BIT. CN must also explain whether MIT will serve a larger market or the same market that BIT serves.

As set out in the table above, CN does not provide sufficient information regarding how MIT will function as a satellite to BIT. The following information is required in order to understand the Purpose of MIT as a satellite to BIT or otherwise:

Information Requests:

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Purpose: Meaning of a Satellite Terminal for this Project EIS Guidelines, Part 2, Section 2.1 OPS 2015	CN EIS, Sections 2.1 & 3.1 & Table 3 Documents	**IT.6** **Information re MIT as Satellite Terminal** Please provide a description of the intended functions and operations of MIT in its role as a satellite terminal to BIT, including whether MIT will serve a larger market or the same market that BIT serves.	CN states that MIT is intended to function as a satellite terminal to BIT. However, CN has not provided sufficient information regarding what a satellite terminal is in terms of its function and operations for this Project. This information is required in order to understand the Purpose of MIT.
Purpose: Meaning of a Satellite Terminal for this Project EIS Guidelines, Part 2, Section 2.1 OPS 2015	CN Site Selection Study (App. F), Sections 3.1 & 3.4	**IT.7** **Criteria for Satellite Terminal** With respect to Principle 1 of the Site Selection Principles in the Site Selection Study, please provide the criteria used to consider how a location could act as and be suitable to host a satellite intermodal terminal.	CN states that the site location must act as a satellite terminal to BIT. However, CN has not provided sufficient information regarding what criteria were used to inform an independent reviewer what a satellite terminal is in terms of its relationship to BIT. This information is required in order to understand the Purpose of MIT.

3.2.2 Alternative Means of Carrying Out the Project

Part 2, Section 2.2 of the EIS Guidelines requires CN to “identify and consider” the effects of alternative means of carrying out the MIT Project “that are technically and economically feasible.”

For more information on “alternative means”, the EIS Guidelines direct CN to OPS 2015. OPS 2015 states that “alternative means” can include “options for locations, development and/or implementation methods, routes, designs, technologies, mitigation measures etc.”

OPS 2015 also provides a required four-step analysis for considering the alternative means for carrying out the Project (“4-Step Analysis”):

Step 1: Identify technically and economically feasible alternative means;

Step 2: List their potential effects on valued components;

Step 3: Select the approach for the analysis of alternative means; and

Step 4: Assess the environmental effects of alternative means.

The CN EIS considers the following alternative means of carrying out the Project in Section 2.2:

> *Alternative means of carrying out the Project consider the technical and economic feasibility of the following:*
>
> - *alternative project site location;*
> - *alternative transportation corridors (i.e., routes for truck traffic for vehicles owned and operated by CN); and,*
> - *location and design considerations of key Project components of the preferred site location…*

Each of these alternative means is discussed further in the following sections.

3.2.2.1 Alternative Project Site Locations: BIT

(A) Site Selection Study: Phase 1

With respect to the 4-Step Analysis outlined in OPS 2015, the first step of identifying technically and economically feasible alternative means involves a selection of technical criteria to determine the alternative means and to document the rationale in "sufficient detail for an independent reviewer to assess the criteria developed, the nature of the alternative means considered, the approach taken to assess these alternative means against the criteria, and the alternative means retained for further analysis.

In Section 2.2.1 of the CN EIS, CN evaluates four alternative site locations. However, the detailed Site Selection Study is found in the CN EIS Documents, Appendix F. In Section 3.2 of the Site Selection Study, CN considers 12 potential sites for the Terminal in Phase 1 of the Study, including MIT (Site #9) and BIT (Site #4).

At page 7 of the Site Selection Study, Table 3.1 outlines that BIT fails as a potential site based on Principle 2: "[s]ites that do not meet the minimum size and site orientation requirements along the CN mainline necessary to construct and operate the proposed intermodal terminal include BIT…" Accordingly, BIT was not carried forward to Phase 2 of the Study for consideration.

In circumstances where the Project includes a reference to BIT approaching capacity, and expanding BIT was indeed one of the site locations identified as an alternative means of carrying out the Project to meet CN's "growing operational and commercial needs", insufficient information in relation to BIT as a site location was provided. More specifically, I do not know how the criteria used in Phase 1 of the Site Selection Study to assess site locations against each other were selected or implemented and/or whether the approach taken to assess these alternative means against the criteria also considered using more sophisticated technology/equipment and analysis at BIT to increase capacity and therefore require less space adjacent and parallel to the CN mainline to meet the construction and operational requirements for an intermodal terminal.

I have reviewed CEA Agency Information Requests and CN Information Request Responses regarding the Site Selection Study (specifically, in relation to IR-6), and further information given by CN in response to information requests were only based on Phase 2 of the Site Selection Study and not Phase 1 of the Study. Further information is required to assess the sufficiency of Phase 1 of the Site Selection Study in order to determine whether a satellite terminal is even required to satisfy the "Purpose of the Project".

Design, Equipment and Technology

I believe that an alternative means for increasing the overall BIT terminal throughput capacity is available and was not considered and apparently not included in the CN EIS Documents, even though the "Project" definition includes a reference to BIT approaching capacity. Design, equipment and technology considerations should have been addressed as part of the alternative means assessment in relation to site selection.

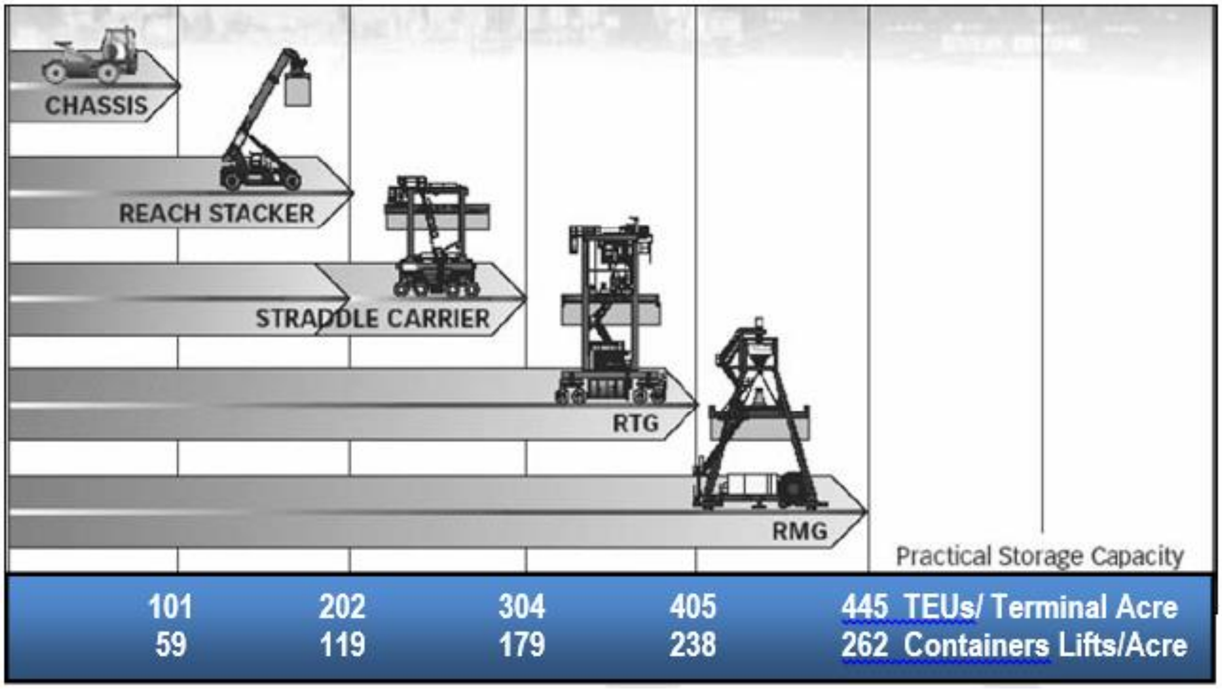
CN has long operated the BIT and other intermodal terminals in their network as a "Reach Stacker" yard crane operation. The Reach Stacker terminal equipment mode of operation, although highly flexible, is generally accepted in the North American intermodal industry as lower productivity terminal yard equipment type. As indicated previously in this report, today's modern intermodal terminal operations have many yard choices that could offer dramatically increased intermodal terminal capacity with smaller footprints and substantial reductions in air contaminant emissions.

Higher productive yard crane operational modes could offer BIT a meaningful alternative, apparently yet to be investigated by CN. This approach would change the current existing BIT intermodal container yard crane equipment from the current yard Top Lift-Forklifts/Reach Stackers and current rail loading Rubber Tired Gantry ("RTG") to one of the following terminal crane equipment operating modes with substantial productivity and throughput benefits:

- A full RTG container yard layout operation replacing the current Top Lift-Forklifts/Reach Stackers yard cranes and keeping the current rail loading RTGs.

- A full container yard layout using state-of-the-art Zero Emission, Electric Drive Wide Span Cranes ("WSC") (a high throughput, small footprint Rail Mounted Cranes ("RMC") container yard operation).

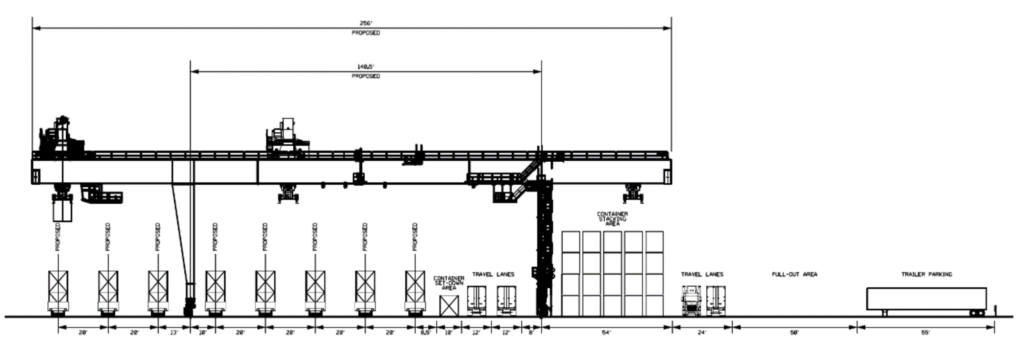
Increasing Terminal Capacity with Yard Crane Equipment Changes



Considering the potential productivity benefits of the above chart, changing from a Reach Stacker yard crane system to a RTG or Rail Mounted Gantry ("RMG") yard crane system could effectively double the intermodal rail terminal practical storage and throughput capacity.

Zero Emission, Electric Drive, Wide Span Cranes & Rail Mounted Cranes

It is clear that the intermodal industry trend in North America for Class I railroads is to more and more turn to zero emission, electric drive, wide span cranes, with a small physical footprint, to maximize intermodal rail terminal throughput capacity on a new or existing intermodal rail terminal. A partial typical cross section of a CSX wide span crane (WSC) also referred to as a RMG crane is illustrated below.



These WSC or RMG/RMC yard crane installations have proven to strikingly reduce air emissions and provide for almost silent terminal crane operations. From an intermodal rail systems standpoint, the WSC/RMG/RMC can dramatically increase terminal throughput and network connections for the railroad while improving facility safety and all while operating in a semi-automated or fully automated operational mode.

The environmental emissions benefits of a WSC/RMG/RMC for an intermodal rail terminal installation are impressive. The following chart is an excerpt from the CSX analysis for the CSX New North Baltimore, Ohio new WSC Integrated Intermodal Logistics Hub project (Northwest Ohio).

Operation	Pollutant (grams/lift)			
	HC	CO	NO_x	PM
WSC	1.8	8.3	23.9	2.1
Reduction vs. conventional	**84%**	**83%**	**84%**	**82%**

HC=Hydrocarbons , CO=Carbon Monoxide, No_x=Oxides of Nitrogen, PM=Particulate Matter, 454g/lb., 2000 lbs/ton

In light of the above, it is apparent that CN does not provide sufficient information regarding the site selection process in relation to BIT as an alternative site. The following information is required in order to understand the alternative means for carrying out the MIT Project:

Information Requests:

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Alternative Means: Site Selection EIS Guidelines, Part 2, Section 2.2 OPS 2015	CN EIS, Section 2.1 Site Selection Study (App. F)	**IT.8** **Site Selection Documents** Please provide any additional reports, analyses or studies on potential sites and site selection criteria, including under Phase 1 of the Site Selection Study.	Technical deficiency of information. CN does not provide sufficient information regarding how it arrived at its site selection locations. This information is required in order to determine the sufficiency of the alternative means analysis for carrying out the Project.
Alternative Means: BIT as an Alternative Site EIS Guidelines, Part 2, Section 2.2	CN EIS, Section 2.2 Site Selection Study (App. F)	**IT.9** **Information on Site Selection Criteria** Please provide further information on the selection and	CN does not provide sufficient information regarding whether increasing capacity at BIT through sophisticated technology and equipment was considered. This information is required in order to

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
OPS 2015		implementation of criteria used in Phase 1 of the Site Selection Study to assess site locations against each other and whether the approach taken to assess alternative site locations against the criteria, considered using more sophisticated technology and equipment at BIT than what currently exists at BIT to increase capacity. If so, please also provide this background information.	understand the sufficiency of the alternative means analysis for carrying out the Project.

(B) Cushman & Wakefield Reports

CN refers to two reports in the CN EIS Documents that relate to the site selection process that were not disclosed: (i) *Cushman & Wakefield – Valuation & Advisory June 2015;* and (ii) *Cushman & Wakefield 2015 – Economic and Financial Impact of an Intermodal Terminal in Milton. Prepared for Canadian National Railway Company ("Cushman & Wakefield – Economic and Financial Impact of an Intermodal Terminal in Milton 2015")*

With respect to *Cushman & Wakefield – Valuation and Advisory June 2015*, Section 3.4 of the Site Selection Study states that a land availability review of 44 sectors was evaluated of which many were disqualified. Disclosure of the report is required by the EIS Guidelines as well as to determine the sufficiency of the site selection process under the "alternative means" assessment, including how other sites were selected and disqualified, including BIT.[5]

The *Cushman & Wakefield – Economic and Financial Impact of an Intermodal Terminal in Milton 2015* is referred to in the CN PJR. The CN PJR states that this report concludes that "the western GTA would be most advantageous given its access to CN's national and international networks" and that "Milton has capacity to attract a substantial amount of intermodal oriented development … based on its location, land availability, affordable price levels, proximity to a broad labour supply and access to the Provincial 400 series highways." Disclosure of this report is required by the EIS Guidelines as well as to determine the sufficiency of the site selection process under the "alternative means" assessment, including whether other sites including BIT were evaluated.

As set out in the table above, CN does not provide sufficient information regarding the site selection process and BIT as an alternative site. The following information is required in order to understand

[5] Please see IT.3 above for my information request for *Cushman & Wakefield – Valuation & Advisory June 2015*.

the alternative means for carrying out the proposed MIT Project:

Information Requests:

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Alternative Means: Economic and Financial Impact EIS Guidelines, Part 2, Section 2.2 OPS 2015	CN EIS, Section 2.2 CN PJR, page 3	**IT.10** **Missing Referenced Document** Please provide the following document: *Cushman & Wakefield 2015 – Economic and Financial Impact of an Intermodal Terminal in Milton. Prepared for Canadian National Railway Company*.	Technical information deficiency. Further, CN references this report to explain the site selection process, but does not provide it. This information is required in order to understand the alternative means proposed.

3.2.2.2 Transportation Corridors (Truck Routes)

Part 2, Section 2.2 of the EIS Guidelines requires CN to include "approved transportation corridors and routes for truck traffic for vehicles owned and operated by the proponent" in its alternative means analysis.

Section 2.2 of the CN EIS and the *BA Group November 2015 Review of Terminal-Generated Truck Traffic* at Appendix E.17 ("BA Group 2015 Report") discuss transportation corridors and truck routes. Furthermore, the CN PJR refers to a BA Group study dated October 2015 (the "BA Group October 2015 Study"), which CN does not provide as part of the CN EIS Documents. Information within the BA Group October 2015 Study, including Figure 16 to the CN PJR (Estimated Proportions of Heavy Truck Trips Utilizing Expected Routes To/From Proposed Logistics Hub), is required in order to understand proposed routes and anticipated volumes of truck traffic at MIT.

In Section 2.2.2 of the CN EIS, CN states that the BA Group was retained to "assess the impact of the truck traffic generated by the development of the proposed terminal." The BA Group 2015 Report generates conclusions based on a number of assumptions and conclusions given to it by CN, including (bolded terms are mine):

Document	Page Reference	Quote
BA Group 2015 Report	1-2 & 10	**CN has determined** that the Terminal: "*is expected to generate approximately 800 trucks per weekday entering and exiting the hub which will include up to 650 inbound and 650 outbound trucks at the beginning and up to 800 trucks each way by 2020. These trucks will enter the hub through the gate, drop off or pick-up a container from the hub and exit the hub."* For the purpose of this assessment, the estimate of up to 800 Terminal-generated heavy-truck 2 trips per day in each direction has been adopted.

Document	Page Reference	Quote
BA Group 2015 Report	2 & 10	**CN has also provided BA Group** with a proportional pattern of hourly ingress and egress movements over the course of a typical 24-hour weekday operation. The pattern was developed through analysis data provided by CN of inbound and outbound gate movements at the Brampton Intermodal Terminal ("BIT") over the course of a year ending in September 2015."
BA Group 2015 Report	6	The directional distribution of Terminal-generated heavy-truck travel to each of the principal points of approach adopted by this assessment is based on information collected through a comprehensive Commercial Vehicle Survey undertaken by MTO at the existing CN Brampton Intermodal Terminal (BIT). Detailed results of the survey were provided by MTO to CN and utilized by BA Group for the purpose of this assessment. Between 2012 and 2014, a total of 790 truck drivers accessing the BIT were surveyed by MTO as part of the Commercial Vehicle Survey. The surveys were based on a random sampling of trucks. The MTO survey data represented a random sampling of trucks currently accessing the BIT and in **CN's opinion** is the best available data to assess the likely origin and destination of truck trips originating from and destined to the BIT. **CN has advised** that the same customer base will be served by the relocation of container traffic from the BIT to the proposed Terminal in Milton in 2020. Consequently, the origin-destination information collected through the MTO survey at the BIT has been adopted as being suitably representative of the distribution of truck trips generated by the Terminal.

Subsequent to the filing of the EIS, CN has included as part of its Information Request Response (IR13-2) in regards to an air quality analysis prepared on September 30, 2016, Traffic Volume Forecasts (2021 and 2031). CN states that the traffic volume forecasts were assembled from "various sources" and is "a reasonable set of volumes".

The BA Group Study 2015 and the September 30, 2016 *Traffic Volume Forecasts (2021 and 2031)* is based on information and assumptions that have been provided to the BA Group by CN. CN does not clearly explain how this traffic data was collected nor where to obtain it. Where CN relies on data collected at BIT, CN does not explain how or why the BIT data can be correlated to the MIT data. This information is therefore requested to be disclosed.

Even where the traffic data can be substantiated with background reports, studies and investigations, the traffic analysis does not sufficiently take into account fundamental factors required to properly assess the sufficiency of the truck traffic used to assess its impact with respect to the development of MIT:

i. **Consistent planning horizon data**:

- Truck traffic analysis was based on 2015 traffic data for a planning horizon of 2020. The September 30, 2016 Volume Traffic Volume Forecasts provided for 2021 and

2031 were for inclusion in the air quality analysis. This information does not seem to be taken into account in the truck traffic analysis.

- Further information in relation to how these 2021 and 2031 forecasts are incorporated into the transportation corridors analysis of the CN EIS (Section 2.2.2) should be provided in order to take into account probable traffic growth in Milton as of these future forecast dates.

ii. **Seasonal traffic data**:

- CN makes statements in relation to the number of trucks entering and exiting MIT. I do not have enough information to understand whether this is a maximum value or average value. Maximum values are required to properly assess peak flows in the traffic and volume analysis.

iii. **Directional distribution of traffic data**:

- CN is relying on a Commercial Vehicle Study by MTO that includes origin and destination data from BIT, as being representative of origin and destination data at MIT, without commenting on how the data can be correlated to MIT or whether there is any uncertainty in doing so or limitations to the conclusions made.

- The MTO Study was not provided as part of the CN EIS Documents and is requested to be disclosed as part of this process.

- However, I was able to access a series of datasets from MTO published in 2015, as listed in Appendix B to this report. If this is the same study that is relied upon by the BA Group, the MTO data appears to be based on a commercial vehicle flow database collected that provides 2006 and 2008 average vehicle daily values. The data is derived from the information collected in the 2006 Ontario Commercial Vehicle Survey, published on April 30, 2015, which was also not provided as part of the CN EIS and is requested to be disclosed as part of this process. Generally, this commercial vehicle survey data is 10 to 12 years old and by the time MIT gets constructed will be even older.

- Further information is required in relation to how and why this origin and destination data can be correlated to MIT including any limitations on the inferences or conclusions that can be drawn from this information, in order to determine the sufficiency of the impact on the traffic analysis presented by CN.

During a May 27, 2015 CN presentation to Halton Regional Council, CN repeatedly referenced an ongoing AECOM in-depth truck traffic study identifying truck traffic impacts associated with the MIT Project. CN does not provide this AECOM truck traffic study. It is required in order to evaluate the truck traffic demands for the Terminal, particularly immediately outside the Terminal gate.

Lastly, I have reviewed the Metrolinx Presentation entitled *Milton Corridor Committee – Meeting #3 – October 7, 2016* and *Correspondence dated February 6, 2017 from Deputy Minister of Transportation (MTO) to Lesley Griffiths, Panel Chair, Milton Logistics Hub Project Review Panel c/o Canadian Environmental Assessment Agency* and note that in relation to sufficiency of transportation corridor information, CN has not commented on how the new Brampton-Milton freight corridor will affect rail and truck traffic patterns, including whether there will be a shift of rail freight presently destined to Brampton for distribution or whether distribution will move onto the Milton corridor for distribution from there.

As set out in the table above, CN has not provided sufficient information regarding the Transportation Corridors (Truck Routes). The following information is required in order to understand the alternative transportation corridors:

Information Requests:

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Alternative Means: Truck Traffic EIS Guidelines, Part 2, Section 2.2 OPS 2015	CN EIS, Section 2.2.2 CN PJR, Section 4.4	**IT.11** **Missing Referenced Document** BA Group October 2015 study referenced in the CN PJR.	Technical deficiency of information. Further, CN does not provide sufficient information regarding traffic data and assumptions. This information is required in order to determine the sufficiency of the alternative transportation corridors and the sufficiency of the description of truck operations.
Alternative Means: Truck Routes EIS Guidelines, Part 2, Section 2.2 OPS 2015	CN EIS, Section 2.2.2 BA Group Study 2015 & BA Group September 30, 2016, Traffic Volume Forecasts (2021 and 2031)	**IT.12** **BA Group Background Information** Please provide the origin of all truck traffic data provided by CN to the BA Group including all reports, studies and investigations. Where traffic data is based on BIT, please explain why the assumptions were made and whether there are limitations on the inferences and conclusions that can be drawn.	Technical deficiency of information. Further**,** CN does not provide sufficient information regarding how the traffic data was collected and where the traffic data and assumptions provided to CN were derived. Where CN relies on BIT traffic data, it does not explain how or where these assumptions are made. This information is required in order to determine the sufficiency of the alternative transportation corridors and the foundation and applicability of this information to MIT truck operations.
Alternative Means: Truck Routes EIS Guidelines, Part 2, Section 2.2 OPS 2015	CN EIS, Section 2.2.2 BA Group Study 2015 and BA Group September 30, 2016, Traffic Volume Forecasts (2021 and 2031)	**IT.13** **2021 and 2031 Traffic Volume Forecasts** Please provide further information in relation to whether and how the September 30, 2016 Traffic Volume Forecasts have been incorporated into the transportation corridors analysis of the EIS (Section 2.2.2).	Technical deficiency of information. CN should incorporate the newly generated traffic data reported in the September 30, 2016 Traffic Volume Forecasts into the traffic analysis provided in Section 2.2.2 of the EIS in order to take into account traffic growth in Milton as of these future forecast dates.

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Alternative Means: Truck Routes EIS Guidelines, Part 2, Section 2.2 OPS 2015	CN EIS, Section 2.2.2 BA Group Study 2015 and BA Group September 30, 2016, Traffic Volume Forecasts (2021 and 2031)	**IT.14** **Seasonal Traffic Data** Please provide detailed information regarding the number of trucks entering and leaving MIT by season and whether the "*800 trucks per weekday entering and exiting the hub which will include up to 650 inbound and 650 outbound trucks at the beginning and up to 800 trucks each way by 2020"* represents an average value or a maximum value.	Technical deficiency of information. There is always a seasonable variability i.e. peaks in October/November timeframe before Christmas, and therefore maximum values are required to properly assess peak flows in the traffic and volume analysis for MIT.
Alternative Means: Truck Routes EIS Guidelines, Part 2, Section 2.2 OPS 2015	CN EIS, Section 2.2.2 BA Group Study 2015 & BA Group September 30, 2016, Traffic Volume Forecasts (2021 and 2031) at page 6	**IT.15** **Missing Referenced Documents** Please provide *MTO Comprehensive Commercial Vehicle Survey* undertaken by MTO at BIT. Please provide *2006 Ontario Commercial Vehicle Survey*, published on April 30, 2015.	Technical deficiency of information. Further**,** CN does not provide sufficient information regarding traffic data and assumptions. This information is required to understand the reliability of the description of truck operations in order to determine the sufficiency of the alternative transportation corridors prescribed.
Alternative Means: Truck Routes EIS Guidelines, Part 2, Section 2.2 OPS 2015	CN EIS, Section 2.2.2 BA Group Study 2015 & MTO Commercial Vehicle Study	**IT.16** **Directional Distribution of Traffic Data** Please provide further information in relation to how BIT traffic data from the MTO Commercial Vehicle Study can be correlated to MIT traffic data, including origin and destination data, and whether there are any limitations on the inferences or conclusions that can be drawn from this Study.	Technical deficiency of information. Further, CN does not provide sufficient information on the applicability of the BIT traffic data from the MTO Commercial Vehicle Study to the MIT traffic data, including origin and destination data. This information is required in order to understand the reliability of the traffic analysis in order to determine the sufficiency of the alternative transportation corridors presented.
Alternative Means: Truck Routes EIS Guidelines, Part 2, Section 2.2 OPS 2015	CN EIS, Section 2.2.2	**IT.17** **Missing Referenced Document** Milton Intermodal Truck Traffic Investigation prepared by AECOM and relied upon by Marie-Therese Houde (former CN Director of Corporate Development).	Technical deficiency of information. During the May 27, 2015 presentation to Halton Regional Council, CN referenced this report to explain the needs of growing customer base at BIT and the potential effects of MIT on truck traffic, but CN does not provide the report. This information is required in order to understand the

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
			truck traffic demands at MIT.
Alternative Means: Metrolinx Freight Corridor EIS Guidelines, Part 2, Section 2.2 OPS 2015	CN EIS, Section 2.2.2	**IT.18** **Information re Brampton-Milton Freight Corridor** Please provide information on the anticipated function of the Brampton-Milton Rail Corridor with respect to the movement of freight to and from the MIT.	CN does not provide sufficient information on how the new Brampton-Milton freight corridor will affect truck traffic patterns, including whether there will be a shift of rail freight presently destined to Brampton for distribution or whether distribution will move onto the Milton corridor for distribution from there. This information is required in order to understand the freight demands at MIT.

3.2.2.3 Key Project Components

Part 2, Section 2.2 of the EIS Guidelines require CN to address the "location of key project components" and "access points to the project site" as part of its alternative means analysis.

Section 1.2.1 of the CN EIS provides CN's list of "key components of the Project", of which many are illustrated in the CN Plans dated April 24, 2015, which form part of the CTA Application ("CN Plans").

However, Section 2.2.3 of the CN EIS only considers the following "key project components" in addressing the alternative means assessment in regard to the location and design of these components:

- truck entrance location;
- gate location;
- Lower Base Line crossing;
- water supply;
- wastewater management;
- SWM;
- utilities; and,
- Indian Creek realignment.

CN does not provide an alternative means analysis with respect to location of all of the key project components it originally defines in Section 1.2.1 of the CN EIS, and therefore does not satisfy the technical requirements of the CN EIS.

With respect to the key project components considered, CN provides its analysis and preferred options in Section 2.2.3 as well as a "Summary of Alternative Means of Carrying out the Project" in Table 2.2 in the CN EIS.

CN considers alternative truck entrance locations in Section 2.2.3.1 of the CN EIS, identifying several potential entrances and assessing them against a variety of criteria identified in Table 2.1. However, CN does not provide sufficient detail with respect to the approach taken to assess the alternative truck locations against the selected criteria and how Britannia Road was considered as the preferred location. For example, CN does not provide any detail regarding why alternative locations failed on "dispersion opportunities", "economic considerations" and "limits potential conflict with existing residences". Further information is required with respect to the "additional upgrades, approvals or engineering design considerations" in relation to the other locations which were not chosen (Step 1 of 4-Step Analysis). CN also does not provide information regarding whether the selection of the preferred Britannia Road entrance will cause significant adverse environmental effects (Step 4 of 4-Step Analysis).

Similarly, CN considers gate location in Section 2.2.3.2 of the CN EIS. CN does not completely satisfy and/or disclose all of the requirements of the 4-Step Analysis, including whether CN selected more than one alternative for the alternative gate location, i.e. inbound and outbound gate locations, the selection of criteria required to determine the technical and economic feasibility of the alternative gate location and whether the preferred option of being setback from the Britannia Road entrance/being adjacent to the work pad will cause significant adverse environmental effects.

CN provides insufficient information in relation to alternative locations and design for the Project's key components and further information is thus requested.

I note that "key project components" have not been defined within the EIS Guidelines. I agree that truck entrance and gate locations are two key project components. However, from my perspective, CN has not labelled or described in the CN EIS Documents, including the CN Plans, many key project components that should have been considered as part of the alternative means analysis with respect to location and design, including dominant equipment operating type and general arrangement of the Project site including yard and container layout and loading track geometry.

The following information is required in order to understand the alternative means analysis for key project components:

Information Requests:

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Alternative Means: Key Project Components EIS Guidelines, Part 2, Section 2.2	CN EIS, Sections 1.2.1 & 2.2.3	**IT.19** **Alternative Means Analysis for Key Project Components** Please provide an alternative means analysis with respect to location and design of <u>all</u> of the key project components identified in Section 1.2.1 of the CN EIS.	CN has not satisfied the technical requirements of the EIS Guidelines.
Alternative Means: Other Key Project Components EIS Guidelines, Part 2, Section 2.2	CN EIS, Section 2.2.3.2	**IT.20** **Other Key Project Components Not Considered** Further, please provide an alternative means analysis for location and design for other key project components not identified in the CN EIS including dominant equipment operating type and general arrangement of the Project site including yard and container layout as well as loading track geometry.	CN has not identified all key project components. The EIS guidelines requires CN to consider alternative means for the location and design of key project components.
Alternative Means: Key Project Component – Truck Entrance Location EIS Guidelines, Part 2, Section 2.2	CN EIS, Section 2.2.3.1 & Table 2.1	**IT.21** **Alternative Truck Entrance Locations** Please provide information related to the approach taken to assess the alternative truck locations against the selected criteria and how Britannia Road was considered as the preferred location. This request includes information of why alternative locations failed under the criteria selected and information related to the "additional upgrades, approvals or engineering design considerations" of the other truck locations which were not chosen. Additionally, please provide information of whether the preferred location will cause significant adverse environmental	CN has not satisfied the 4-Step Analysis required by OPS 2015 as incorporated into the CN EIS.

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
		effects.	
Alternative Means: Key Project Component – Gate Location EIS Guidelines, Part 2, Section 2.2	CN EIS, Section 2.2.3.2 & Table 2.1	**IT.22** **Alternative Gate Locations** Please provide information required under the 4-Step Analysis, including: whether CN selected more than one alternative for the alternative gate location i.e. inbound and outbound gate locations, the selection of criteria required to determine the technical and economic feasibility of the alternative gate locations and whether the preferred option of being setback from the Britannia Road entrance/being adjacent to the work pad will cause significant adverse environmental effects.	CN has not satisfied the 4-Step Analysis required by OPS 2015 as incorporated into the EIS Guidelines.

3.2.3 Design Information

Part 2, Section 3.1 of the EIS Guidelines requires the CN EIS to include a description of the "project components, associated and ancillary works, and other characteristics that will assist in understanding the environmental effects."

Section 3.2 and 3.3 of the CN EIS describes MIT Project setting, referring to Figures 2 & 3, Appendix B to identify the Project components and the preliminary design of the Terminal and proposed project components, respectively.

While the CN EIS provides some information on Terminal design and project components, it does not provide sufficient information to properly assess the design of the proposed MIT Project that would be need to be provided in order to understand the full picture of environmental effects. Further information requested with respect to the MIT design and layout of project components that have not been provided by CN include:

i. Terminal entrance and exit gate area layouts/plans including container inspection facilities, inbound and outbound truck canopies, Equipment Interchange Report (transfer of custody) booths and drive assistance buildings (roadway station);

ii. Terminal Administration Building description, floor plans and all building elevations;

iii. Terminal refrigerated container operating areas;

iv. Maintenance and repair building/facility floor plans, elevations; and

v. Terminal equipment fueling system

Although the CN Plans illustrate some of these components, they have not been labelled or specifically addressed. A full hardcopy blueprint set of the all of the engineering drawings contained within CN's Project Number 60332275 (and any associated project numbers to MIT) is thus requested, in order to understand all of the design features of MIT.

Further, CN states in Section 3.3 that "as engineering studies progress and consultation continues… some of the details of the Project described in the following sections may be refined". Updated CN plans are thus requested in order to assist in understanding the true picture of environmental effects.

Information Requests:

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Design: Additional project components EIS Guidelines, Part 2, Section 3.1	CN EIS, Sections 3.1 to 3.3 & Figures 1 to 3 (App. B) CTA Application: CN Plans	**IT.23** **MIT Design and Layout Information** Please provide further information with respect to the MIT detailed design and layout of the following project components that have not been specifically described or labelled in the CN Plans, including: ▪ Terminal entrance and exit gate area layouts/plans including container inspection facilities, inbound and outbound truck canopies, Equipment Interchange Report booths and drive assistance buildings (roadway station); ▪ Terminal Administration Building description, floor plans and all building elevations; ▪ Terminal refrigerated container operating areas; ▪ Maintenance and repair building/facility floor plans, elevations; and ▪ Terminal equipment fueling system	A description of all of the project components, associated and ancillary works, and other characteristics is required in order to assist in understanding whether there are any associated environmental effects.

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Design: Engineering Drawings EIS Guidelines, Part 2, Section 3.1	CN EIS, Sections 3.1 to 3.3 CTA Application: CN Plans	**IT.24** **Missing Documents** Full hardcopy blueprint copies of CN Plans in Project Number 60332275 (and any associated projects related to MIT)	The engineering drawings are required in order to understand the full design of MIT and to thus understand whether there are any associated environmental effects.
Design: Updated Design of Project Components EIS Guidelines, Part 2, Section 3.1	CN EIS, Sections 3.1 to 3.3 & Figures 1 to 3 (App. B)	**IT.25** **Design of Project Components** Please provide updated information and design of Project components and associated and ancillary works	CN has stated that only a preliminary design has been provided and that project components will be further refined as engineering studies progress and consultation continues. An updated design is required in understanding the true picture of environmental effects.

3.2.4 Construction Information

Part 2, Section 3.2 of the EIS Guidelines require the CN EIS to include "descriptions of the construction… phases associated with the proposed project."

These must include "descriptions of the activities to be carried out during each phase, the location of each activity, expected outputs and an indication of the activity's magnitude and scale" as well as a "schedule including the time of year, frequency, and duration for all project activities."

Section 3.2.1 of the EIS Guidelines require the CN EIS to include a description of the following site preparation and construction activities:

- *site clearing, excavation, and grading activities (location, footprint);*
- *borrow materials requirements (source, quantity);*
- *laying of new track and realignment of existing track (methods, timing);*
- *water course diversion required (location, methods, timing);*
- *erosion and sediment controls to be used during construction.*
- *equipment requirements (type, quantity);*
- *construction laydown areas (location, footprint);*
- *administrative buildings, garages, other ancillary facilities (location, footprint);*
- *number of employees and transportation of employees; and*
- *disruption to train activities on the mainline (duration and volume).*

Section 3.4.1 of the CN EIS sets out the main construction activities. CN has also included as part of its Information Request Response (IR-5) a "Conceptual Project Schedule" which it states reflects the construction timing windows that have been incorporated into the construction schedule to minimize and avoid potential environmental effects. The Information Request Response (IR-13)also refers to the Technical Data Report Noise Assessment TDR (Appendix E.10) for a further breakdown of construction activities during each phase of construction, including Table 4.3.2, Table 4.6 and TDR Appendix D.

Several vague and incomplete statements have been made throughout the CN EIS Documents with respect to construction activities and therefore do not fully address the threshold required by the EIS Guidelines. These statements include the following:

Document	Section Reference	Quote
CN EIS	3.4.1 Construction	These activities are common to construction projects. Different phases of construction are expected to occur at different times. It is expected that construction equipment will operate in different areas of the PDA at different times during the construction phase
CN EIS	3.4.1.1 Site Clearing and Grading Activities	An erosion and sediment control plan will be prepared for the construction phase of the Project
CN EIS	3.4.1.2 Track Construction and Signals Installation	Disruptions of train activities on the mainline will occur during cutovers of mainline tracks. The construction staging scheme for the Terminal and track work is a process commonly executed by CN. Once construction of the railway grade is complete, ties and rails will be distributed and placed accordingly along the track alignment. Ballasting, final surfacing with mechanized lifting and lifting equipment, termite welding, grinding and destressing will complete track construction. Signals and switching equipment will be installed as required.
CN EIS	3.4.1.3 Terminal Infrastructure	While the final method and materials to be used for the construction of the work pads have not been finalized, likely materials include either asphalt or roller compacted concrete. The type of pavement for the Terminal pads will be determined during detailed design. In the event of a concrete surface, a temporary batch plant will be constructed at or immediately adjacent to the Terminal (within the PDA), in order to construct the work pads… The location of temporary construction offices will be confirmed during detailed design, but will be located on the site within the PDA. Options include using temporary mobile offices or existing buildings within the PDA as construction offices.
CN EIS	3.4.1.5 Utilities	For third party infrastructure, CN will work with other affected parties, including the Town of Milton and Sun-Canadian, to develop methods and timing for construction to keep on CN's schedule for the protection of the environment.
CN EIS	3.4.1.7 Construction Equipment and Operation	Equipment will operate in different areas of the Project at different times during the construction period. Construction is planned to take place between 07:00 and 21:00, with the majority of activities likely occurring between 07:00 and 19:00 (daytime hours). However, periodic night time construction may be required during some components of the Project work….
CN EIS & App. E.10 Noise Effects	4.3.2 & App. D : Major Construction Activities and Equipment	**Table 4.6: Summary of Major Construction Activities** **Phase Major Construction Activities based on Preliminary Schedule** Phase 1: • Britannia bridge construction

Document	Section Reference	Quote
		• Pipeline relocation • Begin grading for mainline track shift/diversion • Begin Lower Base Line Grade Separation • Prepare laydown areas and setup trailers • Full-site clearing (incl. grub/vegetation)o topsoil • Full-site stripping of topsoil • Berm/barrier construction • Begin grading for major site works and tracks • Begin construction of gate and access bridge • Begin building construction Phase 2: • Continue grading for major site works and track • begin drainage for major site works • complete gate and access bridge • pave access road • continue building construction • continue Lower Base Line bridge construction • complete Britannia bridge • construction mainline track and new Ash East Phase 3: • construct yard tracks and pad tracks • paving pads and gate • complete building construction • final roadworks • construction of new Control Locations (Ash) • install gate systems and pad lighting • south-end track work

A detailed description of construction activities and a detailed construction schedule that includes the incomplete information outlined in the above table is required in order to be able to assess whether CN has taken steps to minimize and avoid potential environmental effects during the construction phases.

Information Requests:

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Construction EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.1 CN EIS Technical Data Report Noise Effects Assessment	**IT.26** **Detailed Description of Construction Activities** Please provide a detailed description of construction activities that were left incomplete in the CN EIS Documents, including:	Further information is needed in relation to construction activities in order to assess is taking steps to minimize and avoid potential environmental effects

	(App. E.10)	▪ An erosion and sediment control plan to be used during construction ▪ duration and volume of disruption to train activities on the mainline ▪ method and timing for laying of new track and realignment of existing track ▪ final method and materials to be used for the construction of the work pads and likely materials to be used ▪ the location of temporary construction offices ▪ Method and timing for construction of third party infrastructure including utility crossings ▪ location and footprint of construction laydown areas ▪ details regarding number of employees and transportation of employees during the construction phase ▪ location and footprint for construction of administrative buildings, garages and other ancillary facilities	
Construction EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.1 CN EIS Technical Data Report Noise Effects Assessment (App. E.10)	**IT.27** **Detailed Construction Schedule** Please provide a detailed construction schedule that includes all components of major construction activities in the Three Phases outlined in Table 4.6 of CN EIS Technical Data Report Noise Assessment (App. E.10).	Further information is needed in relation to construction activities in order to determine whether there is sufficient information to assess whether CN is taking steps to minimize and avoid potential environmental effects

3.2.5 Operations Information

Part 2, Section 3.2 of the EIS Guidelines require the CN EIS to include "descriptions of the… operation phases associated with the proposed project."

Section 3.2.2 of the EIS Guidelines require the CN EIS to include a description of the following operations:

- *on-site logistics and traffic plan (on and off-loading rates, site capacity for trucks, anticipated daily volumes);*
- *anticipated daily, monthly and seasonal schedules for rail transport;*
- *anticipated quantities of transported materials by type;*
- *equipment requirements and maintenance;*

- *infrastructure maintenance;*
- *wastewater and stormwater management on the project site;*
- *reagent requirements for maintenance (volumes, storage, types);*
- *petroleum products (source, volume, storage);*
- *temporary or permanent storage of hazardous materials (source, volume, storage);*
- *contribution to atmospheric emissions, including emissions profile (type, rate and source);*
- *water recycling activities;*
- *waste management and recycling; and*
- *number of employees, transportation of employees, work schedule, lodging requirement on site and off site.*

Under Section 3.4.2 of the CN EIS, CN provides information regarding MIT operations, including:

- truck operations (entrance/exit and movements);
- train operations;
- lift operations; and
- equipment maintenance

Comments with respect to CN's description of Operations will be subdivided into the following three sections: i) railway and truck operations; ii) intermodal terminal operations including lift operations and equipment maintenance; and iii) operations as a satellite to BIT.

3.2.5.1 Railway and Truck Operations

In Sections 3.4.2.1 and 3.4.2.2 of the CN EIS, CN provides a description of truck and train operations respectively.

CN does not provide the following information with respect to railway and truck operations, as required by Section 3.2.2 of the EIS Guidelines. I am therefore requesting the following information from CN:

- on-site logistics and traffic plan (on and off-loading rates, site capacity for trucks, anticipated daily volumes);
- anticipated daily, monthly and seasonal schedules for rail transport; and
- anticipated quantities of transported materials by type.

<u>Truck Operations</u>

With respect to truck traffic, CN refers to the BA Group Study discussed above in Section 3.2.2.2 as its basis for truck traffic. The same information requests made with respect to the BA Group Study above are requested on the basis of determining whether there is sufficient information in relation to truck operations.

CN also states in Section 3.4.2.1 of the CN EIS that "…it is estimated that the majority of truck movements will occur during the daytime. More specifically, it is estimated that approximately 85% of truck movements will occur between 05:00 and 21:00 as identified in the Review of Terminal-

Generated Truck Traffic..." The origin of this data in the BA Group Study is requested in order to determine the foundation and applicability of this information to MIT truck operations.

In Section 3.4.2.1 of the CN EIS, CN has proposed an automated gate system for the MIT entrance facility for trucks. In order to determine the efficiency of this system, descriptive information regarding the CN SpeedGate™ system to reduce the time trucks idle in line both proposed for MIT and currently at BIT is requested.

CN has also publicly indicated[6] that a Terminal Reservation system will be used at MIT to reduce truck times on inbound lanes to MIT. In order to determine the efficiency of this system, descriptive information regarding the Terminal Reservation system both proposed for MIT and currently at BIT is requested.

Lastly, CN has provided the type of truck movements expected to and from the Terminal and states that there will be "a variety of container types". CN has not provided any more detail in relation to the specific types of container types including varied container lengths, anticipated number of container types as well as the anticipated number of types of truck movements in relation to the variety of container types. CN provides illustrations of yard and container layout as part of the CN Plans, but does not clearly identify or describe how the variability of container lengths will be accommodated into the design and operations of the Terminal. This information is required in order to determine whether sufficient information in relation to truck operations has been included, in order to predict related environmental effects.

<u>Railway Operations</u>

CN provides a general description in relation to rail operations in Section 3.4.2.2 of the CN EIS as well as in the Application for an Order Pursuant to Section 98(2) of the CTA for Authorizing Construction, CN, January 22, 2016 (the "CTA Application").

CN states that the Terminal is planned to be served by four intermodal trains per day, including two existing trains that currently operate on the Halton Subdivision. CN does not provide any background information regarding the relationship between adding two new trains to volume forecasts at MIT and how the four trains will operate together to serve market demand. This information is necessary in order to determine whether sufficient information in relation to rail operations has been included to predict environmental effects.

CN provides a basic description of rail operations, from entering the Terminal, loading and unloading railcars, marshalling of trains, fueling of trains, repair of trains and departure of trains from the Terminal. More specific information in relation to daily, monthly and seasonal schedules for rail transport as well as a detailed on-site logistics and traffic plan is required, as earlier requested.

Lastly, I have reviewed two documents with respect to Metrolinx and CN reaching an Agreement-in-Principle ("AIP") to build a new 30km freight corridor between Brampton and Milton which would

[6] Marie-Therese Houde, CN's former Director of Corporate Development, referenced the Terminal Reservation system regarding the proposed MIT Project to Halton Regional Council on May 27, 2015: video available online at: https://www.youtube.com/watch?v=_E3A5EU1OdI.

provide an alternative route, or bypass, for freight rail traffic carried by CN between Brampton and Milton. These two documents are the *Metrolinx Presentation – Milton Corridor Committee (October 7, 2016)* and *Correspondence dated February 6, 2017 from Deputy Minister of Transportation (MTO) to Lesley Griffiths, Panel Chair, Milton Logistics Hub Review Panel c/o Canadian Environmental Assessment Agency.*

These documents explain that the new bybass (the "Brampton-Milton Rail Corridor") would be intended to allow CN to shift its freight traffic from the CN-owned section of the Kitchener corridor to the new bypass line, freeing up capacity for more GO service through Brampton to Kitchener. The Brampton-Milton Rail Corridor concept includes two mainline tracks, initially, and up to six tracks in the longer term.

It is important to be monitoring the effect of the AIP on the Project's design and operations. As such, as part of this process, it will be important to monitor the progress of the Agreement between the Province of Ontario and Metrolinx with CN, including disclosure of the AIP and any information updates to the AIP. It will also be important to understand the anticipated function of the Brampton-Milton Rail Corridor with respect to the movement of freight to and from MIT.

CN has also not provided the anticipated effect of additional freight train traffic in and out of the MIT on the frequency and scheduling of passenger train and commuter rail services for the GTHA. This is an important consideration that will have an impact on railway operations and ultimately, related environmental effects. This information is also in line with a *GTHA Urban Freight Study* produced by Metrolinx, which recognizes that urban freight and commuter traffic demands typically coincide, which compounds peak period congestion. In this study, Metrolinx provides strategic direction and possible actions to increase efficiency of the movement of goods in GTHA.

The following information is required in order to understand railway and truck operations at MIT:

Information Requests:

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Truck Operations EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2.1	**IT.28** **Truck Operations Information** Please provide the following information: ▪ on-site logistics and traffic plan (on and off-loading rates, site capacity for trucks, anticipated daily volumes); ▪ anticipated daily, monthly and seasonal schedules for rail transport; and ▪ anticipated quantities of	Technical information specifically required by EIS Guidelines

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
		transported materials by type.	
Truck Operations EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2.1	**IT.29 SpeedGate System and Truck Reservation System** Please provide descriptive information regarding the CN SpeedGate™ system and the Terminal Reservation system both proposed for MIT and currently at BIT is requested.	This information is needed in order to determine whether sufficient information in relation to truck idle times and truck operations has been included, in order to predict environmental effects.
Truck Movements EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2.1	**IT.30** **Truck Movement Information** Please provide information related to specific types of container types including varied container lengths, anticipated number of container types, anticipated number of types of truck movements in relation to the variety of container types and how the variability of container lengths will be accommodated into the design and operations of the Terminal.	This information is needed in order to determine whether sufficient information in relation to truck operations has been included to predict environmental effects.
Rail Operations EIS Guidelines, Part 2, Section 3.2 s. 98(2) of CTA	CN EIS, Section 3.4.2.2 CTA Application, page 13	**IT.31** **Added Train Operations Information** Please provide background information regarding the relationship between adding two new trains to volume forecasts at MIT and how the four trains will operate together to serve the market demand at MIT.	This information is necessary in order to determine whether sufficient information in relation to rail operations has been included in order to predict environmental effects.
Rail Operations **Requirements for Railway Operations and Services** EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2.2	**IT.32** **Effect of Additional Freight Traffic on Passenger Services** Please provide the anticipated effect of additional freight train traffic in and out of the Milton Hub on the frequency and scheduling of passenger train and commuter rail	This is an important consideration that will have an impact on railway operations and ultimately, related environmental effects.

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
s. 98(2) of CTA		services for the GTHA, including any reports, analyses, studies, projections or assessments of this issue.	
Rail Operations **Requirements for Railway Operations and Services** EIS Guidelines, Part 2, Section 3.2 s. 98(2) of CTA	CN EIS, Section 3.4.2.2	**IT.33** **Agreement-in-Principle Between Ontario and Metrolinx** Please provide the Agreement-in-Principle ("AIP") and information updates to the AIP between the Province of Ontario and Metrolinx with CN to build a new, 30km rail corridor between Brampton and Milton ("Brampton - Milton Rail Corridor").	It is important to be monitoring the effect of the AIP on the Project's design and operations.
Rail Operations **Requirements for Railway Operations and Services** EIS Guidelines, Part 2, Section 3.2 s. 98(2) of CTA	CN EIS, Section 3.4.2.2	**IT.34** **Anticipated Function of Brampton-Milton Corridor** Please provide the anticipated function of the Brampton – Milton Corridor with respect to the movement of freight to and from the MIT.	It is important to understand how the Brampton-Milton Corridor will operate in conjunction with MIT in the movement of freight, as it will have an impact on railway operations and ultimately, related environmental effects.

3.2.5.2 Intermodal Terminal operations Including Lift Operations and Equipment Maintenance

In Section 3.4.2 of the CN EIS, CN discusses general operations of the intermodal terminal. In Sections 3.4.2.3 and 3.4.2.4 of the CN EIS, CN provides a description of lift operations and equipment maintenance, respectively.

Although it is required by Section 3.2.2 of the EIS Guidelines, CN does not provide the following information with respect to railway and truck operations. I am therefore requesting the following information from CN:

- a description of infrastructure maintenance; and
- a description of temporary or permanent storage of hazardous materials, including source, volume and storage.

<u>General Operations</u>

In Section 3.4.2 of the CN EIS, CN makes the following statement with respect to volume projections of containers handled by the Terminal:

> *The Project will be designed to allow efficient transfer of containerized cargo between trains and the Terminal. Once completed, the Terminal will operate 24 hours a day, 7 days a week and is projected to handle approximately 350,000 containers annually at the start of operation and is designed for approximately 450,000 containers annually at full operation.*

CN does not provide any background information or foundation of how this projection was reached and thus I require background information in the form of any reports, analyses, data or studies to support this CN statement. This information is required in order to understand MIT's operation requirements.

CN further states in Section 3.4.2 of the CN EIS that some containers are temperature controlled to accommodate products that must be chilled/frozen or heated in the winter and some containers of goods will be categorized as dangerous goods. In order to have an accurate picture of operations at the Terminal, a projection of volume of each of these special container types must be taken into account when developing on-site logistics and design.

With respect to hazardous goods, CN states that they will not handle dangerous goods in bulk and that the hazardous goods will be handled in accordance of the *Transportation of Dangerous Goods Act*. Additional information regarding how these goods will be stored, where they will be stored and how CN will control the movement of bulk hazardous goods not entering the Terminal.

I also note that CN has not provided any information on Terminal emergency response operational procedures, i.e. fire, accident, hazardous spills, deleterious environmental spills and containment. This information is required in order to understand the full picture of MIT's operational requirements and whether these considerations were taken into account when developing on-site logistics and design is requested.

<u>Lift Operations and Equipment Maintenance</u>

CN provides some statements under Sections 3.4.2.3 and 3.4.2.4 of the CN EIS on the type of equipment it will be using at the Terminal, which includes prominent use of mobile reach stackers to lift containers on and off a chassis and on and off a railcar, and the use of yard tractors, light vehicles and maintenance vehicles. CN has also indicated the number of each type of equipment that will be required at the Terminal. I am requesting further background information to understand how the forecasted number of each type of equipment correlates to volume projections at MIT in order to determine whether an adequate amount of each type of equipment has been selected to ensure efficiency of operations at MIT.

Further, given the recent trends in intermodal terminal equipment outlined earlier in my report, it would also be useful to have a brief description from CN of its future terminal planning criteria for deploying terminal equipment automation at MIT and BIT, including CN's plans and commitments for future deployment of higher capacity terminal yard crane equipment, such as a rubber tired gantry crane (RTG), automated bridge cranes or rail mount gantry cranes (RMCs).

CN also provides general information regarding the use of work orders and managing of workload in the yard to track the location of every container through the use of computers. In order to understand the full picture of MIT's operation system, a more detailed description of the intended MIT Operating System (TOS) to be deployed at the Terminal is required, and how it compares to the BIT operating system.

With respect to equipment maintenance, CN has stated that it has a "rigorous maintenance program to ensure its equipment is safe and efficient". Further information in relation to how CN plans to deploy this program at MIT, including an annual schedule of the maintenance program, is required in order to completely understand all of the operations at MIT and how it may impact environmental effects.

Information Requests:

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
General Operations of Intermodal Terminal EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2	**IT.35** **General Intermodal Terminal Operations** Please provide the following information: • infrastructure maintenance; and • temporary or permanent storage of hazardous materials, including source, volume and storage.	Technical information specifically required by EIS Guidelines
General Operations of Intermodal Terminal EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2	**IT.36** **Container Volume Projections** Please provide any reports, analyses, data or studies to support the statement: *The Project will be designed to allow efficient transfer of containerized cargo between trains and the Terminal. Once completed, the Terminal will operate 24 hours a day, 7 days a week and is projected to handle approximately 350,000 containers annually at the start of operation and is designed for approximately 450,000 containers annually at full operation.*	Technical information deficiency. Further, this information is required in order to understand MIT's operation requirements.
General Operations of Intermodal Terminal EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2	**IT.37** **Volume Projection of Special Containers** Please provide a projection of volume of special container types at the Terminal, including those that require temperature control and those that contain hazardous goods.	This information is required in order to understand MIT's operation requirements.
General Operations of Intermodal	CN EIS, Section 3.4.2	**IT.38** **Handling and Storage of**	This information is required in order to understand MIT's operation

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
Terminal EIS Guidelines, Part 2, Section 3.2		**Hazardous Goods** Please provide information on how hazardous goods will be stored, where they will be stored and how CN will control the movement of bulk hazardous goods not entering the Terminal.	requirements.
General Operations of Intermodal Terminal EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2	**IT.39** **Terminal Emergency Response Operational Procedures** Please provide CN's information regarding emergency response operational procedures in the case of i.e. fire, accident, hazardous spills, deleterious environmental spills and containment.	This information is required in order to understand the full picture of MIT's operational requirements and whether these considerations were taken into account when developing on-site logistics and design.
Lift Operations EIS Guidelines, Part 2, Section 3.2	CN EIS, Sections 3.4.2.3 & 3.4.2.4	**IT.40** **Number of Each Type of Equipment** Please provide further background information of how the forecasted number of each type of equipment correlates to volume projections at MIT.	This information is required in order to determine in order to determine whether an adequate amount of each type of equipment has been selected to ensure efficiency of operations at MIT.
Lift Operations EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2.3	**IT.41** **Equipment Selection** Please provide a brief description from CN of its future terminal planning criteria for deploying terminal equipment automation at MIT and BIT, including CN's plans and commitments for future deployment of higher capacity terminal yard crane equipment, such as a rubber tired gantry crane (RTG), automated bridge cranes or rail mount gantry cranes (RMCs).	This information is required to determine whether CN has considered using efficient lift equipment at MIT or is planning to implement more advanced technology in the future at MIT
Lift Operations EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2.3	**IT.42** **MIT Operating System** Please provide a more detailed description of the intended MIT Operating System (TOS) to be deployed at the Terminal and how it compares to the BIT operating	This information is requested in order to understand the full picture of MIT's operating system.

Topic	Reference to CN EIS Documents and Information Responses	Requested Information	Rationale
		system.	
Operations: Equipment Maintenance EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2.4	**IT.43** **Information on Equipment Maintenance Program at MIT** Further information in relation to how CN plans to deploy its rigorous maintenance program at MIT, including an annual schedule of the maintenance program.	This information is required in order to completely understand all of the operations at MIT and how it may impact environmental effects.

3.2.5.3 Operations as a Satellite to BIT

CN states throughout the CN EIS Documents that it has been determined that a satellite terminal is required and that MIT would act as a satellite facility to BIT. However, the CN EIS is missing information relating to how MIT will operate as a satellite to BIT.

Further, there is conflicting information presented in the CN EIS Documents. For example, the BA Group Study 2015 states: “CN has advised that the same customer base will be served by the relocation of container traffic from the BIT to the proposed Terminal in Milton in 2020.”

The CN EIS does not provide sufficient information or data describing the function and operation of MIT as a satellite intermodal terminal operation to BIT. The following questions, which come to mind when reading the CN EIS, are not answered anywhere in the CN EIS Documents:

- What are the MIT satellite operational requirements related to BIT?
- Would segments of intermodal trains be shuttled between MIT and BIT?
- How would truckload cargo be handled and controlled in a satellite intermodal operation?
- Would a single Terminal Operating System (TOS) control both the BIT and the MIT terminal operations with MIT as a satellite terminal?

Accordingly, a description of the intended functions and operations of the MIT in its role as a satellite to BIT is required. A description of the anticipated volumes of freight movements between BIT and MIT, by what mode of transport and on what transportation routes is also requested. This information is required in order to determine the reasonableness of MIT as a satellite hub operating in concert with BIT operations.

Information Requests:

Topic	Reference to CN EIS Documents and Information	Requested Information	Rationale

	Responses		
Operations Information: Satellite Terminal EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2	**IT.44** **Description of MIT as Satellite to BIT** Please provide a description of the intended functions and operations of the MIT in its role as a satellite to BIT is required.	This information is required in order to determine the reasonableness of the MIT as a satellite hub operating in concert with BIT operations.
Operations Information: Satellite Terminal EIS Guidelines, Part 2, Section 3.2	CN EIS, Section 3.4.2	**IT.45** **Description of Freight Movements Between BIT and MIT** Please provide a description of the anticipated volumes of freight movements between BIT and MIT, by what mode or modes of transport, on what transportation routes.	This information is required in order to determine the reasonableness of the MIT as a satellite hub operating in concert with BIT operations.

3.2.6 Requirements for Railway Operations and Services

I understand that CN also requires approval under Section 98(2) of the CTA. CN submitted a CTA Application, as earlier referenced.

I have been advised that the test for approval under CTA, section 98(2) is set out in the following table:

Document	**Section Reference**	**Legislative Provision**
CTA	98(2)	98 (1) A railway company shall not construct a railway line without the approval of the Agency. (2) The Agency may, on application by the railway company, grant the approval if it considers that the location of the railway line is reasonable, taking into consideration requirements for railway operations and services and the interests of the localities that will be affected by the line.

Based on the information provided to me by Gowling WLG, my understanding is that in determining whether the location of the proposed railway line is reasonable under Section 98(2) of the CTA, the CTA Joint Panel member, must consider the “interests of the localities” as well as the “requirements for railway operations and services”.

I have been advised that “requirements for railway operations and services” can include the need for the line, alternative locations for the line, operational requirements and the use of equipment, infrastructure and crews.

It is my opinion that CN provides insufficient information in the CN EIS as well as in the CTA Application to evaluate whether the location of the proposed railway is reasonable, taking into account the views that I earlier presented in this report.

CN has provided insufficient information in relation to all aspects of purpose, alternative means, design, construction and operations, including the: (i) the purpose of MIT and whether BIT could have been selected as an alternative site by upgrading BIT's equipment and technology; (ii) market demand and background traffic volumes; and (iii) operations information including how MIT will act as a satellite to BIT, and the interface of MIT with the proposed Brampton-Milton Freight Corridor and passenger rail services for Halton.

Accordingly, my information requests under the CTA coincide with the information requests presented in this report with respect to the CN EIS.

4.0 CONCLUSIONS

As set out above, in each of the six categories of review under the CN EIS Documents and the CTA Application, there are areas where CN has provided insufficient information in relation to the Project. I have thus requested additional information and data, including missing documents, in order to be able to assess the purpose of and alternative means of MIT as well as significance of adverse environmental effects in relation to the design, construction and operations of MIT.

Generally, on the grounds expressed in this report, I have set out 45 information requests that I suggest be made to CN with respect to the Project.

Signed this 10th day of March, 2017

M. J. Vickerman

M. J. Vickerman, P.E., AIA
President, Vickerman & Associates, LLC

VICKERMAN & ASSOCIATES, LLC

M. John Vickerman, AIA, PE

President
Vickerman & Associates, LLC
Principal Architect, Civil Engineer
Port and Intermodal Rail Master Planning and Design

Professional State Registrations (21 States):

Registered Architect: AL, CA, CT, DC, FL, HI, IL, IN, LA, ME, MD, MA, MS, NH, NJ, NC, NY, PA, RI, TX, VA
Professional Engineer: CA, FL, MD, VA, WA

National Professional Registrations:

Review
NCARB No. 32456, 1985 (Registered Architect)

Education:

M.S., Structural Engineering & Structural Mechanics
University of California at Berkeley, California 1976
B.S., Architectural Engineering
California Polytechnic State University, 1971

Years of Transportation Experience: 40 years

Current Professional Affiliations & Memberships:

- American Association of Port Authorities (AAPA)
- American Institute of Architects (AIA)
- Transportation Research Board/National Research Council/National Academy of Science
- Editorial Advisory Board of the Great Lakes/Seaway
- United States Maritime Resource Center, Inc. (USMRC), Maritime Simulation Institute (MSI) Board of Directors, Newport, RI

Employment History:

US Navy Civil Engineer Corps.	(1971-1975)
Jordan, Casper, Woodman, Dobson	(1976-1980)
Vickerman/Zachary/Miller, Inc.	(1980-1995)
TranSystems Corporation	(1995-2008)
Vickerman & Associates, LLC	(2008-Present)

PROFESSIONAL BIOGRAPHY & RELEVANT PROJECT EXPERIENCE:

John Vickerman is the President of Vickerman & Associates, LLC a professional services consulting firm specializing in the planning and design of port, intermodal and freight logistics facilities. John's maritime and intermodal practice has become internationally known for providing innovative solutions to the many operational, planning and design issues confronting the marine and intermodal transportation industry. Much of John's work focuses on assisting ports, railroads, and shipping companies to recognize and prepare for future market and technological changes.

As a specialist in intermodal and maritime terminal design, John has worked on major port projects throughout the United States and the world for more than 35 years. **67 of the 90 North American deep-water general cargo ports have benefited from his personal strategic master planning and design capabilities.** His international practice includes work for many of the Canadian Ports, the Ports of Rotterdam, Hong Kong, Mainland China, Melbourne, Australia, Pecèm, Brazil, Puerto Rico, the Panama Canal Authority, the intermodal freight analysis for Eurotunnel between England and France.

Mr. Vickerman completed three terms as Chairperson for the Intermodal Freight Terminal Design & Operations Committee under the purview of the Transportation Research Board (TRB)/National Research Council (NRC)/National Academy of Science (NAS) and served on many national Policy Committees for the TRB. John has served on the Freight Advisory Roundtable Board and as an Advisory Board Member to the United States Merchant Marine Academy, Global Maritime & Transportation School. He currently is a member of the Editorial Advisory Board of the *Great Lakes/Seaway Review* and serves as a Board of Director Member of the United States Maritime Research Center (USMRC) - Maritime Simulation Institute (MSI) in Newport, Rhode Island.

MARITIME, PORT, INTERMODAL, AND LOGISTICS PLANNING AND DESIGN PROJECT EXPERIENCE:

The following port and intermodal projects are contracts accomplished by Vickerman & Associates, LLC within the last ten years with John Vickerman as the Principal-In-Charge of the project. Specific project references and expanded descriptions are available upon request.

Port of New Orleans Strategic Port & Intermodal Port-Wide Master Plan. Vickerman & Associates was retained in February 2017 as a port and intermodal expert sub-consultant for preparation of the Port NOLA Comprehensive Strategic Port and Intermodal Master Plan by Tetra Tech Corporation, the prime consultant for the Phase II Port of New Orleans Comprehensive Strategic Port Master Plan. At the completion of Phase I work by another consulting team, the Tetra Tech – Vickerman & Associates team was commissioned by the Port of New Orleans to take over the Port-Wide Comprehensive Strategic Port and Intermodal Plan at the conclusion of the I work.

1. Promote the development and growth of the Port by establishing a long-term vision, creating land use principles, and prioritizing capital investments for Port facilities and operations.
2. Adapt Port policies, operations, facilities and infrastructure to changing technology, cargo trends, regulations, natural and man-made disasters, and competition from other U.S. and foreign seaports.
3. Integrate economic, engineering, environmental and community considerations into the Port process for evaluating the impact of development projects and growth scenarios.
4. Create a roadmap for future port development that is consistent with federal, state, and city laws, with the primary mission of increasing waterborne trade and commerce.

Houma Navigation Canal (HNC) Lock Complex (TE-113) Terrebonne Parish, LA Navigational Study. Vickerman & Associates was retained in August 2015 as a shipping and navigational expert sub-consultant by CB&I Coastal, Inc. the prime consultant for the design and project management services for a new $475 million lock, floodgate, and adjacent flood walls for the HNC Lock Complex Project as recommended by the USACE on the west side of HNC in accordance with a PEIS approved for the project to provide long term protection and restoration features recommended in the 2012 Louisiana State Master Plan that aims to stop salt water from intruding up the canal and into Terrebonne Parish. The lock is a part of the USACE Federal Morganza-to-the-Gulf Levee System. Vickerman & Associates (V&A) provided expert commercial navigational advisory services to the CB&I Coastal, Inc. project team. Vickerman & Associates prepared and furnished the following work elements for the Navigation Study:

- Historical, current and future waterway improvement and operational recommendations
- Comprehensive Vessel Navigation Traffic Analysis
- Analyze Typical Tow Sizes and Future Tow Trends
- Analyze Towboat Horsepower Ranges
- Provide Vessel Navigation Computer Simulations

San Diego Unified Port District (Port of San Diego) Tenth Avenue Marine Terminal (TAMT) Strategic Maritime Business Plan Update. The San Diego Unified Port District ("SDUPD" and "the District") commissioned Vickerman and Associates ("V&A") team update the San Diego Unified Port District Maritime Business Plan ("2008 Business Plan") published in December 2008 by the Port of San Diego. The overall objective of the Tenth Avenue Marine Terminal Redevelopment Plan ("Redevelopment Plan" or "the Plan") was to provide the District with a series of market driven port terminal development concepts for the Tenth Avenue Marine Terminal (TAMT). The Plan updated the maximum practical capacities to meet potential 2035 cargo terminal needs and provides an overall flexible strategic market direction. Vickerman & Associates established an overall business framework within which project decisions should be made. The Plan's total maximum practical capacity for the TAMT depends on the overall business framework, and it is estimated to be between 5,000,000 and 6,000,000 metric tons. Vickerman & Associates Redevelopment Business Plan's optimum development concepts recommended that the District's focus on the following key strategic development issues:

1. Improvements need to be market-driven and follow a market forecast (Market Forecast Demand Minus Current Terminal Capacity Equals Justifiable Terminal Needs and Requirements). A Modular Operating Grid System (MOGS) should be used in the planning, design and construction of improvements.

2. Improvements need to maximize cargo throughput capabilities and efficiencies, meet the District's Climate Action Plan policies and procedures, and provide the District with competitive financial return on the District's investment.
3. Successful implementation of any improvement needs to focus on the recommended operating nodes: Multipurpose Dry Bulk Cargo, Containerized Fresh Fruit, Liquid Bulk, and Multipurpose General Cargo Neo-bulk and Containerized Cargoes operations.

San Diego Unified Port District (Port of San Diego) National City Marine Terminal (NCMT) Strategic Maritime Intermodal Marketing & Redevelopment Plan. The San Diego Unified Port District ("SDUPD" and "the District") commissioned Vickerman and Associates ("V&A") to update the December 2008 San Diego Unified Port District Maritime Business Plan ("2008 Business Plan"). The overall objective of the National City Marine Terminal (NCMT) Optimization Study ("Optimization Study") provided detailed market driven port terminal optimization concepts for National City Marine Terminal (NCMT). The NCMT Optimization Study evaluated and analyzed the following topics:

- Identification of key optimization strategies and options
- Short, medium and long market forecast
- Cargo growth options (Domestic Coastwise Traffic ~ lumber and Hawaii, Automobile imports / exports, and Distribution Center services)
- Long term facility growth vision
- Intermodal rail operations recommendations
- Street access and egress options (Centralized Gate Concept)

Navigational Channel Planning, Analysis & Design Recommendations for the Calcasieu Ship Channel Salinity Control Measures Project. Vickerman & Associates was retained in June 2013 as the Navigation Study Expert sub-consultant to the Tetra Tech Corporation, the prime consultant to the State of Louisiana, Department of Natural Resources, Office of Coastal Protection and Restoration (OCPR), in connection with Contract No. 2503-13-11. Traffic in the Calcasieu Ship Channel (CSC) is expected to increase due to the expanded operations of the present channel users and the construction of proposed new LNG port terminals. It is forecasted that the vessel traffic will increase significantly over the next 20 years, with the number of vessel calls expected to double by 2020. This increased traffic could have a significant impact on the operations of the CSC, and changes to channel infrastructure are necessary to avoid critical navigational congestion and vessel delays. Vickerman & Associates analyzed the future navigation needs of the rapidly changing CSC as the maritime industries changed and LNG emerged with dramatic growing of import facilities being converted to export. The CSC has been transformed by major LNG terminals along the CSC. Future alternatives were evaluated by Vickerman & Associates based on the impacts to future navigation such as delays, limited passing availability, or overall constraints of vessel movement. Guidelines and design criteria were established based on future navigation needs. Vickerman & Associates assisted the project team with various detailed navigation analyses to support the conceptual design and preliminary planning and engineering phase of the Calcasieu Ship Channel Salinity Control Measures - Planning and Feasibility Phase Engineering Services.

Duluth-Superior Cruise Ship Terminal Facility Study. Vickerman & Associates was retained as an expert cruise terminal planner in September 2012 by Krech Ojard & Associates, P.A. the prime consultant for the Duluth-Superior Cruise Ship Terminal Facility Study. Vickerman & Associates prepared a comprehensive architectural and operational cruise facility based program requirements study for the proposed new Cruise Terminal considering a strategic planning horizon of approximately 10 to 20 years. Lake Superior, the largest of the five Great Lakes, is an emerging market for cruise and ferry passengers. The Port of Duluth-Superior is located at the far western edge of Lake Superior and is the navigational western anchor for the Great Lakes/St. Lawrence Seaway navigational system, being the Number 1 Great Lakes/St. Lawrence Seaway Port by tonnage with over 1,000 vessels calls a year. The navigational season for the Great Lakes is generally March 25 to January 16th each year and is seasonally adjusted. The constraining vessel dimensions for the St. Lawrence Seaway Locks is a maximum length of 740 ft., a beam of 78 ft. and a draft of 26 ft. 9 in. Duluth-Superior Harbor is an ideal naturally protected harbor sanctuary for navigational vessels and has full St. Lawrence Seaway channel (27 feet) depth. Emerging facility trends in the cruise industry throughout North America handling passengers both domestically and internationally was analyzed.

Plaquemines Parish Louisiana – Implementation Services for the Port of Plaquemine - Port and Intermodal Strategic Master Plan. Vickerman & Associates was retained in February 2009 as a port and intermodal expert sub-consultant for preparation of the Plaquemines Parish Comprehensive Strategic Port and Intermodal Terminal Master Plan by Trident Holdings, a Canadian Port Developer, and prime consultant for the Plaquemines Parish Port Strategic Plan. The Master Plan proposed development of over 750 acres of new port terminal development. The implementation multi-year work had a value of $1,162,953 as of April 2016 and continues to increase as active Port marketing and tenant negotiations continue. This Master Plan Implementation terminal parcels have been expanded to 6 parcels. Parcels 2 and 3 have been devoted to a new LNG Terminal valued at $8.5 billion for Venture Global. The implementation work involves an array of prospective tenant marketing activities, conceptual terminal planning and design activities, and detailed terminal lease negotiations. The Port Development Plan has been expanded to include a total of 4,218 acres and 21,620 lineal feet of adjacent riverfront deep water access along the 6 contiguous parcels.

Port Authority of New York & New Jersey (PONYNJ) Demand, Capacity and Infrastructure Analysis Future Port Terminal Intermodal Rail Facility Design Recommendations. Vickerman & Associates was retained in April 2015 by the Port Authority of New York & New Jersey and their project prime consultant, HDR Engineering Inc., to provide a port and intermodal expert advisory services primarily focused on "Future Port Terminal Design Recommendations". Vickerman & Associates participated on all phases of the project (Phases I, II, III and IV). The Demand, Capacity and Infrastructure Analysis was Port wide and involved all PANY/NJ Port Terminals and Real Estate as well as all intermodal rail terminals and the PANY/NJ EXPRESS Rail System. The PANY/NJ Scope of Work included the following Tasks:

Task I - Identify future annual demand for markets served by the Port of NY & NJ over the course of the next 20 years.

Task II - Determine the capacity and ability of the current terminals, rail facilities, cargo handling equipment, and landside connections to meet future demand:

Task III - Determine the most efficient distribution and configuration of container terminals, composition of cargo handling equipment, mix of infrastructure/assets. Recommend improvements, and changes to terminals, equipment/assets and operating practices required to optimize the ability of the Port to meet future demand while generating increased revenues for the agency and increased economic activity for the region.

Task IV - Describe challenges related to implementation of any proposed recommendations.

Port of Providence, RI (ProvPort) Allens Avenue Marine Terminal Development. In August 2015, the Vickerman & Associates was commissioned by ProvPort, Providence Redevelopment Agency (PRA) and Waterson Terminal Services (WTS) to provide ProvPort/PRA/WTS with a market assessment, market growth plan and targeted market opportunities for development of a new greenfield Port Terminal Development. These tasks were delivered on January 2, 2016 and supported expansion of ProvPort. The findings are contained in several terminal development studies during 2016. The proposed new three berth marine terminal with two barge berths designed to meet the requirements for general cargo and provide multipurpose port marine terminal capabilities with an on-dock intermodal rail logistics capability is located in the general vicinity of the Burges Cove and Fox Point Reach area of the Providence River. The marine terminal development is located on the western bank of the Providence River in the general vicinity of the Allens Avenue easterly to the waterfront. The MARAD (Maritime Administration of the USDOT) Port Economic Impact Kit was used to derive the key Economic Development Impact factors using an input-output (I/O) model analysis for the planned Marine Terminal Development. The would encompass approximately 60.4 acres of marine terminal acreage including the Phase I & II acreage. The new marine terminal would have a 2,880 ft. marginal wharf, and multipurpose container terminal improvements.

SLI Logistics Park, Rodman, Panama - Panama Canal - Logistics Consultant Services. Vickerman & Associates was selected as the prime consultant in January 2013 to provide logistics analysis and distribution center conceptual planning for a new inland port logistics center serving the new PSA Panama International Terminal (PPIT) located at the entrance of the Panama Canal, on the pacific side at the former US Rodman Naval Base. PPIT is a new port terminal built at the Pacific western-side entrance of the canal by a Singapore government-owned company. The PPIT project has completed its first phase of construction with a state-of-the-art 300 meters length container berth equipped with 3 Post Panamax quay cranes and 6 RTGs and began operations in December 2010. Vickerman & Associates will survey existing logistics services in the Canal Zone and develop design requirements for the new logistics park.

Iowa Department of Transportation (DOT) Lock and Dam Modernization and Reconnaissance Study. Vickerman & Associates was retained in 2012 by the Iowa DOT and their project general consultant, HDR Engineering Inc. to provide a Upper Mississippi River commercial market analysis including identification of key shipping and logistics market drivers, future shipping market forecast assessment, and recommended Inland Waterway development strategies and logistics options. The benefits of an improved lock and dam system were described in the study with quantitative evidence compiled illustrating the important economic value of continuing to use the waterway system for both the regional and national economies. The study answered the question: What Can Iowa Do to Stop the Deterioration of the System.

Commonwealth of Virginia - Joint Legislative Audit and Review Commission (JLARC) - Special Report: Review of Recent Reports on the Virginia Port Authority's Operations. Vickerman & Associates was retained in December 2012 to provide support to the JLARC and to convey information from the maritime port industry perspective regarding (1) the position of Virginia Port Authority (VPA) and Virginia International Terminals, Inc. (VIT) in the intermodal market; (2) potential for VPA/VIT market growth; (3) projected future volume of VPA/VIT; (4) recent volume declines experienced by VPA/VIT and recovery from them; (5) validity of cost comparisons of VPA/VIT to other ports; (6) extent to which VPA/VIT institutional structures impede sales and marketing; and (7) the operational reputation of VIT in the shipping community.

Logistics Market Drivers Analysis

Virginia International Terminals (VIT), Virginia Port Authority (VPA) - Port Terminal Operations Evaluation and Due Diligence Study for Maersk Unsolicited Proposal to the Virginia Commonwealth. Vickerman & Associates was retained in July 2012 to provide the VIT with an evaluation of all four of VIT's operational port terminals. The study was to focus on evaluating terminal productivity, operational safety, VIT terminal revenue and expenses, port competition evaluation and prepare a 20 year long range cargo volume forecast for all VIT assets and to prepare due diligence analysis support to VIT in consideration of the April 2012 unsolicited proposal from Maersk/APM Terminals to purchase all of the Port of Virginia's port terminal operations for $4 billion over a 48 year period using the State's Public-Private Transportation Act of 1995.

Port of Providence, RI (ProvPort) - Two Mobile Harbor Crane Procurement Services. Vickerman & Associates was commissioned in July 2012 by ProvPort and the Rhode Island Economic Development Corporation (RIEDC) to provide professional advisory services for technical expert consulting reviewing the RFP procurement process, crane technical specifications and contract proceedings for the acquisition of two mobile harbor cranes and the associated design and construction of two new barges for the Port. The mobile harbor crane acquisition is a component of ProvPort's Tiger II grant award through the US Department of Transportation (USDOT), Maritime Administration (MARAD).

Ohio Statewide Freight Plan - Ohio River Terminal Assessment and River Terminal Strategic Planning. In early 2012 Parson Brinkerhoff commissioned Vickerman & Associates to provide the PB Team with maritime and intermodal transportation consulting services in support of Parsons Brinckerhoff, Inc.'s (PB) contract with the Ohio Department of Transportation to perform a statewide freight study. Vickerman & Associates was responsible for analysis and strategic planning for all Ohio River Ports bordering the State of Ohio and in particular the following Ohio River Terminals: Columbiana, Wellsville, and South Point River Terminals. Vickerman & Associates conducted in-depth interviews with all Ohio River Terminals and provided a needs assessment and strategic project identification for critical Ohio River terminal infrastructure.

San Diego Unified Port District (SDUPD) Expert Witness Services - Port Terminal Operations Evaluation. Vickerman & Associates was retained in 2012 as an expert witness by the firm Butz Dunn & DeSantis (BD&D), in connection with BD&D's representation of SDUPD in civil litigation action before the Superior Court of the State of California for the County of San Diego referred to as "SDUPD versus San Diego Refrigerated Services Inc. The consulting services provided professional port terminal evaluation services including analysis of port terminal layout, configuration and operational related topics for the Port of San Diego - Tenth Avenue Marine Terminal (TAMT). The focus of this marine terminal evaluation study is the western portion of the TAMT encompassing both the SDRS and the Dole Food Company Inc. - Fresh Fruit Container Terminal, leaseholds and associated terminal operations.

Florida Inland Port (FIP) - Intermodal Logistics Center - St. Lucie County, Florida. Vickerman & Associates was retained in 2011 by Florida Inland Port, LLC (formerly Treasure Coast Intermodal Campus, TCIC) and their project general consultant, HDR Engineering Inc., to provide a strategic master plan and intermodal market and supply chain management assessment for a 4,000 acre, ultimately 29 million sq. ft., Inland Port - Intermodal Container Transfer Facility (ICTF) - Logistics Center serving the South Florida freight market. Located in southwest St. Lucie County, the FIP project will be developed into a major freight logistics hub over the next 30 to 35 years. The FIP will create an entirely new industrial model for Florida, ultimately providing a seamless connection to direct on-dock rail service at Florida's key seaports, along with easy access to all major highways. The FIP warehousing and distribution center will provide a full service logistics environment accommodating a variety of manufacturing and industrial uses.

2012 Ohio Statewide Freight Plan - River Port and Marine Terminals. Vickerman & Associates was retained in February 2012 to provide port, maritime and river terminal consulting services in support of Parsons Brinckerhoff's contract with the Ohio Department of Transportation to perform a Statewide Freight Study and analysis to understand how Ohio's freight transport infrastructure is being utilized. The study will identify and analyze modal freight volumes, commodities, and origins/destinations. Vickerman & Associates provided strategic port terminal evaluations and intermodal market and supply chain evaluations for all of the Ohio State River Terminals.

Wingspan International Inland Port Logistics Center, Port of Moin, Republic of Costa Rica. Vickerman & Associates was retained in 2011 by Wingspan International, LLC to provide a strategic master plan and intermodal market assessment for the new 200 acre Inland Port - Intermodal Container Transfer Facility (ICTF) - Logistics Center serving the Port of Limón/Moin, on the Caribbean coast of Costa Rica. The Inland Port Logistics and Transhipment Center will serve a variety of customers including potentially the new newly announced 33-year concession by APM Terminals, Maersk Line, a $992 million post panamax six berth new container port for the new Moin Container Terminal (TCM) in Costa Rica. The Puerto Limon/Moin port complex currently handles approximately 80 percent of Costa Rica's international fresh fruit trade.

Port of Galveston Expert Witness Services - Port Facilities Evaluation. Vickerman & Associates was retained in March 2012 as an expert witness by the firm Greer, Herz & Adams LLP in connection with representation of the Port of Galveston (POG) before the 212th Judicial District Court of Galveston County, Texas referred to as "Cause No. 11-CV-1330 - POG/Lexington Case" regarding contested Hurricane IKE storm-induced port facility damage. The focus of this port facilities evaluation study was an evaluation of the Port's damage sustained as a result of Hurricane IKE and a review and evaluation of the various storm damage assessments related thereto.

Port of Erie - Erie-Western Pennsylvania Port Authority - Freight Shipping and Master Development Plan. In early 2010 Martin Associates (John C. Martin LLC) and Vickerman & Associates agreed to team and work together for the Port of Erie on the Freight Shipping and Master Development Plan for the Port of Erie. Vickerman & Associates was retained as a port and intermodal rail facilities expert for the project which involved evaluating all port operations, profiling existing port operations, developing a detailed statement of probable cost for expansion/development of the infrastructure necessary for a modern freight terminal facility based on the team's market assessment. A specific emphasis was placed on assessing the potential for the development of a container feeder service terminal and opportunities afforded for Heavy Lift and project specialty cargo.

Port of Miami On-Dock Intermodal Rail Terminal, Florida East Coast Railway (FEC). Vickerman & Associates was retained in 2010 as one of the General Consultants to the FEC Railway CEO and expert intermodal terminal advisor to the FEC Railway, Rail America and Fortress Investment Group for the planning, design and operation of the new Port of Miami On-Dock Intermodal Rail Terminal. The $52 million program included upgrading the Port Bascule Bridge and improvements to 4.5 miles of rail access to the Port from the FEC Hialeah Inland Port in Miami.

Development of a Florida Statewide Intermodal Development Strategy for Florida East Coast Railway (FEC). Vickerman & Associates was retained in 2010 as one of the General Consultants and intermodal terminal advisors to the FEC Railway, Rail America and Fortress Investment Group for the planning, design and operation of a statewide express intermodal service from Port of Miami and Port Everglades to Jacksonville, FL. The project also included new logistics distribution center planning and design of new central Florida Intermodal rail and distribution center projects.

Port Everglades On-Dock Intermodal Rail Terminal, Florida East Coast Railway (FEC). Vickerman & Associates was retained in 2010 as one of the General Consultants to the FEC Railway CEO and expert intermodal terminal advisor to the FEC Railway, Rail America and Fortress Investment Group for the planning, design and operation of the new Port Everglades On-Dock Intermodal Rail Terminal at Southport. The project includes a new on-dock intermodal rail terminal complex with automated bridge crane design capabilities handling both international and domestic intermodal rail volume.

Port of Longview, Washington - Port and Intermodal Strategic Port Master Plan. Vickerman & Associates was retained in early 2010 as the Port Master Plan Consultant for preparation of the Port of Longview Port and Intermodal Master Plan by HDR Engineering Inc., the prime consultant. The Port Master Plan provided new business opportunities and strategic options for increasing port capacity using the latest sustainable terminal concepts. The Port of Longview is developing the first major Export Grain Terminal in the United States at a cost of over $200 million with an annual capacity of 4.74 million bushels or 130,000 metric tons of corn, soybeans and wheat.

Plaquemines Parish Louisiana - Comprehensive Port and Strategic Master Plan. Vickerman & Associates was retained in 2009 as a port and intermodal expert sub-consultant for preparation of the Plaquemines Parish Comprehensive Strategic Port and Intermodal Terminal Master Plan by Trident Holdings, a Canadian Port Developer, and prime consultant for the Plaquemines Parish Port Strategic Plan. The $551,000.00 Comprehensive Strategic Master Plan included two new port developments one on the East Bank and one on the West Bank of the Mississippi River. The West Bank port development included a state-of-the-art two berth container terminal, an on-dock intermodal rail terminal and adjacent logistics distribution park with a capital construction cost estimate of $441 million and a terminal throughput capability of 700,000 TEUs per year. The East Bank port development included a general cargo container terminal estimated at $332 million with a container throughput of 200,000 TEUs per year and included a Dry Bulk Terminal option estimated at $110 million with an annual throughput of 3,360,000 tons per year. The Master Plan provided a new Public-Private-Partnership (PPP) strategy and positioned the Port in establishing Louisiana as a major logistics distribution leader in national and Gulf Coast maritime and intermodal markets.

Erie Inland Port (EIP) Logistics Center Development for the Economic Development Corporation of Erie County (EDCEC), Erie, Pennsylvania. Vickerman & Associates was selected in early 2009 as the General Consultant and expert intermodal advisor on a major new freight intermodal logistics center for Erie County. Prepared a truly transformational sustainable state-of-the-art intermodal rail inland port and logistics distribution center concept incorporating two Lake Erie Ports integrated into a state-of-the-art multimodal logistics hub serving multiple Class I railroads. The EIP will eventually become a 1,000 acre integrated intermodal terminal and distribution center logistics park with more than 7 million sq. ft. of modern distribution center infrastructure.

Maher Melford International Terminals Inc., Guysborough, Nova Scotia. For the last six years John Vickerman has been commissioned as the General Consultant for the development planning for a state-of-the-art fully automated three berth container port and adjacent CN intermodal rail terminal with 1500 acres of adjacent integrated logistics Park development. As currently envisioned, Maher Melford will deploy an advanced automated container terminal concept developed by Hamburg Port Consulting GmbH (HPC). The terminal operating system is a high grade form of container automation. In container and intermodal terminal will use advanced horizontal transport system of Automated Guided Vehicles (AGV) in combination with Rail Mounted Gantry Cranes (RMG) with quay parallel orientation in the Container Yard (CY). When successfully deployed, the Maher Melford terminal would be the first container terminal in North America to deploy AGVs.

Great Lakes Commission (GLC) Chicago Area Waterway System (CAWS) – "Envisioning a Chicago Area Waterway System for the 21st Century" Inland Waterway Planning. Vickerman & Associates was retained in early 2011 as the Port and Intermodal Rail Terminal sub-consultant expert on the HDR Engineering Inc. team, the prime consultant for the Great Lakes Commission/Great Lakes & Saint Lawrence Cities Initiative for the "*Envisioning the Chicago Area Waterway System for the 21st Century Project*". The visibility and migration of the Asian Carp movement up the Illinois River and the potential catastrophic impacts on the Great Lakes fishing industry has resulted in the GLC Commissioning a $2 million effort for the ecological separation of the CAWS from various Aquatic Invasive Species (AIS), most notably the Asian Carp. This effort will involve improving Chicago area transportation systems and the potential for developing new port and intermodal rail terminals at separation dam sites along multiple rivers and waterways in the CAWS.

Shipyard Creek Associates LLC (SCA) - Port of Charleston - Macalloy Multimodal Logistics Center, Charleston, SC. For the last four years, the Principal-in-Charge and General Consultant for development planning and design of the 155 acre Macalloy Site CSX Intermodal Terminal adjacent to the SCSPA Three Berth Navy Base Container Terminal. SCA, in a strategic partnership with CSX Railroad, will develop the Macalloy Intermodal Terminal at Shipyard Creek in the Port of Charleston, into a dominant North American East Coast container gateway and a major distribution logistics load center. A privately developed, environmentally sustainable, near-dock intermodal rail terminal adjacent to and directly linked to the new SCSPA Navy Base Container Terminal Development will no doubt change the port and intermodal competitive landscape in the US Southeast.

Shipyard Creek Associates LLC (SCA) - Port of Charleston – Laurel Island Multimodal Logistics Center, Charleston, SC. For the last four years, the Principal-in-Charge and General Consultant for development planning and design of the 240 acre Laurel Island Intermodal Terminal adjacent to the SCSPA Columbus Street Container Terminal. SCA will develop the Laurel Island Intermodal Terminal into a major North American East Coast container gateway and distribution logistics load center. This project is a privately developed, environmentally sustainable, near-dock intermodal rail terminal adjacent to and directly linked to the SCSPA Columbus Street Container Terminal.

Port and Intermodal Security Training for FBI, TSA and NCIS – McMunn Associates. Since July 2008 McMunn Associates Inc. (MAI) has retained Vickerman & Associates as Principal Instructor and Subject Matter Expertise (SME) in support of MAI's Federal Training Courses on Commercial Maritime Shipping and Port Operations (CMSPO) and Maritime Domain Awareness (MDA) program. John Vickerman has been the Principal instructor on day long training courses with the United States Navy (USN), US Transportation Security Administration (TSA), US Naval Criminal Investigative Service (NCIS), US National Maritime Intelligence Center (NMIC) and the US Federal Bureau of Investigation (FBI) in the area of port security, operations and intermodal transportation systems.

Galveston Historic Downtown Seaport Master Plan, Port of Galveston, Texas. Vickerman & Associates was retained in 2009 by H&A Architects & Engineers (Formerly CMSS Architects, PC) as the team's port and maritime planning expert sub-consultant. This comprehensive seaport waterfront master plan was completed in early 2011. The goal of the master plan was to generate a new vision of a more complex, modern economy for the City of Galveston downtown redevelopment effort with particular focus on the "East End" Port of Galveston maritime seaport terminals and operations. The project included consideration for the enhancement and expansion of the Port of Galveston's current cruise terminal operations and the potential of developing new "World Class" cruise terminal linked directly to the historic urban seaport.

Tembec General Partnership and Tembec Industries Inc. Strategic Shipping and Logistics Assessment Study. Vickerman & Associates was commissioned by Tembec Industries in October 2010 to prepare a strategic shipping and logistics evaluation and analysis study of Tembec's current pulp shipment operations from Canada to North Asia (mainly China). Tembec is one of the largest North American wood pulp shippers. Currently Tembec ships approximately 30,000 metric tons monthly from Vancouver, BC and approximately 30,000 metric tons monthly from Eastern Canada via Port Authority of NY/NJ (Port Newark & Port Elizabeth Terminals only). This Strategic Shipping and Logistics Assessment Study included forecasting an evaluation of maritime logistical global shipping trends within the next 5 years and also include strategic recommendations for Tembec to best position and deploy their shipping operations in light of emerging new shipping and logistics trends.

Port Authority of New York & New Jersey Federal Maritime Commission Expert Witness Services. Vickerman & Associates was retained in 2008 and again in 2011 as an expert witness by the firm Weil, Gotshal & Manges LLP., as the chief legal counsel to the Port Authority of New York & New Jersey (PANY/NJ) for the legal defense in the Federal Maritime Commission (FMC) Case No. (08-03). The case rests on a complaint filed by Maher terminals Inc. that alleges the PANY/NJ granted preferential lease terms to a competitor. Vickerman & Associates was retained to provide Defense attorney's with expertise in container and intermodal rail terminal analysis and expert witness revaluation services.

Sparrows Point Automobile Terminal Development, Baltimore, Maryland. Vickerman & Associates was retained in 2008 as the Principal-in-Charge of the planning and design of the Cargo Ventures LLC Sparrows Point Automobile Terminal development.

Port Alberta Inland Port and Logistics Park, Edmonton, Alberta. Vickerman & Associates was retained in 2008 as an intermodal terminal expert sub-consultant by InterVISTAS Consulting Inc. for the development planning of the Port Alberta Inland Port and Integrated Logistics Park for the City of Edmonton Alberta. The work scope included market assessment and conceptual facilities layouts.

Louisiana International Gulf Transfer Terminal, Southwest Passage, Metairie, Louisiana. Vickerman & Associates was retained in 2009 by the State of Louisiana and continues as a port and intermodal expert advisor to the Louisiana International Deep Water Gulf Transfer Terminal Authority for general consulting and advisory services regarding development of a world class container transfer terminal at the mouth of the Mississippi River, for transferring containers from ocean-going vessels to barge and coastal feeder vessels.

Port Strategic Master Development Plan Update 2009 - Port of Port Arthur, Texas. Vickerman & Associates was retained in 2009 by the Port and Tetra Tech Corporation as the project port and intermodal terminal sub consultant expert to Tetra Tech as the prime consultant on the Port of Port Arthur (POPA) 2009 Master Development Plan Update. This $625,000 Port Master Plan Update Project effort included a comprehensive the determination of the best use development of new 500 acre land acquisition. Major elements of this project included data collection; facility assessment, analysis of existing port operations, a Master Port Development Plan which developed alternative scenarios and solutions, assessed potential future business risks, and new business opportunities. The Team also developed a phased Capital Development Improvement Plan and proposed specific scenarios for increases in the operational efficiency and capacity of the facilities to enable it to handle anticipated business growth.

Port of Greater Cincinnati Development Authority General Consultants Advisory Services: Vickerman & Associates was retained in 2010 to provide general consulting and advisory services to the Port of Greater Cincinnati Development Authority (PGCDA) for PGCDA projects involving rail and intermodal improvements in the Mill Creek Corridor and planning related to waterfront industrial development along the Ohio River.

Project Experience Explanatory Note: John Vickerman was a Founding Principal for both Vickerman/Zachary/Miller, Inc. (1980) and TranSystems Corporation (1995). Since 1980, John Vickerman has served as a project Principal-In-Charge or Project Manager, with the project team for the following major port and intermodal projects which highlight his port and intermodal experience and capabilities. The following projects are only a partial listing of Mr. Vickerman's maritime and intermodal industry experience.

Ports of Los Angeles and Long Beach 2020 Master Plan, Los Angeles, California. Project Manager for the *"Cargo-Handling, Operations, Facilities and Infrastructure Requirements Study (OFI)"* sometimes referred to as the **POLA/POLB 2020 Strategic Master Plan**. This strategic port master plan involved a $5.3 billion expansion of the San Pedro Bay Harbor with 38 new port and intermodal terminals. The Master Plan determined facility requirements and water use plans to the year 2020, for the Port of Los Angeles and the Port Long Beach including comprehensive port terminal and intermodal terminal development.

Naval Station Support Function Consolidation Study, Long Beach, California. Principal-in-Charge for the Port of Long Beach Master Plan for consolidation and relocation of Naval Station support functions.

Intermodal Transfer Facility Design, Philadelphia, Pennsylvania. Principal-in-Charge of planning and design for AmeriPort, the 100-acre Regional Intermodal Transfer Facility (RITF), Delaware River Port Authority.

FastShip Feasibility Study, Philadelphia, Pennsylvania. Principal-in-charge of the FastShip Atlantic Terminal Plan Port Facilities Evaluation Study for the Delaware River Port Authority and FastShip Atlantic, Inc.

On-dock Intermodal Rail Facility Design and Construction, New York, New York. Principal-In-Charge of planning, design and construction management services for the $8.5 million ExpressRail Intermodal Transfer Facility at the Port of New York and New Jersey.

Maersk/Sea-Land Conceptual On-dock Intermodal Facility Study, New York, New York. Project Manager for a conceptual study of the on-dock intermodal rail facilities for Maersk Terminals/Sea-Land site at the Port Authority of New York and New Jersey.

Marketing, Operations and Development Plans, Norfolk, Virginia. Principal-in-Charge for preparation of a Marketing, Operations and Development Plan for the Newport News Marine Terminal, the Portsmouth Marine Terminal and the Norfolk International Terminals, all part of the Virginia Port Authority.

Master Development Plan, Richmond, Virginia. Officer-In-Charge for preparation of the Master Development Plan for the Port of Richmond Terminal (PORT).

Pier J Facility Design, Long Beach, California. Principal-in-Charge of design for an on-dock intermodal rail facility for Maersk Line at Pier J, Port of Long Beach.

English Channel Tunnel Rail Schedule Study, England. Principal-in-Charge for a computer simulation study to evaluate operations, including equipment requirements, for intermodal facilities owned by British Railways and serving the English Channel Tunnel.

Strategic Plan for the Redevelopment of the Port of New York. Principal-in-Charge for a major study of the redevelopment of the New York City waterfront to increase maritime cargo handling. Study examined market forecasts for containerized and non-containerized commodities, inland distribution patterns and requirements by mode and commodity, shipper/carrier requirements, site attributes and environmental/community constraints.

Southport Master Plan and Southport Phase VI Terminal Yard Improvements, Port Everglades Department of Broward County. Principal-in-Charge for conceptual plan development of the new Southport Intermodal complex. This study involved analyzing current terminal operations, terminal capacity, and commodity growth forecasts. These analyses were utilized in development of a phased capital improvement plan.

Naval Base Re-Use Plan, Charleston, South Carolina. Principal-in-Charge for marine cargo terminal re-use plan for the Charleston, South Carolina Naval Complex as part of larger maritime and commercial reuse planning strategy. Included facilities inventory of the 1500 acre property, which was made available by base closure, as well as cargo demand forecasting, needs assessment, alternatives analysis, conceptual terminal design, and road/rail improvements planning.

Blair Waterway Master Plan, Tacoma, Washington. Principal-in-Charge of the Port of Tacoma's 2010 Master Plan to develop a ten-year improved-use master plan encompassing dry bulk, neo bulk, break-bulk and containerized cargo for the Blair Waterway, Port of Tacoma.

Marine Terminal Facility Development, Portland, Oregon. Principal-in-Charge of the marine terminal facility master development plan, Terminals 5 and 6, Port of Portland.

Marine Master Plan, Seagirt Marine Terminal, Baltimore, Maryland. Principal-in-Charge of the 264-acre Seagirt marine terminal master plan including the detailed design of the "on-dock" intermodal rail facility for the Port of Baltimore.

Strategic and Master Site Development Plan, Gulfport, Mississippi. Principal-In-Charge of strategic and master site development plan for intermodal cargo facilities, including break-bulk and dry bulk, container storage, rail, truck and ship operations at the Mississippi State Port at Gulfport.

Strategic Master Plan, Freeport, Texas. Principal-In-Charge of Strategic Master Plan for the Port of Freeport which encompasses over 8,000 acres of maritime and non-maritime property, including intermodal cargo handling operations.

Maritime Facilities Renovation, San Francisco, California. General Consultant to the Port of San Francisco for overall program management, development of design criteria, monitoring of design, budget and schedules for projects totaling $42 million to renovate marine facilities and construct an ICTF.

Maritime Master Plan, San Francisco, California. Principal-in-Charge for a conceptual maritime master plan of approximately 640 acres of the Southern Waterfront, Pier 48 to Pier 98, Port of San Francisco and engineering feasibility study for San Francisco Container Terminal, Berth 92 to 96.

Container Terminal Design, San Francisco, California. Engineering design for modernization of Army Street Container Terminal, Port of San Francisco.

Cool Carriers Refrigerated Warehouse Engineering Services, Port Hueneme, California. Principal-In-Charge of project to design Cool Carriers Refrigerated Warehouse at Port of Hueneme. Provided architectural and engineering drawings and specifications for construction of a 142,000 square foot cold storage facility. The largest "on-dock" refrigerated facility on the US west coast.

Conceptual Facility Master Plan, Port Hueneme, California. Officer-In-Charge of Port Hueneme's master plan for recommended capital improvements, circulation plan, centralized gate operation and auxiliary facilities.

Dundalk and Seagirt Marine Terminal Conceptual Designs, Baltimore, Maryland. Principal-in-Charge of the 570-acre Dundalk Marine Terminal master plan.

Daniel Island Conceptual Design, Charleston, South Carolina. Principal-in-charge for Terminal "X" conceptual planning for the Port of Charleston which included preparation of cargo forecasts, analysis of existing terminals, and conceptual design for the Daniel Island Development Plan.

Dames Point Master Plan, Jacksonville, Florida. Principal-in-Charge for master planning the 500-acre Dames Point Marine Terminal, Jacksonville Port Authority.

Aloha Towers Engineering Services, Honolulu, Hawaii. Principal-in-Charge for marine engineering, structural engineering and architectural programming for two cruise ship terminals, pier extensions, a ferry terminal, underground parking and all waterfront features, Aloha Tower Waterfront, Honolulu Harbor.

Cruise Industry Investigative Study, Boston, Massachusetts. Principal-In-Charge of a study to investigate the possibilities for the cruise ship industry at the Port of Boston. This project was performed for the Boston Redevelopment Authority and the Massachusetts Port Authority.

Berth 22 Reconstruction, Oakland, California. Officer-In-Charge for conceptual study through final construction documents for reconstruction of Berth 22 at the Port of Oakland, in order to accommodate Post Panamax vessels.

Wharf Reconstruction and Design, Redwood City, California. Principal-In-Charge for plans, specifications and cost estimates for design of Wharf 4 and reconstruction of Wharf 3, Port of Redwood City.

USGS Marine Facility Design, Redwood City, California. Principal-In-Charge for a conceptual planning and detailed design of U.S. Geological Survey Marine Facility, Port of Redwood City.

Port Performance and Master Plan Study, San Juan, Puerto Rico. Principal-in-Charge of a port performance study and design of a master site development plan to guide the Puerto Rico Ports Authority in future decisions regarding cargo throughput and storage, as well as the possibility for a cruise terminal facility.

NYK Line Administrative Headquarters Building Design, Los Angeles, California. Principal-In-Charge of overall terminal planning and design of five new state-of-the-art buildings at a 134-acre container terminal for NYK Line, Port of Los Angeles.

Cold Storage Facility Design, San Diego, California. Principal-In-Charge for design of Tenth Avenue Marine Terminal cold storage, handling and fumigation facility at the Port of San Diego. The 100,000 square foot facility was California's first on-dock refrigerated warehouse.

Pier J Facility Design, Long Beach, California. Principal-in-Charge of design for an on-dock intermodal rail facility for Maersk Line at Pier J, Port of Long Beach.

Federal Highway Landside Access Course, Washington, D.C. Principal-in-Charge and Principal Investigator to develop and teach a three-day course on passenger and freight intermodal transportation for the United States Federal Highway Administration and the National Highway Institute titled "Landside Access for Intermodal Facilities."

Chatham County Intermodal Freight Study, Savannah, Georgia. Principal-In-Charge for the development of a comprehensive cargo traffic study for the Georgia Department of Transportation. This study encompassed air, river, rail and street traffic in order to determine traffic constraints in each mode of transport for the county.

VICKERMAN & ASSOCIATES, LLC

Appendix B: List of Documents Reviewed

1) EIS Guidelines for the Project

2) EIS prepared by Stantec Consulting Ltd. for CN, dated December 7, 2015 (including cover letter from CN dated December 7, 2015)

3) EIS Technical Appendices:

    a) "Milton Logistics Hub – Technical Data Report, Socio-Economic Baseline (SEB)" (Appendix E.12)

    b) "Terminal Generated Truck Traffic" (Appendix E.17)

    c) "Site Selection Study" (Appendix F)

4) "Planning Justification Report (PJR) In Support of a Logistics Hub Planned in Southwest Milton", December 2015, prepared by Bousfields Inc.

5) Project Description Report (PDR), CN, March 31, 2015

6) Freight Supportive Guidelines, Ontario, 2015

7) "GTHA Urban Freight Study: Technical Backgrounder", prepared for Metrolinx, HDR/iTrans, 2011

8) Application for an Order Pursuant to *Canada Transportation Act*, Section 98(2) for Authorizing Construction, CN, January 22, 2016

9) CN Site plan drawings dated April 24, 2015 provided as part of the *Canada Transportation Act*, Section 98(2) Application

10) "Greater Golden Horseshoe Growth Forecasts to 2041: Technical Report", by Hemson Consulting Ltd., Technical Report November 2012 (and data files)

11) "Greater Golden Horseshoe Growth Forecasts to 2041" by Hemson Consulting Ltd., Technical Report (November 2012) Addendum (and data files)

12) The Operational Policy Statement: "Addressing 'Purpose Of' and 'Alternative Means' under the *Canadian Environmental Assessment Act, 2012*", CEAA, March 2015

13) "Pathways: Connecting Canada's Transportation System to the World - Volume 1" Canada Transportation Act Review prepared by the Minister of Transport, 2015

14) “Building Competitiveness: A Proposed Multimodal Goods Movement Strategy for Ontario” (Consultation Document), Transportation Policy Branch, Ministry of Transportation, July 10, 2012

15) Metrolinx Presentation – Milton Corridor Committee (October 7, 2016)

16) CN additional responses to CEAA information requests (IRs) 1-25

17) Halton Brief 2016 – Role of Halton Planning Framework within CEAA Panel Review of the CN Milton Logistics Hub Project

18) The Operational Policy Statement: Addressing “Need for”, “Purpose of”, “Alternatives to” and “Alternative Means” under the *Canadian Environmental Assessment Act*, Update November 2007

19) Correspondence dated February 6, 2017 from Deputy Minister of Transportation (MTO) to Lesley Griffiths, Panel Chair, Milton Logistics Hub Project Review Panel c/o Canadian Environmental Assessment Agency

20) 2006 MTO Commercial Vehicle Survey data sets, online at: https://www.ontario.ca/search/data-catalogue?sort=asc

CN MILTON LOGISTICS HUB

REVIEW OF RISK ANALYSIS INFORMATION IN EIS

March 9, 2017

By

F.G. Bercha

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1. INTRODUCTION

1.1 Summary

I am a professional engineer and a specialist in risk analysis. I was retained by the Halton Municipalities (the Regional Municipality of Halton, the City of Burlington, the Town of Halton Hills, the Town of Milton, and the Town of Oakville) to review the CN Milton Logistics Hub Development EIS, and its associated relevant appendices. I considered the sufficiency of the information provided to consider the risk of potential accidents and malfunctions during project construction and operation, both on the project site and on the surrounding roads. I was asked to focus my review on "the technical validity of the information, the methods and analysis used, and the conclusions regarding the significance of any environmental effects, proposed mitigation measures, and related follow-up programs."

Overall, I concluded that the information provided by CN was insufficient in a number of aspects, as discussed in my report. I have set out information requests for supplemental information that I recommend should be made to CN.

1.2 Purpose of Work and Scope of Report

The general purpose of this work is to provide expert assistance for the Halton Municipalities' participation in a Federal Environmental Assessment Panel Review on the CN Milton Logistics Hub Development (the "CN Proposal") for assessing the risk of potential accidents or malfunctions during project construction and operation, on the project site and on the surrounding roads and public locations.

The list of documents [numbered 1-18] that I reviewed or referred to is attached to my report as Appendix A. Specifically, the work includes a review and evaluation of the adequacy of information and data, methodology, and any conclusions on acute risks to the public and recommendations on mitigating such risks, as set out in the "Milton Logistics Hub, Summary of the Environmental Impact Statement [Appendix A, documents 2, 4, 5]," and related appendices [Appendix A, document 3] and other relevant documents [Appendix A, documents 1, 6, 7, 8, 9, 10, 11]. This review is restricted to that of information on acute risks to the public (such as risks from fires, explosions, or toxic releases causing fatality or serious injury) and excludes environmental damage and chronic health risks.

Accordingly, following this introductory section, this document describes the data and information provided, standards relevant to assessing risk, specific information requests I recommend, the adequacy of any conclusions and recommendations for risk mitigation given, and my conclusions and recommendations.

1.3 Expert Qualifications

I have been principal engineer and president of Bercha Group since 1975. I provide professional services on transportation, oil and gas facility, urban planning, and industrial projects requiring technical specialization in risk and reliability analysis including availability and reliability, constructability, economic, operational, and public safety analysis for operations in a variety of environments and locations. I have successfully provided innovative solutions to complex engineering and risk problems and developed new methods for better assessment and management of risks associated industrial and transportation project risk and reliability interactions with public and asset safety.

I obtained my Bachelor's Degree from the University of British Columbia in 1963, became a registered Professional Engineer in Alberta in 1969, and obtained my PhD in Engineering at the University of Toronto in 1972, specializing in probabilistic engineering. I also hold a DSc in Architecture obtained in 2012, in the area of building safety.

I am a member of numerous professional societies including the American Society of Mechanical Engineers and the International Society of Risk Analysis. I have authored over 100 refereed and published papers on the subjects of risk analysis, industrial safety, and other applications of risk and reliability physics and engineering, as well as over 300 technical reports on risk and reliability analysis.

My background includes industrial and frontier regions engineering experience, project management, design, resident engineering, research, university and industrial course teaching and technology transfer. I have also been qualified as an expert in risk analysis and have provided expert testimony at provincial, national, and international tribunals such as the Alberta Energy and Utilities Board, the National Energy Board, California Public Utilities Commission. In 2010 I also published a comprehensive book on risk analysis entitled "Risk Analysis Methods and Applications" [16].

2. ASSESSMENT OF CN EIS AND APPENDICES FOR ADEQUACY OF INFORMATION FOR RISK ANALYSIS

2.1 The Guidelines for Preparing the EIS

I reviewed the "Guidelines for the Preparation of an Environmental Impact Statement, Milton Logistics Hub" dated July 2015 [1] which provided the following instructions in regard to preparation of the EIS. I have also placed emphasis on certain portions of the instructions which I will discuss following the quote.

> **6.6.1 Effects of potential accidents or malfunctions**
>
> The failure of certain works caused by human error or exceptional natural events (e.g. flooding, earthquake) could cause major effects. The proponent will therefore conduct an **analysis of the risks of accidents and malfunctions**, **determine their effects** and present **preliminary emergency measures.**
>
> Taking into account the **lifespan of different project components**, the proponent will identify the probability of potential accidents and malfunctions related to the project, including an explanation of how those events were identified, **potential consequences** (including the environmental effects as defined in section 5 of CEAA 2012), the **plausible worst case scenarios** and the effects of these scenarios.
>
> This assessment will include an identification of the **magnitude of an accident and/or malfunction**, including the quantity, mechanism, rate, form and characteristics of the **contaminants and other materials likely to be released into the environment during the accident and malfunction events** and would potentially result in an adverse environmental effect as defined in section 5 of CEAA 2012.
>
> The EIS will describe the **safeguards** that have been established to protect against such occurrences and the **contingency and emergency response procedures** in place if such events do occur.

In reviewing the above requirements of the EIS Guidelines, I noted that CN was directed to address the following issues:

- **Risk analyses:** Both <u>qualitative</u> and <u>quantitative</u>.
  - In terms of the <u>qualitative</u> aspects, CN was requested to identify events that may lead to accidents and malfunctions, considering what contaminants or other material may be released into the environment, the consequences of such events, and plausible worst case scenarios.
  - Regarding the <u>quantitative</u> aspects, CN was asked to provide an "analysis of the risk" of accidents and malfunctions, which is a numerical exercise. Additional factors mentioned above, such as lifespan of project components and the presence of safeguards, are relevant to the quantification of risk.

- **Mitigation:** CN was required to describe the safeguards established to protect against the risk of accidents or malfunctions.

- **Emergency Response procedures**: CN was also required to discuss what emergency response procedures and measures would be put into place on a preliminary (preventive) basis (also called "**strategic measures**"), as well as procedures that would be used upon accidents and malfunctions occurring ("**tactical measures**").

I note that the above guidelines also refer to adverse environmental effects with respect to *CEAA 2012*. My expertise is in acute risks to the public such as from accidents and toxic substances; I will therefore not comment on chronic risks from other environmental impacts.

2.2 Approaches to Risk Analysis

To analyze risk, one must (1) identify the hazard, (2) determine the probability of occurrence, and (3) assess the consequences should it occur. The individual specific risk from a given event occurring is a combined measure of the numerical probability of occurrence, and the magnitude of effect [16] to a specific individual at a specific location.

There are a number of standards and approaches to calculating risk in connection with a proposed project such as the CN Intermodal terminal. While it cannot be claimed that any specific risk thresholds have gained universal acceptability, a sufficient number of individual risk, risk matrix, and risk spectrum thresholds have been adopted by various jurisdictions to make it worthwhile to consider some of these in evaluating the risk level acceptability for the subject development. I have listed a number of works on standards of risk assessment giving risk acceptability criteria in Table 3.1 (references are listed in Appendix A).

Table 1: Public Risk Standards

13.	Major Industrial Accident Council of Canada (MIACC). "Hazardous Substances Risk Assessment – A Mini Guide for Municipalities and Industry". 1994.
14.	Canadian Society for Chemical Engineering MIACC CSChE, Risk Assessment – Recommended Practices for Municipalities and Industry, 2015.
15.	Bercha Engineering Limited, Cumulative Risk Assessment and Land Use Planning Project, Summary Final Report, City of Edmonton, 2011.
16.	Bercha, FG. Risk Analysis Methods and Applications, Chapter 4 and 7, Universal Publishers Inc., 2014.
17.	Health and Safety Executive (HSE). "Risk Criteria for Land Use Planning in the Vicinity of Major Industrial Hazards". HSE. London, UK. 1989.
18.	County of Santa Barbara, Environmental Thresholds and Guidelines Manual, Section 15 P119-126 Public Safety Thresholds Revised 2015 Santa Barbara 15P.

Of the above, the MIACC standard is the most commonly used in Canada. Regardless of the risk criteria to use, the information requested below in this report will provide the basis of an adequate quantitative risk analysis of public safety related to the proposed development.

2.3 Risk Thresholds

Risk thresholds are a term generally used to designate the levels of risk which are acceptable in certain situations, and given defined risk recipients (eg. residents, workers, etc.). Possible measures of risk include individual risk, risk expectations, and risk spectra [16, 17, 18].

Individual risk is the probability that a given individual (at a specific location considering their time spent and any sheltering effects, at the location) will become a casualty as a result of the project over a given period of exposure (usually one year). Collective risk expectation can be described by the use of a risk matrix which relates various discrete levels of likelihood of occurrence and severity of consequences. A "risk spectrum" involves a more rigorous assessment of collective risk, and gives a continuous relationship between the probability of occurrence and a quantitative measure of the severity of consequences, such as the number of people affected [16, 17, 18].

A more simple risk criterion is the use of an individual location risk criterion which simply gives the permitted land uses for the individual risk at a specific location, regardless of the amount of time and sheltering of people at that location. This is called the individual risk intensity (IRI) criterion and is detailed in the MIACC standards described in [13, 14].

For the present project it is recommended that individual risk thresholds similar to those described in [15] be considered, but if risks are high and many recipients are exposed, it is recommended that collective risk also be quantified as described in [17, 18].

2.4 Portions of the EIS Relevant to Risk

In reviewing the EIS for the necessary information, I reviewed the section which appeared to focus on information for a risk analysis, section 6.6. ACCIDENTS AND MALFUNCTIONS. This section contained the following subsections:

A "spill" was generally defined in Section 6.6.1, but the section only briefly refers to hazardous materials, and in my opinion did not define them adequately. In my report we shall use the Transport Canada definition of hazardous materials, normally called Dangerous Goods (DG) given as [12]:

> *A product, substance or organism included by its nature or by the regulations in any of the classes listed in the schedule* (See Appendix B to my report)

CN provides a discussion of Human Health Risk analysis (HHRA) in [3], but this fails to discuss acute risks such as those from explosions or toxic gas releases causing immediate fatalities or injuries. No other documents that I reviewed in the EIS discuss acute risks to the public.

2.5 Information Required to Assess Risk for this Facility

An intermodal facility will involve trains transporting goods that are in containers, including dangerous goods (DG), and then transferring the goods between trains and trucks, and transporting the DG by trucks to external locations. A variety of equipment may be used to perform the transfers, such as stackers and reachers. There is risk of accident of malfunction at various points in the process. In order to qualitatively and quantitatively understand the risk, several types of information must be considered.

a. Trains, Vehicles, Transfers, and DGs

First, qualitative and quantitative information on the expected DG train transport, transfer to trucks, and extent of truck travel is required for a public safety QRA. The principal risk source from operations is the release of DG as a result of a malfunction or accident involving train derailment, collision, DG transfer to trucks, truck accident, and other release events.

Specifically, the following information items for a typical scenario – or typical scenarios (ie, max, min, avg) – are needed:

- Number of trains entering and exiting daily, estimated speeds of ingress and egress, station time, movements, locations along the track for idling, unloading, and reloading.

- Types of trains employed, including numbers of cars in each train, train specifications, and certification levels.

- Quantities and types of DG carried by the trains, including their quantities, form (solid, liquid, or gas), and their release parameters. This information will already be tracked by CN as part of its operations and should therefore be readily available.

- A detailed description of the intermodal transfer operations is needed, in terms of exactly how transfers of containerized material occur between trains and trucks, where on the site it occurs, what equipment is used to accomplish the transfer, and the extent of automation and human judgment used in the process.

- Details of the daily expected DG transfer operations (type, quantity, number of transfers, transfer times).

- The lifespan of all equipment used in the intermodal transfer operations also needs to be known. The effective functional time for individual items of equipment and the schedule for refurbishment and replacement are factors that can numerically be factored into the risk analysis.

- DG Truck characteristics and specifications need to be known. The intermodal facility will only allow trucks meeting certain minimum standards into the facility. In general, the higher the standards met by the trucks, the lower the risk of accident or malfunction.

- Driver certifications for the trucks entering the facility need to be confirmed. Only drivers meeting minimum levels of training and licensing will typically be allowed to handle trucks carrying DG.

- Daily DG truck movements and routes (road types, speed limits, Average Annual Daily Traffic) within terminal and routes within 10 km (nominally) of terminal.

- Life cycle characteristics of the operation including annual variations in above and total life cycle. This information is needed both in terms of the variations in locomotive and truck traffic on an annual basis, and the variations in terms of types of DG carried. For instance, in the spring there tends to be more fertilizer being shipped, whereas in the winter the amount of fuel oil increases. These annual patterns are relevant to determining risk associated with the operations.

- Information on the projected lifespan of the facility, and projected changes in types of DG shipped through the facility is also needed for the risk analysis. If this intermodal facility is projected to operate for the next fifty years, there will be changes to the DG being shipped over that time, some of which can be anticipated now. For example, as hydrocarbons become more scarce, the volume of transported hydrocarbons may decrease significantly over the next fifty years.

- The extent of human exposure in the vicinity of the proposed intermodal facility also needs to be factored into the risk analysis. Therefore, information on local population distributions, both current and projected, is necessary.

- Risk during the construction phase as opposed to the operations phase should also be considered. This will require detailed information as to the construction plans and schedules, and the equipment that will be used on site, and the extent of increased heavy truck traffic due to the construction.

b. Mitigation and Emergency Response Measures

The emergency response measures and plans should be provided, so that they can be considered and factored into the risk analysis and mitigation. There are two types of such measures: **strategic** safeguards such as alarms and spill containment areas, and **tactical** measures, which focus on response times and procedures in the event an incident occurs.

Municipalities generally have emergency response planners on staff who can provide templates for risk analysis and containment. In typical practice, it will be necessary to provide these plans to the municipality before the development can be approved. In addition, the Transportation Safety Board has templates for risk analysis that would be applicable to this facility.

As well, an explanation of any other measures to mitigate risk of accidents and malfunctions should be provided, as such measures can quantitatively reduce risk and should therefore be considered.

c. Worst Case Scenarios

A qualitative description of plausible worst case scenarios in the event of accident or malfunction should also be factored into the risk analysis. Examples of such scenarios would be the 1979 Mississauga derailment of a train carrying DG, or a possible sequential ignition of train cars carrying propane. Consequences such as fatalities or severe injuries should also be considered.

2.2 Review of EIS and Information Requests

I reviewed the EIS as discussed above, and in my opinion, the information provided in the documents reviewed is inadequate for input into a qualitative and quantitative risk analysis (QRA). Insufficient information is provided in respect of each of the above three categories of needed information.

In particular, the information provided in the documents reviewed was conceptual only. Although general concepts and plans were expressed, what was missing was the qualitative and detailed quantitative information on all aspects of the operation related to DGs, which is required for the conduct of a public safety QRA as explained above. I have also provided examples of DG train information collected for other locations [15], which is shown in Appendix C.

No detailed information was given on mitigation of risks to the public, and such risks are not described. Regarding preliminary emergency measures, safeguards, and contingency and emergency response procedures, a list of existing CN Emergency response plans was referred to, but the actual plans do not appear to have been provided with the EIS.

Based on my assessment, there are a number of deficiencies in the EIS in terms of the information needed to consider risk. I have suggested the below information requests be made of CN so that the deficiencies can be addressed. After receiving and reviewing the requested information, some further information may also be required.

Table 2: Information Requests

Topic	Reference to CN EIS [2]	Requested Information	Rationale
Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS s. 6.6.2	**RA1. Train Volume and Station Activities** Please provide the numbers of trains entering and exiting daily, estimated speeds of ingress and egress, time spent at station, movements, and track locations for loading, unloading, and idling.	This information is necessary for assessing risk by conduction a Quantitative Risk Assessment.
Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS s. 6.6.2	**RA2. Train Specifications** For each type of train that will be using the facility, please provide the relevant certification levels, technical specifications, and numbers of cars per train.	This information is necessary for assessing risk by conduction a Quantitative Risk Assessment.
Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS s. 6.6.2	**RA3. Transfer Operations** Please provide a full description of the intermodal transfer operations, including the site location where transfers occurred, and the equipment used to affect transfers of containers. An analysis of the daily expected DG transfer operations in terms of type, quantity, number of transfers, and transfer timing is also needed.	This information must be considered for the modeling of risk from daily DG operations.
Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS s. 6.6.2	**RA4. Intermodal Equipment Lifespan** Regarding the equipment used for transferring containers between trains and trucks, please list the equipment and provide information for each on its technical useful life span. As well, please advise of CN's intended refurbishment and replacement programs in respect of all equipment to be used at the site in the transfer operations.	This information is relevant for the modeling of risk from daily operations. This information is also required by the EIS Guidelines, which request that the proponent take "into account the lifespan of different project components".

Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS s. 6.6.2	**RA5. Truck Specifications** For trucks carrying DG that will be permitted entry to the facility, please provide full technical specifications and characteristics, including tonnage limitations and permitted types of cargo.	This information must be considered for the modeling of risk from daily operations.
Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS s. 6.6.2	**RA6. Truck Driver Certifications and Permits** For drivers of trucks carrying DG that will be permitted entry to the facility, please provide details of driver certifications and licenses, and permits required for each truck type.	This information is relevant to the modeling of risk from daily operations.
Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS s. 6.6.2	**RA7. Truck Routes** Please provide details and mapping showing daily expected DG truck movements and routes. Information is needed on road types they will travel on, speed limits, and Average Annual Daily Traffic projections, both within the terminal and within 10 km of the terminal.	This information is relevant to the modeling of risk from daily operations.
Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS App. E7	**RA8. Human Exposure** Please provide public population distributions within 10 km of the site, and associated land use types, both current and future. For example, if land is zoned for commercial, residential, industrial, or recreational use, it needs to be factored into the risk analysis.	The density of the human population in the vicinity of the site, and the approved uses of land in the vicinity, are both important factors to consider in assessing risk from the operations of the terminal. Public exposure numbers and locations as well as an understanding of indoor and outdoor exposure are particularly important for assessing individual specific and collective risk.
Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS s. 6.6.2	**RA9. Details of DG** Please provide detail on the types of DG anticipated to be pass through the intermodal terminal. Details should be provided on quantities, form (liquid, solid, gas), containment characteristics (pressure, temperature, container type), and potential release parameters.	This information must be considered for the modeling of risk from daily DG operations.

Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS s. 6.6.2	**RA10. DG Annual Variation** Please explain the annual variations in types of DGs shipped. For example, certain goods such as fertilizer will tend to be shipped in larger volumes in the spring.	The quantities and timing of movement of DG are relevant to the modeling of risk from operations.
Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS s. 6.6.2	**RA11. DG Projected Changes** Over the planned lifespan of the facility, please advise of any foreseeable changes in the quantities and types of DG that will be shipped through the facility over its lifespan.	The future quantities and timing of movement of DG must be considered for the modeling of risk from operations.
Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS s. 6.6.2	**RA12. Emergency Response Plans** Please provide copies of any emergency response plans, with both strategic (preventive) and tactical (responsive) measures considered. As well, the plans should comply with any local municipal requirements so this should be confirmed.	The plans are relevant to considering operational risk from the facility, and the extent to which any risk has been mitigated. As well, the EIS Guidelines require that such plans be provided: "The EIS will describe the **safeguards** that have been established to protect against such occurrences and the **contingency and emergency response procedures** in place if such events do occur."
Railway Networks and Crossings (Risk) EIS Guidelines Part 2, section 6.6.1 Halton Brief, Table D.5, Transportation	EIS s. 6.6.2	**RA13. Worst Case Scenarios** Please provide a discussion of plausible worst case scenarios associated with operation of the terminal.	Details of the extent of possible impacts from an accident or malfunction are required as they need to be considered in the course of performing risk analysis. As well, the EIS Guidelines required this information: "the proponent will identify . . . the plausible worst case scenarios and the effects of these scenarios."

4. CONCLUSIONS

The CN Milton Logistics Hub Development EIS and associated appendices were reviewed to assess the adequacy of information to form a basis of a quantitative risk analysis (QRA) of public safety during the construction and operation of the proposed facility. The information provided in the documents reviewed is inadequate for input into a QRA. The most significant issue is that the information provided is only conceptual rather than qualitative and quantitative.

Qualitative and detailed quantitative information on all aspects of the operation related to DGs is required for the conduct of a public safety QRA. Such information is described and characterized herein in Information Requests (IR) and partially exemplified with examples from other studies.

In summary, it is concluded that insufficient information on the proposed development for the conduct of a quantitative risk analysis of public safety from acute risks is provided. Details of the information required are given in this document.

Signed this 9th day of March, 2017

Frank G. Bercha

APPENDIX A

CN/Stantec Documents

1. Canadian Environmental Assessment Agency, "Guidelines for the Preparation of an Environmental Impact Statement, Milton Logistics Hub", July 2015.

2. Stantec Consulting Ltd. "Milton Logistics Hub, Summary of the Environmental Impact Statement," Canadian National Railway Company, December 7, 2015.

3. Stantec Consulting Ltd. "Milton Logistics Hub, Summary of the Environmental Impact Statement," Appendix E.7, Technical Data Report, Human Health Risk Assessment, Drc., 201.

4. Stantec Consulting Ltd. "Milton Logistics Hub, Figures," undated.

5. Stantec Consulting Ltd. "Milton Logistics Hub, Renderings," undated.

6. Appendix A, Renderings, Milton Logistics Hub, undated.

7. Appendix A, Figures, Milton Logistics Hub, undated.

8. BA GROUP, "Review of Terminal Generated Truck Traffic," Memorandum, November 30, 2015.

9. Canadian Environmental Assessment Agency, "Requirements for Additional Information from CN for the Milton Logistics Hub EIA", March 15, 2016.

10. CN, Milton Logistics Hub EIS, Response to CEAA IR 1 of March 15, 2016, (all re environmental effects), Prepared by Stantec, May 18, 2016.

11. CN, ATMOSPHERIC ENVIRONMENT, (re: Greenhouse Gas Emissions), Milton Logistics Hub, Response to CEAA IR 10 of March 15, 2016, F. Moreau, June17, 2016.

Other Documentation

12. Transport Canada. *Transportation of Dangerous Goods Act, June, 2009* (portions, as referenced).

13. Major Industrial Accident Council of Canada (MIACC). "Hazardous Substances Risk Assessment – A Mini Guide for Municipalities and Industry". 1994.

14. Canadian Society for Chemical Engineering, MIACC CSChE, Risk Assessment – Recommended Practices for Municipalities and Industry, 2015.

15. Bercha Engineering Limited, Cumulative Risk Assessment and Land Use Planning Project, Summary Final Report, City of Edmonton, 2011.

16. Bercha, FG. Risk Analysis Methods and Applications, Chapter 4 and 7, Universal Publishers Inc., 2014.

17. Health and Safety Executive (HSE). "Risk Criteria for Land Use Planning in the Vicinity of Major Industrial Hazards". HSE. London, UK. 1989.

18. County of Santa Barbara, Environmental Thresholds and Guidelines Manual, Section 15 P119-126 Public Safety Thresholds Revised 2015 Santa Barbara 15P.

19. *Canadian Environmental Assessment Act, 2012,* section 5

APPENDIX B

SCHEDULE OF DG SUBSTANCES [12]

- Class 1 — Explosives, including explosives within the meaning of the *Explosives Act*
- Class 2 — Gases: compressed, deeply refrigerated, liquefied or dissolved under pressure
- Class 3 — Flammable and combustible liquids
- Class 4 — Flammable solids; substances liable to spontaneous combustion; substances that on contact with water emit flammable gases
- Class 5 — Oxidizing substances; organic peroxides
- Class 6 — Poisonous (toxic) and infectious substances
- Class 7 — Nuclear substances, within the meaning of the *Nuclear Safety and Control Act*, that are radioactive
- Class 8 — Corrosives
- Class 9 — Miscellaneous products, substances or organisms considered by the Governor in Council to be dangerous to life, health, property or the environment when handled, offered for transport or transported and prescribed to be included in this class

APPENDIX C

TRAIN DG INFORMATION EXAMPLE

From [15]

Table 2.5.1 (= Table D.2.5.1)
Daily Train Information Summary

Area	Code	DG Route	Number of Trains per day	Type of train/car											
				LPG		Ammonia		Gasoline		Chlorine		Hydrochloric Acid		Other	
				%	No	%	No	%	No	%	No	%	No	%	No
Cloverbar	CCP1	Hwy 16 @ Hwy 216 (Meridian St.) to 33 St. NE (RR232	8	20	1.600	40	3.200	30	2.400	0.10	0.008	3	0.240	6.90	0.552
	CCN1	Hwy 16 @ 17 St NW to 33 St. NE (RR232)	8	20	1.600	40	3.200	30	2.400	0.10	0.008	3	0.240	6.90	0.552
Southeast	SCP1	50 St. @ 82 Ave to 34 St. &94 Ave NW	12	20	2.400	40	4.800	30	3.600	0.10	0.012	3	0.360	6.90	0.828
	SCN1	Sherwood Pk Fwy @ 29 St NW to Whitemud Drive & 17 St. NW	8	20	1.600	40	3.200	30	2.400	0.10	0.008	3	0.240	6.90	0.552
Horsehills	HCN1	Manning Fwy near 17 St NW to 259 Ave (Hwy 37)	2	20	0.400	40	0.800	30	0.600	0.10	0.002	3	0.060	6.90	0.138

Table 2.5.2 (= Table D.2.5.2)
Annual Train Information Summary

Area	Code	DG Route	Number of Trains per Year					
			LPG	Ammonia	Gasoline	Chlorine	Hydrochloric Acid	Other
			LPG	AMM	GAS	CHL	HCA	OTH
Cloverbar	CCP1	Hwy 16 @Hwy 216 (Meridian St.) to 33 St. NE (RR232	584	1,168	876	2.9	88	201
	CCN1	Hwy 16 @ 17 St NW to 33St. NE (RR232)	584	1,168	876	2.9	88	201
Southeast	SCP1	50 St. @82 Ave to 34 St. &94 Ave NW	876	1,752	1,314	4.4	131	302
	SCN1	Sherwood Pk Fwy @29 St NW to Whitemud Drive & 17 St. NW	584	1,168	876	2.9	88	201
Horsehills	HCN1	Manning Fwy near 17 St NW to 259 Ave(Hwy 37)	146	292	219	0.7	22	50

CNR Milton Mobility Hub – Environmental Impact Statement (EIS)

EXPERT REPORT ON GEOTECHNICAL ASPECTS

Prepared by: **Mehdi Mostakhdemi** and **Dan Dimitriu** of Amec Foster Wheeler Environment and Infrastructure ("Amec Foster Wheeler")

Dated: March 10, 2017

1. INTRODUCTION

We are geotechnical engineers at Amec Foster Wheeler. We have been retained by the Halton Municipalities (collectively, the Regional Municipality of Halton, the City of Burlington, the Town of Halton Hills, the Town of Milton, and the Town of Oakville) to conduct an independent review of the Technical Data Report Geotechnical Investigation (Appendix E5) (the Geotechnical Report) prepared by Stantec on behalf of Canadian National Railway Company (CN) as part of the Environmental Impact Statement (EIS) in support of the design and construction of the new satellite intermodal terminal (the Terminal) in Milton, Ontario.

The geotechnical report covers the Project Development Area (PDA) defined as the area of physical disturbance directly associated with the project footprint which covers approximately 185 hectares (ha) of CN owned property with approximate borders of Tremaine Road to the south, First Line to the north, Britannia Road to the west and Lower Base Line to the east.

1.1 Qualifications

Mehdi Mostakhdemi, Msc., P. Eng.

Mr. Mostakhdemi, P.Eng. has over 12 years of experience working as a geotechnical engineer and a structural project manager covering a variety of fields including construction, and infrastructure projects. Mr. Mostakhdemi holds a B.Sc. in Civil Engineering and a M.Sc. in Geotechnical Engineering from Tehran Polytechnic, and a M.Eng. in Geotechnical Engineering from the University of Alberta, Canada.

In his work as an engineer and consultant, he has been involved in numerous development projects and consulting engagements in the Halton area. He is therefore very familiar with the terrain and the geotechnical features found in this region.

Dan Dimitriu, PhD., P. Eng.

Mr. Dimitriu is a Geotechnical Engineer with over 45 years of experience in fieldwork, foundation design, research, and academic fields of the practice of the engineering profession. The spectrum of projects Mr. Dimitriu has been involved with include stabilization of natural and man-made slopes, design of temporary and permanent retaining structures, soil improvement by preloading, dewatering and stone columns, deep foundations for buildings, bridges, tunnels and off-shore structures, heavy foundation for large industrial and commercial projects, as well as numerous more common projects for conventional foundations, pavements, sewers, culverts and conduits.

1.2 Purpose of Review

Our scope of work for this report focused on the review of the Geotechnical Report to determine the technical validity of the information provided in the report, the methods and analysis used in preparation of the report, and the completeness of the design recommendations for the geotechnical aspects of the proposed development as they may relate to potential environmental impacts.

1.3 Materials Reviewed

As mentioned above, we reviewed the **Geotechnical Report and the geotechnically related aspects of the EIS**. We also reviewed the Guidelines for the Preparation of An Environmental Impact Statement pursuant to *Canadian Environmental Assessment Act, 2012*, Milton Logistic Hub Project, Canadian National Railway Company dated July 2015 (the "**EIS Guidelines**").[1] Section 6.1.2 of the EIS Guidelines described the requirements relating to the geotechnical aspects.

1.4 Review and Information Requests

The EIS Guidelines indicated that the baseline information should include sufficient detail to enable the identification of how the project could affect the Valued Components (VCs) and the analysis of those effects. In our review, we found that there were a few items that appeared to be missing, and some aspects of the work that were not sufficiently detailed to permit an assessment of the significance of the effects on the VCs. We have set out our comments below. Our recommended requests for information to address these insufficiencies are summarised in the table immediately following.

- **Seismic activities:** The EIS Guidelines require a discussion of the history of seismic activities in the area. As well, a site seismic classification in accordance with applicable standards (i.e., National Building Code of Canada or Ontario Building Code) would be standard practice. However, this assessment was not provided.

- **Grade Separation at Lower Baseline Road:** The project incorporates a grade separation to be implemented at Lower Baseline Road. However, details have not been provided as to the subsurface conditions at this site, nor have geotechnical design recommendations been made for this work. If work proceeds without sufficient characterization of the subsurface conditions,

[1] Our review was conducted in accordance with the professional standards outlined in *Professional Engineers Reviewing Work Prepared by Another Professional Engineer* (PEO 2011); and Guideline for Professional Engineers Providing Geotechnical Engineering Services Revised 11/15/98.

significant problems related with unexpected subsurface conditions could arise, such as excavation instability and failure during construction, or disturbance of aquifers or utility lines during construction, etc. Therefore, additional geotechnical investigation should be conducted at the proposed grade separation site prior to advancement of the design.

- **Culverts:** The project incorporates several culvert replacements and extensions at the road crossings of the watercourses. The geotechnical design report will require provisions to address scour prevention, wingwall designs for the culverts, earth/backfill pressures recommendations including compaction effects, and inclusion of frost tapers (OPSD 803.030) within settlement sensitive areas to reduce the damaging effects from differential frost heave.

- **Replacement Watercourses and Storm Management Ponds:** CN proposes to relocate sections of watercourses and to create several stormwater management ponds. These works involve permanent cuts into the terrain. The geotechnical report identified groundwater and the potential of confined aquifers that pose risks of artesian conditions where the excavations approach or intersect the pressurized water layers. The excavations that encounter more pervious lenses or layers, such as sands and silts, may result in the unexpected release of previously pressurized groundwater. These factors should be considered and planned for in CN's mitigation measures.

- **Impact of Traffic Increase:** It is understood that the construction of intermodal terminals would increase the volume of traffic and number of heavy trucks in the surrounding area. This could be problematic, if the surrounding roads and infrastructure were designed to withstand lighter vehicles and/or lower traffic volumes, and accordingly may not support the increased volumes and loads that are anticipated.

  The assessment of the impact of the proposed development on the surrounding roads and infrastructure was not included in scope of the geotechnical report, as the geotechnical report only focused on the PDA. The geotechnical/pavement investigation and assessment of the impacts of the proposed development on the surrounding roads and infrastructure (i.e., roads and infrastructure outside of the PDA) should be incorporated into the geotechnical analysis for further review and assessment.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Geotechnical EIS Guideline Part 2 Section 6.1.2. Halton Brief, Table D.3, sensitive surface and groundwater features	EIS App E.5	**GT1. Seismic Activities** Please provide a discussion of the history of seismic activities in the area of the proposed site. As well, please provide the seismic classification of the site area.	This information is required by the EIS Guidelines. As well, it is standard practice to consider the seismic history of the area and to determine the site seismic hazard and site seismic classification for design purposes based on geotechnical findings.
Geotechnical EIS Guideline Part 2 Section 6.1.2. Halton Brief, Table D.3, sensitive surface and groundwater features	EIS App E.5	**GT2. Grade Separation at Lower Baseline Road** Please review the subsurface conditions in the vicinity of the proposed grade separation at lower baseline road. Based on those conditions, please provide a proposal in terms of the geotechnical design recommendations and the design of the foundation.	Prior to implementing a grade separation, it is necessary to consider the existing subsurface conditions. Based on those existing conditions, geotechnical design recommendations can be made to support the geotechnical, structural and drainage design of important aspects such as the bridge foundation, earth retaining structures, drainage and subdrainage.
Geotechnical EIS Guideline Part 2 Section 6.1.2. Halton Brief, Table D.3, sensitive surface and groundwater features	EIS App E.5	**GT3. Installation of Culverts** In light of the proposal to install culverts in the watercourses, please explain what mitigation measures will be used to prevent scour, bank erosion, and support the design of associated retaining structures. Should the culverts cross underneath settlement sensitive areas, please also consider the need for frost tapers.	The use of culverts to bridge over portions of the existing watercourses will require measures to prevent scour and erosion consistent with the geotechnical conditions at the particular locations. As required by the EIS Guidelines, CN should address the potential for such effects including risks for stream bank erosion and the potential instability. Geotechnical recommendations for compacted backfill against retaining structures should address the effects of compaction effort, and sloping ground. As well, in the case of pavement or other settlement sensitive areas exposed to seasonal freezing, there is risk of differential frost heave. This would affect the performance of the finished works. Frost tapers should be considered to reduce the impacts of frost heave.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Geotechnical EIS Guideline Part 2 Section 6.1.2. Halton Brief, Table D.3, sensitive surface and groundwater features	EIS App E.5	**GT4. Replacement Watercourses and Storm Management Ponds** To relocate sections of watercourse and to create storm management ponds, permanent and relatively deep cuts into the terrain will be required. The risk of hitting pervious lenses or developing artesian conditions should be considered, along with proposed mitigation and prevention measures.	Given the subsurface condition at the site revealed by the geotechnical investigation, there is a risk of hitting pervious lenses or otherwise disrupting existing aquifers. The formation of pathways for the flow of pressurized groundwater could result in significant disruption and damage, and ultimately may lead to loss of solids, subsidence and erosion, and possibly contamination of the groundwater from surface contaminants as discussed in the EIS Guidelines. These factors should therefore be considered in advance.
Geotechnical EIS Guideline Part 2 Section 6.1.2. Halton Brief, Table D.3, sensitive surface and groundwater features	EIS App E.5	**GT5. Impact of Increased Traffic** The increased amount of traffic from heavy trucks can have a significant impact on the subgrade and on the paved surfaces, as well on the surrounding environment. This should be factored into the geotechnical investigations and environmental assessments.	In addition to general environmental issues (traffic congestion, noise, dust, etc.) increased heavy truck traffic can accelerate the wear and deterioration of existing public roads. A road preconstruction condition survey would assist with a better understanding of the mechanical impacts of the added construction and operation traffic will have on the existing public roads.

Signed this 10 day of March, 2017

m.m

Mehdi Mostakhdemi

Signed this 10 day of March, 2017

Dan Dimitriu

CNR Milton Logistics Hub
Review of Environmental Impact Statement (EIS)
and Supporting Documents

Water and Natural Heritage

Submitted to:

Region of Halton

Prepared by:

Amec Foster Wheeler Environment & Infrastructure
Blackport and Associates
Dougan & Associates
Matrix-Solutions Inc.
North-South Environmental Inc.
C. Portt and Associates

March 11, 2017

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1.0 INTRODUCTION

1.1 SUMMARY OF FINDINGS

The Environmental Impact Assessment provided by CN in support of the proposed Milton Mobility Hub and associated documentation (the "EIS"), in the opinion of the Water / Natural Heritage Team (W/NH Team), does not have sufficient information to allow the CEA Panel to assess whether the project is likely to result in Significant Adverse Environmental Effects in respect of the water and natural heritage aspects. In some cases, the framework and methods selected by CN are considered inadequate, which, in the opinion of the W/NH Team resulted in insufficient data and unsupportable conclusions, which in some cases are potentially misleading. There are also instances of insufficient disclosure of study conditions and rationale, which has resulted in the W/NH Team not being able to assess the validity of the EIS results. In many cases, there is insufficient information to consider the EIS in relation to the impacts on land use, using the applicable standards and guidelines in Halton Region.

Accordingly, the W/NH Team has set out 57 information requests that it suggests be made to CN in respect of its work on water and natural heritage aspects.

1.2 PURPOSE OF REVIEW AND SCOPE OF REPORT

The team of experts comprising the W/NH Team, was retained by the Regional Municipality of Halton, the City of Burlington, the Town of Halton Hills, the Town of Milton and the Town of Oakville (collectively, the "Halton Municipalities") to conduct a review of the EIS specific to water and natural heritage.

The W/NH Team has focused comments in this report on whether sufficient information has been provided in the EIS to determine whether the Project meets the requirements of the EIS Guidelines dated July 2015, as well as the standards set out in the Halton Brief.[1] As directed by the CEA Panel, the W/NH Team has considered sufficiency in the context of whether adequate information has been provided to allow a proper and fulsome assessment of the technical validity of the information, methods, analysis, and conclusions regarding the identification and significance of any environmental effects, mitigation, and proposed follow-up programs.

1.3 REPORT STRUCTURE

Due to the integrative nature of water (surface and groundwater) and terrestrial and aquatic features, which collectively comprise a natural heritage system (NHS), the W/NH Team has integrated its sufficiency assessment of the EIS and combined these disciplines into this document.

Within this document, the W/NH Team initially provides comments regarding broad-level concerns with the framework and perspectives from which CN proceeded with its work. The W/NH Team outlines why the approach used by CN does not use a **systems perspective**, as the work did not consider the integrated and interdependent nature of the components which comprise the natural heritage system. This has resulted in fundamental deficiencies that in the opinion of the W/NH

[1]Please see Appendix A for a list of documentation reviewed.

Team, compromise many of the EIS results, as well as the validity of any conclusions that can be drawn from them. The lack of a natural heritage system perspective is an over-arching, primary issue that underscores a main concern that the W/NH Team has with the CN work as outlined in Section 1.5 of this document. The W/NH Team's specific comments on the absence of a Natural Heritage Systems approach are provided at the end of the discussion of other components in Section 2. This is considered a logical progression, as the Natural Heritage System integrates all of the disciplines contained within this review.

The W/NH Team then provides technical comments regarding specific work and methods employed by CN in the EIS. Where material insufficiencies have been identified in CN's methodology, analysis, conclusions, mitigation proposals, or follow-up programs, the W/NH Team explains why further information is considered needed to address these insufficiencies.

The technical comments are divided into five disciplines as set out below, with the relevant subject matter experts conducting reviews of areas relevant to their expertise.

A. **Surface Water: *Ron Scheckenberger***

B. **Groundwater: *Bill Blackport***

C. **Stream Morphology: *John Parish***

D. **Natural Heritage - Fish and Fish Habitat: *Cameron Portt***

E. **Natural Heritage - Terrestrial Species and Habitat: *Mirek Sharp, Sarah Mainguy, Jim Dougan, Karl Konze***

1.4 EXPERT QUALIFICATIONS

Ron Scheckenberger, M. Sc., P. Eng.

Mr. Scheckenberger is a professional civil engineer with specialized education and experience in Water Resources and Hydrologic/hydraulic Modelling. Since graduating from McMaster University, Mr. Scheckenberger has worked for over 30 years in the field of Water Resources Engineering, as both a Project Engineer and Manager. Mr. Scheckenberger currently leads the Water Resources department of Amec Foster Wheeler, a consulting firm involved in environmental consultancy and engineering.

Mr. Scheckenberger also has extensive experience with projects involving water resources management in Halton region, and specifically for studies done with the Town of Milton. Along with other expert consultants involved in this report, Dougan & Associates, C. Portt and Associates, Blackport and Associates, and Matrix-Solutions, Mr. Scheckenberger and his team at Amec Foster Wheeler has been involved in a number of environmental studies supporting the land use and infrastructure planning in the Town of Milton (the "**Milton Projects**"), since 1998. The following provides a brief list of some of the Milton Projects of direct relevance to the proposed Milton Intermodal Facility:

- Sixteen Mile Creek Area 2 and Area 7 Subwatershed Study (Bristol Survey), 2000

- Indian Creek Subwatershed Study (Sherwood Survey), 2004
- Phase 1 Bristol Survey Environmental Monitoring Plan, 2007
- Sherwood Survey Environmental Monitoring Plan, 2010-2015
- Indian Creek Scoped Characterization, 2013 (Draft)
- Milton Education Village Functional Stormwater Environmental Management Plan, 2013 (Draft)
- Britannia Road Class Environmental Assessment, 2014
- Sixteen Mile Creek Area 2 and Area 7 Subwatershed Update Study, 2015
- Boyne Survey Functional Stormwater and Environmental Management Strategy, 2015

Based on the involvement in the foregoing studies, the experts retained on this matter have had considerable exposure to the area's water and environmental resources, including planning for new communities and supporting infrastructure.

Bill Blackport, M. Sc., P. Geo.

Mr. Blackport is a consulting hydrogeologist. Mr. Blackport has a M.Sc. in Earth Sciences (Hydrogeology) from the University of Waterloo. Mr. Blackport is a full practicing member of the Association of Professional Geoscientists of Ontario. Mr. Blackport has over thirty years of experience in hydrogeologic field investigations, impact assessments, and groundwater quality and quantity interference issues.

He was employed for several years as a hydrogeologist at the Ontario Ministry of the Environment, and has also taught physical hydrogeology at the University of Waterloo. In addition to having extensive experience in consulting for hydrogeological issues, Mr. Blackport was also involved in the Milton Projects and has detailed hydrogeological knowledge of the Halton area.

John Parish, M.A.

Mr. Parish is a consulting geomorphologist, who specializes in fluvial geomorphology and integrated stream restoration. He has over 30 years of experience working in the field of fluvial geomorphology, river management, erosion assessments, environmental assessment, and planning.

Mr. Parish is a full practicing member of the Association of Professional Geoscientists of Ontario. He has an M.A. in Geomorphology from Wilfred Laurier University, as well as a B.E.S. in Physical Geography from the University of Waterloo. Included in his over 30 years of experience is involvement in the Milton Projects. Mr. Parish therefore has significant knowledge and experience of the watercourses in the Region of Halton.

Cameron Portt, M.Sc.

Mr. Portt is a scientist and consultant specializing in the areas of fisheries resources, fish habitat evaluation, environmental impact assessment of fish and their habitat, and the design and evaluation of measures to avoid mitigate, or compensate for impacts to fish habitat.

Mr. Portt has over 35 years of experience as a fisheries scientist and consultant, and has been working in this field since graduating from University of Guelph in 1980 with a M.Sc. in Zoology. He has been involved in numerous subwatershed and planning studies, many of which focused on areas of Halton Region. He has also consulted on projects relating to infrastructure and erosion control, as well as designing and implementing monitoring studies to track impacts on watercourses, aquatic habitat, and fish communities. Mr. Portt's extensive experience includes involvement in the Milton Projects.

Mirek Sharp, M.Sc.

Mr. Sharp is the Founder, Principal, and Senior Terrestrial Ecologist at North-South Environmental Inc., a consulting firm specializing in terrestrial ecology and natural heritage. Mr. Sharp undertakes studies in all areas related to ecology including field studies, data analysis, and mapping, assessment of significance, and policy analysis and monitoring, often in relation to landscape planning and design projects.

Mr. Sharp holds a M.Sc. in Ecology from the University of Guelph, as well as a B.E.S. in Environmental Studies (Honours) from the University of Waterloo. He has worked for over 35 years in the field of Ecology, primarily throughout Ontario, but also including projects in New Brunswick, Manitoba, Alberta, Nunavut, Yukon, Thailand and Romania. Mr. Sharp has been engaged in natural heritage planning in Halton since 1978 and has assisted the Region in the transition from a "features-based" approach to protecting natural heritage to a "systems-based" approach which reflects the current science for maintaining biodiversity and ecological function at a landscape level. Recently, his firm, North-South Environmental Inc., played a major role in establishing the Region of Halton's Regional Natural Heritage System. He has provided expert testimony to the Ontario Municipal Board on numerous occasions, including in regard to his work on the Region's Natural Heritage System (NHS). He routinely undertakes peer reviews of a variety of undertakings throughout the Greater Toronto Area.

Sarah Mainguy, M.Sc.

Ms. Mainguy has degrees in Biology (Acadia University, Wolfville, Nova Scotia) and Zoology (University of Guelph, Ontario). Her 28 years of consulting experience as an ecologist, on projects in Ontario, Alberta, Nova Scotia, New Brunswick, Quebec and the mid-western and eastern United States, include a strong background in both botanical and wildlife studies, particularly breeding birds and amphibians, extensive experience in Species at Risk, and expertise in conducting integrated wildlife and botanical studies within terrestrial and wetland ecosystems, in agricultural, urban and wilderness landscapes.

Ms. Mainguy has conducted and managed a diversity of projects, both in small remnant ecosystems in urban and agricultural areas and in broad wilderness landscapes. Her experience encompasses the trade-offs between remediation/avoidance of human impacts and protection of Species at Risk through implementation of federal and provincial Class Environmental Assessment and Environmental Impact Assessment for projects involving residential development, infrastructure, mining, energy, and many other types of development. She develops management plans for natural heritage features to improve habitat. She has also applied her knowledge of natural heritage to provide a basis for environmentally sensitive development, to provide input to municipal environmental planning initiatives, and to provide recommendations for park planning in wilderness areas. She has provided expert witness testimony at the Ontario Municipal Board and to the Environmental Review Tribunal.

Jim Dougan, M.Sc.

Mr. Dougan is the Founder, and currently a Senior Ecologist and Director of Dougan & Associates - Ecological Consulting and Design, specializing in terrestrial ecology, natural heritage planning, and ecological restoration design firm, Dougan & Associates. He provides ecological expertise and directs projects in several fields including natural heritage, landscape ecology, watershed studies, and assessments of regional systems.

Mr. Dougan graduated with his M. Sc. in Applied Ecology from the University of Guelph in 1975, and founded the firm in 1981. He was then employed to provide technical services under contract to the Ontario Ministry of Natural Resources and Environment Canada, spent six years as a field botanist and arborist for Ecoplans Ltd., and has since directed his own firm for more than 35 years. He has worked or directed studies in Ontario, Quebec, Nunavut and Newfoundland.

Beginning in 1993, he has provided ecological consulting services through his firm, in addition to teaching at the University of Toronto and University of Guelph on topics including landscape ecology and ecological design. Mr. Dougan routinely directs peer reviews on natural heritage planning matters, and has regularly appeared as an expert before the Ontario Municipal Board and other hearing bodies since 1978.

Through the work of Dougan & Associates on the Milton Projects cited earlier, as part of a multi-disciplinary team, Mr. Dougan has directed the terrestrial studies and natural heritage planning for the Town of Milton since its expansion began in 1998. During that period, the provincial and regional policy frameworks for natural heritage planning have evolved substantially, and these changes are reflected in the systems approach that Mr. Dougan has integrated in Milton through the Milton Studies and others. Dougan & Associates has extensive knowledge of the areas surrounding the local area for which the CN Intermodal Facility is proposed, and is currently engaged in a subwatershed study for South Milton, immediately east and south of the CN site.

Karl Konze, B.Sc.

Mr. Konze is a Senior Wildlife Ecologist with Dougan & Associates. He specializes in the field identification of birds, terrestrial animals, insects, and diverse faunal groups, and regularly conducts seasonal wildlife surveys and habitat assessments. Mr. Konze is a recognized expert in field ornithology, who also specializes in the creation of long term wildlife monitoring plans. He has an excellent knowledge of the various protocols used in wildlife inventory and monitoring (e.g., Ontario Breeding Bird Atlas, Forest Bird Monitoring Program, Marsh Monitoring Program, etc.), and was the primary author of the 1997 Ministry of Natural Resources document: Wildlife monitoring programs and inventory techniques for Ontario. For the past 18 years he has worked with Dougan & Associates.

Mr. Konze graduated with his B. Sc. (Hons) from the University of Guelph in 1992, and then worked as a research consultant and project coordinator for federal, provincial, and NGO agencies involved in wildlife inventories and management in Ontario, Saskatchewan, Nunavut and Hawaii. His experience includes peer review and Ontario Municipal Board (OMB) witness testimony. He has extensive knowledge of the ecology and wildlife in Halton Region, having been involved in Milton studies since 1998, peer reviews of Subwatershed Impact Studies for the Town, and wildlife studies for the South Milton Subwatershed Study.

1.5 FUNDAMENTAL IMPORTANCE OF A SYSTEMS APPROACH

Prior to focusing on some of the technical insufficiencies and corresponding information requests in Section 2, the experts hereby outline a broader, over-arching concern with the framework and approaches employed by CN.

While it appears that some of the work done on the “water” aspects was sufficiently characterized and led to reasonably supported conclusions, it is important to emphasize that all aspects of water and the other components of the natural heritage system form part of an integrated, inextricably linked regional ecosystem. Because of this, individual features (watercourses, woodlands, etc.), cannot be evaluated in isolation, as their value is in part determined by their relationship to all the other features in the system. Moreover, because any particular feature may contribute relatively localized function (e.g., providing fish or breeding bird habitat) and contribute to broader watershed or regional functions (e.g., contributing to minimum viable populations at a landscape scale), it is essential that analysis of features and systems embrace a range of scales to fully understand their value and significance. Individual features may also be reliant on the interplay of biophysical conditions at site-specific to local scales. Wetlands, riparian zones and lowland forests require an understanding of reliant biota and their life cycle requirements at local to watershed scales. This, in concert with a locally-focused feature-based water budget that reflects the range of seasonal conditions and landscape evolution, is necessary to evaluate the potential for Significant Adverse Environmental Effects and inform protection and mitigation recommendations. A valid, science-based analysis of potential environmental effects thus requires, first and foremost, identification and evaluation of their interaction with other elements within the system at a variety of scales, as well as a consideration of the elements individually. This is the essence of the ecosystems-based approach that comprises the current science for understanding and protecting natural heritage, and which forms the basis for science-based natural heritage planning throughout Ontario, including Halton.

A useful illustration of these principles may be made in regard to CN’s study of Species at Risk. The general approach was to consult a federal schedule for individual Species at Risk and then, finding four such species, to do limited field work focused on searching for relevant habitats and sightings of those four species. However, in order to properly assess risk to individual species, it is necessary to evaluate them in the context of a larger framework that determines where these species fit into the ecology of the regional natural heritage system, their requirements at various times in their lifecycles, their food sources, habitats and movement corridors, and their interaction with, and reliance on, other species, including those that are not listed on the federal schedule as being at risk. Not only did CN’s work show technical insufficiencies that relate to matters such as how their consultants performed or documented their field work, a broader issue exists in that many crucial elements needed to define the study and to consider the species, as they fit into the regional natural heritage system, do not appear to have been taken into account. It is noteworthy that there is substantial information available at the watershed and regional scales in Halton to assist in this fuller evaluation.

As detailed further in the natural heritage section later in this report, there are standard approaches and guidance espoused by Environment Canada and the Province of Ontario that require a systems-based approach to studying potential environmental effects. In addition, Halton Region's Regional Official Plan (ROP) explicitly requires a systems-based, precautionary approach, in which the area's subwatershed boundaries provide the ecologically meaningful scale for study of environmental impacts. In this regard, there are several subwatershed studies for the areas adjacent to, and encompassing, CN's lands which provide crucial historical information and practical guidance for defining the parameters and methodology of the studies of water and the natural heritage system that were not used by CN. These studies provide important baseline information that should have been considered when studying potential environmental impacts in the area. There is also NHS mapping available that shows the relationship of the natural heritage features within, and adjacent to, the CN lands to the broader Regional Natural Heritage System as defined in the ROP.

When embarking on an environmental assessment, it is important to consider the substantial guidance provided by the Region through the policies provided in the ROP, as well as Regional guidelines, the local planning framework, and the associated studies that have been undertaken in the Region. These are based on rigorous, transparent, science premised on systems-based standards for characterizing and protecting natural features and ecological functions, and determining adverse impacts of development. They provide detailed guidelines on environmental impact assessment, field studies, and interpretation of wildlife habitat including those for Species at Risk. Guidance is also provided in developing systems-based mitigation strategies. The detailed information and guidelines have been developed based on extensive local research and study, and have been tailored to the ecology, needs, and sensitivities of the local region. In the W/NH Team's view, it is important to use these resources in considering environmental impacts of a proposed project in the Region, if the goal is a scientifically valid study of the risks of adverse environmental effects. Simply put, incorporating and building on the rigorous work and scientific study already done would have led to results that provide a complete, reliable and grounded assessment of the CN lands, and the risk of adverse environmental impacts.

This report provides a further discussion of CN's work and any technical insufficiencies, including more detailed comments in Section 2.5 in regard to addressing a systems approach.

2.0 ASSESSMENT OF THE EIS

2.1 SURFACE WATER

RESPONSIBLE EXPERT: RON SCHECKENBERGER

2.1.1 Documentation Overview

The principal document that outlines information on surface water quality and quantity, specific to the Milton Logistics Hub, is Appendix E.15 to the EIS (reference "Milton Logistics Hub Technical Data Report, Hydrology and Surface Water Quality Baseline Study and Effects Assessment", December 7, 2015, Stantec Consulting Limited). This Technical Data Report also has a number of appendices, related to Figures, Stormwater Management Strategy, Floodplain Assessment, Surface Water Monitoring, Levels, Water Quality and Sediment Quality.

The Technical Data Report for Surface Water focuses on the following four (4) components: Climate, Hydrology, Hydraulics, and Water Quality (chemistry, temperature). The approach conducted by Stantec, on behalf of CN, has included a review of desktop information, associated field studies, and related technical analysis.

In terms of the technical analysis, two frameworks were used, specifically:

1. **a baseline study of existing conditions**. The objective was to "describe and present available information and characterize the baseline conditions of climate, hydrology, surface water and sediment quality in the study area".

2. **a surface water effects assessment**. The objective was to "investigate changes to hydrological and hydrometric conditions, as well as surface water and sediment quality conditions in the study area".

2.1.2 Discussion and Information Requests

In the following sections, areas of deficiency relevant to surface water are explained, and the information requests needed to remedy those deficiencies are outlined at the end of each section.

2.1.2.a Watershed Delineation / Current Data

The Project Development Area (PDA) lies in a relatively flat area. As such, small differences in elevation and topography, which are used to delineate the watershed/catchment boundaries, could make a significant difference to projections of the limits of drainage and associated hydrology. It is therefore important to use the most recent data available to establish the limits of the drainage areas.

In the EIS, the catchment delineation has been prescribed from older GIS (Geographic Information System) and topographic data from the Land Information Ontario Database. More recent and contemporary mapping is available through the Town of Milton and Conservation Halton. This includes topographic mapping performed using LiDAR (Light Detection and Ranging), which is an advanced topographical mapping system which is considered more accurate than the GIS and topographic data contained in the Land Information Ontario Database.

There is also other detailed local information available which contains more recent data on area resources and management, including:

- The Sherwood Survey Monitoring reports, which contain detailed information on stormwater management performance and runoff conditions. These and other parameters have been monitored since 2004, and the data reported annually since 2007. The Sherwood Survey development area is directly north of the PDA.

- Indian Creek Tributary system characterization of runoff and topography was performed in 2011 for the proposed Education Village development, which lies northwest of the PDA.

- Several local roadway environmental assessments were performed by Halton Region including Tremaine Road (2012-2013) and Britannia Road (2013) which contained detailed information with respect to resources and management.

The step of watershed / catchment delineation, characterization and model parameterization should have been performed using the most recent studies, so that the resulting data on drainage and hydrology can be as accurate and up-to-date as possible.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Surface Water EIS Guideline Part 1 Section 4.3.3. Halton Brief, Table D.3, sensitive surface and groundwater features	EIS App E.15 Section 4.1 and 8.0	**WNH1. Determination of watershed boundaries / Use of current data** Please reassess the watershed boundaries and characterization by using: • the LiDAR topographic mapping available from the Town of Milton and Conservation Halton; • the EAs for Tremaine Road and Britannia Road; and • the characterizations done for the neighbouring Sherwood Survey and Education Village development areas.	In order to best predict impacts of the project on drainage and hydrology, it is necessary to build from accurate topographic mapping of the area, including current characterization. The Land Information Ontario Database contains less current information. The LiDAR topographical data and the recent EAs from the area contain the best and most current information from which to characterize the boundaries of the drainage area as well as the area's resources.

2.1.2.b Stormwater Management and Diversions

From the information provided, it appears that a conventional Impact Assessment has not been conducted, and rather, CN's approach has been to directly establish a concept for mitigation rather than assess a number of alternatives and thereby work towards a preferred solution. The Impact Assessment aspect of a study of this nature is considered a crucial component in determining the 'best' mitigation plan for a project.

For instance, stormwater management scenarios are considered, however their derivation and assessment has not been appropriately documented in order to understand the advantages and disadvantages of each. Normally, prior to finalizing a development plan, an Impact Assessment is conducted so that existing Valued Components (VCs) can be considered and either avoided or appropriately planned into the future land use fabric. Where these VCs cannot be avoided, then appropriate mitigation needs to be considered in respect of those VCs. Rather, in the case of CN's EIS, it appears that there was no Impact Assessment, and CN overlaid its proposed development plan on the area and then established mitigation approaches consisting of a series of works, including: (a) diversions; (b) enclosures; (c) stormwater management facilities; (d) infiltration BMPs (swales and permeable pavers). Without an Impact Assessment, it is not considered possible to understand the effectiveness and necessity of the mitigation approaches. In addition, there are further deficiencies with each of the mitigation approaches in respect of these measures, as explained in the following.

(a) Diversions: There are significant diversions proposed as part of the preferred stormwater management strategy: 48% of Tributary B's drainage area into a stormwater management facility and 54.6 ha of Tributary A's drainage area of the total of 453 ha is directed into a stormwater management Facility #1. The diversions have not been appropriately assessed in terms of their potential impact on low, moderate, and high flows. As well, the impact of the proposed shortening of Indian Creek and its tributaries has not been considered. For instance, a 1075 m section of Indian Creek is proposed to be realigned into a new 571 m channel. The loss of more than 500 m of channel length has not appropriately been considered in terms of riparian flood storage (volume loss) and potential off-site impacts on peak flows and system hydrology. Hence, if an Impact Assessment had been the first step these significant diversions may not have been necessary to the extent outlined.

(b) Enclosures: Tributary A has three proposed enclosures of 40, 125 and 75 m; the potential impact of these enclosures on system hydrology and hydraulics has not been appropriately considered. The use of enclosures means there will be a corresponding loss of riparian flood storage which serves to attenuate flood flows. The result can lead to increased peak flows to downstream areas. The impact of this should be considered.

(c) Stormwater Management Facilities: One of the mitigation approaches advanced by CN involves the use of stormwater management facilities, which have been designed to drain over 12 days following a 25 mm event. The Town of Milton, in its Development Guidelines, requires that stormwater management facilities drain over a period of no longer than three days maximum in order to reduce odour and nuisance concerns with standing water and also provide capacity in the event of multiple (i.e., back to back) storms over the period of facility draw down. A 12 day draw down period means that another storm event would have a high chance of occurring during that period, which can then potentially recirculate the contaminants back into the receiving water and reduce available storage for flood and erosion control.

Furthermore, the stormwater management facilities have been designed without consideration of the criteria related to the “Regional Storm”, which is the Regulatory Standard in Ontario. Hurricane Hazel which occurred in 1954 represents the governing standard for defining Regulated flood limits in the Milton Area. The current Provincial direction requires that the flood impacts associated with the Regional Storm be considered in designing new developments. CN designed its flood management system to the 100 year storm (defined as a storm that would have a 1% chance of happening in any given year) which is a lower design standard than the Regional Storm.

(d) Infiltration-based BMPs: A further mitigation approach involves the use of swales and permeable pavers to promote onsite infiltration. However, there has been no assessment of the potential for contamination to the local groundwater system from infiltrating potentially contaminated surface water. An intermodal facility of the nature planned by CN can reasonably be expected to have high traffic volumes from trucks, hence providing a high likelihood for urban contaminants. Furthermore, permeable pavers may not be able to withstand the loading from heavy trucks and associated off-loading machinery, hence permeable pavement systems may not be an appropriate infiltration-based BMP for this project.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Surface Water EIS Guideline Part 1 Section 2.1, 2.4, and Part 2, Section 6.4 Halton Brief, Table D.3, sensitive surface and groundwater features	EIS App E.15 Section 6.1.1.1.1	**WNH2. Conduct an Impact Assessment** Prior to considering mitigation measures, an Impact Assessment which considers the VCs currently in the PDA should be conducted.	Prior to establishing the management plan and mitigation approaches, it would be preferable to determine which VCs can be left undisturbed. Mitigation should only be considered after it has been determined that it is not feasible to avoid disturbance of specific VCs. Instead, CN discusses mitigation at the outset, resulting in the need for diversions, long enclosures made of hard infrastructure, and significant reductions of channel length. This process, in the opinion of the W/NH Team has not been appropriately sequenced, for instance it may be that the proposed diversions, or the extent of the diversions planned, may not be necessary. This need would have been better understood had an Impact Assessment been conducted at the outset

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			and the site planned accordingly. In any event, the results of an Impact Assessment are considered required in order to properly assess the mitigation measures that have been proposed.
Surface Water EIS Guideline Part 2 Section 6.4 Halton Brief, Table D.3, sensitive surface and groundwater features	App E.15 Section 5, and sections 6.1.1.1.1 and 6.1.1.1.2	**WNH3. Drawdown times and sizing standard for stormwater management facilities** Please explain the rationale for a 12 day drawdown time for the stormwater management facilities, and why the facilities were not designed to the Regulatory standard as per current provincial convention.	The Town of Milton requires a maximum three-day drawdown time for stormwater management facilities in order to avoid issues (odour, nuisance, plant die-off, etc.) associated with standing water and also to reduce the likelihood of remixing of the contaminants due to further storms over the resident period. Longer drawdown periods also mean that less water can be captured in the stormwater management facility should storms occur during the draw down period which can lead to exacerbated off-site impacts (flood erosion, water quality), and more maintenance. If CN's position is that a 12 day drawdown time is suitable, an explanation is needed. The Province requires that the potential impacts resulting from proposed land use changes be assessed on the basis of 2 through 100 year storm events as well as the Regulatory (Hurricane Hazel) event. CN should consider potential impacts of its project on the off-site Regulatory event.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Surface Water EIS Guideline Part 2 Section 6.4 Halton Brief, Table D.3, sensitive surface and groundwater features	App E.15 Section 6.2.1.1	**WNH 4.Containment of contaminated runoff** Please explain how groundwater contamination will be addressed through the proposed use of swales and permeable pavers in an Intermodal facility, rather than having facilities to collect and treat contaminated runoff.	CN has proposed measures to address the loss of infiltration due to the Project, including the use of swales and permeable pavers. However, an intermodal facility is expected to have heavy vehicular traffic and offloading equipment, which cannot likely be structurally supported by permeable pavements. As well, trucks and associated vehicles tend to be coated in contaminants which, if washed off in an intermodal facility and drained to swales and permeable parameters have the potential to contaminate the groundwater. Further rationale for the use of these mitigation measures is required to understand whether significant adverse environmental effects are likely to result.

2.1.2.c Hydrology and Water Budget

The field program involved the measurements of *in situ* water levels and velocity. These were only collected over a period of six weeks. CN then used these data to support its estimate of runoff responses. In the opinion of the W/NH Team, this short collection period cannot be used to accurately predict runoff characteristics, as it would be skewed by particular seasonal conditions, or weather events. The predictions based on this short term monitoring dataset would furthermore lack statistical validity due to the brevity of the study period. A minimum monitoring period that spans at least three seasons is considered the accepted practice in the field.

As well, the CN Team applied an <u>event-based</u> methodology for its hydrologic modelling, which involves analysis of a theoretical event termed a “design storm” to generate peak flows and runoff volume for various recurrence intervals. However, the standard methodology used for watershed planning is a <u>continuous simulation</u> methodology. The Town of Milton and Conservation Halton have adopted this methodology since 1998. This approach incorporates over 40 years of meteorologic data for the local area. The HSP-F (Hydrologic Simulation Program - Fortran) has been used as the hydrologic model since 1998. This approach and model is far superior to an event-based methodology. Continuous simulation methodology incorporates historical data.

Furthermore, the model has been specifically approved for use for the Indian Creek. The HSP-F model would provide for a more scientifically robust analysis of the potential impacts of the project particularly with respect to projections of erosion and water budget, as well as providing locally relevant information for flood management. In contrast, the event-based method used by CN does not provide as comprehensive baseline data for establishing water budget and erosion mitigation protocols, as it does not account for seasonality, or other antecedent conditions. It relies on gross summaries and surrogates that are not well-supported for watershed planning and impact assessments.

Similarly, in terms of the studies on water budget, CN applied an empirical methodology using the USGS (Thornwaite and Mather equations), which reflect simplifications of how a watershed would respond to a given event. These methods only provide a general characterization based on empirical relationships. In contrast, the HSP-F continuous modelling approach uses several years of historical recorded data. Again, the continuous simulation HSP-F model would have provided a more discrete and locally-based analysis to support mitigation planning and assessment.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Surface Water EIS Guideline Part 2 Section 6.1.4 Halton Brief, Table D.3, sensitive surface and groundwater features	App E.15 Section 4.2.1.1	**WNH5. Stream flow measurements for consecutive seasons** The data collected for streamflow measurements, in terms of *in situ* water levels and velocity, only spanned six weeks. Please consider collecting data for a period of three consecutive seasons (eg. spring, summer and fall in a given year).	A six week period of monitoring should not be used as a basis to estimate or characterize runoff responses and thereby establish criteria for managing impacts to flooding and erosion. The results are highly likely to be skewed by seasonal conditions. A minimum monitoring period of three seasons is considered required in order to obtain data that can be validly used to predict runoff.
Surface Water EIS Guideline Part 1 Section 4.3.3. Halton Brief, Table D.3, sensitive surface and groundwater features	App E.15 Section 4.3.2 and 4.4.1 and App. B	**WNH6. Use approved HSP-F continuous simulation program to predict seasonal runoff condition** Please apply the approved HSP-F ("Hydrologic Simulation Program – Fortran") model and continuous simulation methodology, to provide predictions of runoff characteristics.	The existing approved HSP-F continuous simulation methodology has been prepared by the Town of Milton and has been in use since 1998. It can be used to more accurately predict runoff characteristics.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Surface Water EIS Guideline Part 2 Section 6.1.4, 6.2.2 Halton Brief, Table D.3, sensitive surface and groundwater features	EIS App E.15 Section 4.4.2 and 5.5.4	**WNH7. Use HSP-F continuous simulation program to establish water budget** Please apply the approved HSP-F model and the continuous simulation methodology to provide predictions of system water budget.	The existing approved HSP-F continuous simulation methodology has been prepared by the Town of Milton and has been in use since 1998 on Indian Creek. It can be used to more accurately predict the area's water budget.
Surface Water EIS Guideline Part 2 Section 6.4 Halton Brief, Table D.3, sensitive surface and groundwater features	App E.15 Section 6.1.1.1.1	**WNH8. Analyze off-site neighbouring flood risk** Please analyze the flood risk on neighbouring properties.	There are potential at-risk properties downstream of the PDA, including areas that have or will be designated for residential use. CN should review the risk of flooding. This can be readily done by using the HSP-F and HEC-RAS (Hydrologic Engineering Centre -River Analysis System) programs.

2.1.2.d Water Quality

Only sediment and phosphorus were analyzed by way of a mass balance technique by CN. The balance of the standard water quality parameters were estimated using "professional judgment" rather than through analysis. Further details on why this approach was adopted should be provided.

Furthermore, in order to confirm the validity of the data collected, it would be best practice to conduct a comparison with locally collected historical water quality data. The Phase 2 Sherwood Survey Monitoring Study which includes detailed water quality measurements, has been ongoing in the local area, just north of the PDA, for over 5 years. This information is available from Conservation Halton and the Town of Milton, and is considered relevant to an assessment of water quality in the PDA.

As well, when sampling water chemistry, CN made no distinction between wet weather and dry weather sampling. This distinction is crucial, because when it is raining, there will be more of certain contaminants in the water due to increased potential for mobilization of those contaminants.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Surface Water EIS Guideline Part 2 Section 6.1.4, 6.2.2 Halton Brief, Table D.3, sensitive surface and groundwater features	App E.15 Section 4.4.3 and 5.6.1 Response to IR 16, 17	**WNH9. Rationale for limited measurement of contaminants** Please explain the rationale for providing mass balance measurements for only two parameters, sediment and phosphorus, and not for other parameters important to assessing water quality, including: dissolved oxygen, metals, and bacterial levels.	Mass balance estimates would provide actual data that is important to assessing water quality, as opposed to subjective figures based on professional judgment. In order to assess the likelihood of the potential for a significant adverse effect on water quality, it is considered necessary to better understand the rationale for relying on measurements for some parameters and judgment for other, equally important parameters.
Surface Water EIS Guideline Part 1 Section 4.3.3. Halton Brief, Table D.3, sensitive surface and groundwater features	App E.15 Section 4.4.3 and 5.6.1 Response to IR 16, 17	**WNH10. Validation of Water Quality Baseline** Please validate your water quality measurements and estimates by comparing these with water quality data obtained from the Phase 2 Sherwood Survey Monitoring study.	The Sherwood Survey development area is directly north of the PDA, and its runoff water quality has been under detailed study and monitoring for over five years. The water quality information from that study should be used to confirm the validity of the baseline measurements and estimates performed by CN, so that the baseline can be rationalized locally and better predictions made in relation to impact of the Project on runoff water quality.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Surface Water EIS Guideline Part 2 Section 6.1.4, 6.2.2 Halton Brief, Table D.3, sensitive surface and groundwater features	EIS App E.15 Sections 4.2.2 and 4.3.4	**WNH11. Distinguish between wet and dry weather conditions for water quality sample collection** Please discretely collect data for both wet and dry periods.	Weather conditions at the time of sample collection make a significant difference in contaminant levels as rain causes the mobilization of certain contaminants, which will influence the chemistry of the water sample collected.

2.1.2.e Sediment Quality

Sediment quality was assessed by CN, however it is not typical to study this parameter in the context of a surface water assessment. This information appears likely to be intended to be used for site impact management, but this is unclear. CN has also not explained how the sediment quality sampling was performed or used in the assessment.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Surface Water EIS Guideline Part 2 Section 6.1.4 Halton Brief, Table D.3, sensitive surface and groundwater features	EIS App E.15 Section 4.2.2 and 4.3.5	**WNH12. Sediment data collection and use** Please explain how the sediment quality data were collected, and the intended use of these data in site impact management or in any other project aspect.	Little information on the manner of collecting the sediment quality data, and its intended use, has been provided. This information is necessary to assess the validity of the collection method, and how this information will be used in site impact management.

2.1.2.f Climate Change

While it is apparent that a climate change assessment was considered, it is unclear as to how it has been applied in the assessment of the proposed mitigation. Typically, climate change data would be used to project changes to precipitation, and then the preferred mitigation strategy would take these projections into account by way of a stress test which further determines the potential need for enhanced system resiliency. For instance, larger buffer zones around stormwater collection areas may be required to build better resiliency in response to a projection of increased precipitation due to the shift in meteorology caused by climate change. However, the stormwater strategy proposed does not appear to have considered these potential impacts.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Surface Water EIS Guideline Part 2 Section 6.1.4 and 6.2.2 Halton Brief, Table D.3, sensitive surface and groundwater features	EIS App E.15 Section 4.2.2 and 4.3.5	**WNH13. Application of climate change assessment** Please explain how the climate change assessment was factored into the mitigation strategy for stormwater management.	Although a climate change assessment was performed, it is not clear if it was used to develop and /or assess the preferred mitigation strategy.

2.2 GROUNDWATER

RESPONSIBLE EXPERT: BILL BLACKPORT

2.2.1 Documentation Overview

Overall, the majority of the work done by CN in respect of the groundwater component was sufficient and well-documented. There are three areas in which further explanation or follow-up is needed in order to assess the work and the likelihood of significant adverse environmental effects.

2.2.1.a Comments on CN's Methodology and Background Information

The majority of the methods applied by CN to the groundwater component were consistent with industry-accepted hydrogeological field investigations and assessment practices and are considered generally appropriate. The general methods to assess changes to the groundwater flow system within the context of a recharge/discharge flow system, considering both quantity and quality, are also appropriate. The number and spatial distribution of the boreholes, monitoring wells and drive point piezometers (instruments for monitoring pressure or depth of groundwater) is sufficient for characterizing the local assessment area. The extent of groundwater level monitoring and hydraulic conductivity testing provides general hydrogeological characteristics. The number of groundwater samples was sufficient to characterize the local groundwater quality.

The presentation of the background information provided a sufficient description of the physiography, land use, larger scale geologic and hydrostratigraphic setting. The hydrogeology related to regional groundwater flow, regional groundwater quality, and regional and local groundwater supply was adequately presented. An assessment of the local assessment area, as it relates to Source Water Protection was presented. It was concluded that the local assessment area does not include any highly vulnerable aquifers, significant groundwater recharge areas or wellhead protection areas. This was a reasonable conclusion.

An assessment of the local hydrogeologic setting was presented. A determination of the shallow horizontal groundwater velocity was determined to be on the order of 1 metre every 72 years. The drive point piezometers monitored for Indian Creek indicate downward gradients and subsequently a ‘losing’ stream and a lack of groundwater discharge.

Three geologic cross-sections were created through the local assessment area. The maps consistently reflect the clay/silt nature of the Halton Till.

The assessment of the potential groundwater recharge based on the water balance appeared to be generally consistent for this type of Halton Till. Pre- and post- construction water balances were carried out and the annual change to infiltration was reported to be reduced from 92 mm to 68 mm. Based on the localized nature of this reduction, the deeper nature of the local water wells, and the lack of groundwater connection to Indian Creek, it was concluded that the reduction in recharge was unlikely to affect the hydraulic function of these receptors. This assessment and conclusion is appropriate.

Due to the low hydraulic conductivity of the shallow soil, the quantity of water needed to be pumped is considered low. Regardless, a dewatering assessment is proposed to be carried out to estimate dewatering needs. Where dewatering is greater than 50,000 L/day, a Permit to Take Water will be necessary. It is proposed that a groundwater discharge management system be established to provide sediment control and that private well monitoring would be carried out within an established zone of influence. This assessment and conclusion is appropriate.

General best management practices for spill containment have been proposed and are generally acceptable.

2.2.2 Discussion and Information Requests

An important factor that CN did not appear to adequately consider was that portions of the landscape in the PDA are comprised of weathered Halton till. Such material tends to be more prone to fracture, which could result in a greater hydraulic connection and higher groundwater velocity. This factor should be taken into account by CN when considering the potential for fracture and increased flow.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Groundwater EIS Guideline Part 2 Section 6.1 and 6.2.2 Halton Brief, Table D.3, sensitive surface and groundwater features	App E.6 Sections 5.2, 5.4	**WNH14. Consideration of potential for increased horizontal and vertical groundwater flow** In considering the risk of groundwater contamination and change in groundwater flow velocity, please take	The PDA sits on terrain known as the Halton Till, which incorporates weathered portions and is thus prone to fracture in horizontal and vertical directions. Such fractures would create new pathways for groundwater. In order to understand the potential for adverse environmental effects, CN should take this additional factor

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
		into account the presence of weathered Halton till.	into account in conducting its risk assessment.

As well, during the construction phase and during operations, groundwater flow can be intercepted by servicing trenches and the potential preferential pathways they create. This in turn can affect potential discharge features. It is presented that groundwater discharge is minimal but mitigation through anti-seepage collars should be further assessed at the design stage. This assessment is appropriate. However, it should also be recognized that the preferential pathways can be a conduit for contaminated water resulting from spills and as such that should be a consideration for anti-seepage collars as well.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Groundwater EIS Guideline Part 2 Section 3.2.2 Halton Brief, Table D.3, sensitive surface and groundwater features	App E.6 Sections 5.2, 5.4	**WNH15. Anti-seepage collars to prevent contamination** Please clarify whether anti-seepage collars will be used within the servicing trenches during construction and operation.	Servicing trenches provide a potential conduit for enhanced subsurface flow within the natural clay deposits, and therefore increase the risk for groundwater contamination. Anti-seepage collars would reduce the risk of contamination. It is not clear from the EIS whether CN plans to use anti-seepage collars.

CN has provided no recommendation for groundwater monitoring subsequent to this study. However, a basic groundwater level and quality program would be expected.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Groundwater EIS Guideline Part 2 Section 8.2 Halton Brief, Table D.3, sensitive surface	App E.6 Section 6.3	**WNH16. Groundwater monitoring program** Please explain whether CN would implement a construction and post	A monitoring program is necessary both during the construction phase and afterwards in order to confirm that groundwater levels and quality are

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
and groundwater features		construction groundwater monitoring program.	maintained, and to confirm the accuracy of CN's initial assessment. An intermodal facility is likely to be exposed to contaminants, and involve storage of fuel and other potential contaminants on site. For such a facility, it is reasonable to conduct a baseline survey of groundwater quality and levels, and to continue monitoring these parameters during operations.

2.2.3 Conclusion

It is concluded that any potential groundwater quantity or quality impacts resulting from the construction or operation of the facility are acceptable, and in the event of any potentially significant impacts related to dewatering or spills, best management practices will be in place to maintain groundwater quantity and quality. Subject to the comments regarding the potential for fractured tills, the need for seepage collars, and the need for a monitoring program, from the perspective of groundwater, the majority of the information provided by CNR is considered sufficient to allow an assessment of the potential for significant adverse environmental effects in respect of impact on groundwater.

2.3 STREAM MORPHOLOGY

RESPONSIBLE EXPERT: JOHN PARISH

2.3.1 Documentation Overview

The stream morphology is discussed and presented in the EIS (Sections 6.1 – 6.8) as part of the summary on surface water and fish/fish habitat. Most of the stream morphology work is in support of the proposed channel alterations and mitigation work on Tributary A and Indian Creek (Appendix E.2). Additional stream morphology information is found in the fish and fish habitat assessment (Appendix E.4) and the hydrology and surface water quality assessment (Appendix E.15).

With respect to stream morphology methods employed, they are found in Appendix E.2, and focus on the larger watercourses (Tributary A and Indian Creek), which are also the watercourses that are proposed to have the mitigation efforts. The broader methodology included a desktop program, field characterization and analytical work. Because of the planned alterations, design analyses were also necessary.

The desktop review completed by Stantec and summarized in Appendix E.2 consists of a review of previous studies completed on watercourses in the general study area. The documents review included the Milton subwatershed studies completed by AMEC. This review and inclusion of the results from this work was suitable and appropriate.

In terms of further characterization, analysis, and planned mitigation in respect of the channel alterations, planned enclosures, and crossings, the analytical methods were generally appropriate. Stantec employed the software tool "RiverMorph" to complete the basic analyses and provide a summary of the collected field data. Analyses that were lacking were linking the flow data with channel stability, sediment supply, channel erosion and sediment movement. While the expectation of these analyses was not high (in other words, no need for robust quantitative analyses), some preliminary discussion on the role of these functions under existing conditions would be necessary.

There were some significant areas in which the analysis and justification was not sufficiently detailed. I have commented below on areas of deficiency and the information requests that I recommend to address the deficiencies.

2.3.2 Discussion and Information Requests

2.3.2.a Reach Characterization and Historical Data

Reaches are sections of river in which boundary conditions are relatively uniform. They have similar features such as slope, sinuosity, volume, flow, and geology. It would be standard scientific procedure when proposing significant alterations to a watercourse to first characterize all of the reaches along the watercourse in order to understand what types of configuration and features are at issue. However, this was not done. Only a high level assessment of Indian Creek and Tributary A was provided.

There was also very little information presented on Tributary B (which is proposed to be eliminated) and Tributary C (which has a new crossing proposed). Some physical channel information on these two tributaries is found in the Fish and Fish Habitat Technical Appendix (Appendix E.4), but this information lacked much morphological data.

To characterize the watercourses, typical methods would have included stream walks with visual observations and the completion of metrics such as RSAT (Rapid Stream Assessment Technique), which provides insight on channel health and function and the RGA (Rapid Geomorphic Assessment), which provides insight on channel stability.

In addition to being standard practice, full reach characterization was important to rationalize some of Stantec's subsequent work. In its later analysis and design, Stantec advanced conclusions based on its study of "reference" reaches, which are sample reaches that are assumed to be sufficiently representative of the remainder of the watercourse at issue that designs of new channel sections can be prepared with reference to their features and dimensions. It is noted that the boundaries of the chosen reaches were based on cultural boundaries (eg. roads) as opposed to scientific justification, which is problematic. However, putting this issue aside, at a minimum, it would be necessary to have a characterization of the sample reaches in the context of the other reaches so that it is known whether those reference reaches are indeed representative.

The data presented in Appendix E.2 is thorough for the two reference reaches that were surveyed in the field. Data was also provided on background data and historic assessment. The reference reach channel morphology data was used to support the proposed channel design and mitigation efforts. The primary issue/challenge with the data is that there is not enough of it. There are gaps/deficiencies with the desktop work, specifically a characterization of the reaches.

Another area of deficiency was the historical review of the watercourses. Stantec did complete a general historic assessment on channel alteration over time as well as changes to the surrounding land use, but no analysis of historical features of Indian Creek, the largest waterway at issue, was provided. In the context of the planned alterations, it would be important to have an understanding of any past historical channel adjustments that have already been performed on Indian Creek, as well as how much Indian Creek has migrated or meandered over time, in cm/year. This information would be important to understand how dynamic Indian Creek is, and therefore how sensitive it is to alteration.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Stream Morphology EIS Guideline Part 1 Section 4.3.3, Guideline Part 2 Sections 6.1.4, 6.3.1 Halton Brief, Table D.3, sensitive surface and groundwater features	Sections 6.1-6.8, App. E.2	**WNH17. Reach Characterization for Indian Creek and Tributaries** Please characterize all reaches of Indian Creek and Tributaries A, B, and C, in terms of dimensions, slope, sediment, sinuosity, flow, and geology. Please also provide RSAT (Rapid Stream Assessment Technique) data and RGA (Rapid Geomorphic Assessment) data for each watercourse.	Because CN proposes to cause such significant alterations to these watercourses, in order to assess the design and potential impacts of those alterations it is necessary to have an adequate understanding of the original conditions and characteristics of these watercourses. This is essential so that the newly designed portions can be configured to be as similar to the original as possible, and so that the risk of negative impacts such as excessive erosion downstream and altered flow rate are minimized. In addition, CN had selected a sample reach on each of Indian Creek and Tributary A, and used these sample reaches for reference in the subsequent design work. Adjacent reaches should have been characterized so that the extent to which the selected reaches were representative of the remainder

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			of the watercourses could be understood. Further, while some mitigation measures have been discussed in terms of aquatic habitat, there has been insufficient work done to understand how the balance between flow and sediment will change in these watercourses. These parameters have significant impacts on erosion potential, and therefore it is crucial to have a good understanding of the original conditions when considering new designs.
Stream Morphology EIS Guideline Part 1 Section 4.3.3, Guideline Part 2 Sections 6.1.4, 6.3.1 Halton Brief, Table D.3, sensitive surface and groundwater features	Sections 6.1-6.8, App. E.2	**WNH18. Historical Information for Indian Creek** Please describe any past historical channel alterations on Indian Creek, as well as showing the extent of migration of Indian Creek, over the same timeframe as done for the historical overview of the area already provided.	Information on how Indian Creek responded to any past alterations, and the extent of natural migration in cm/year, is important in order to understand how sensitive Indian Creek is to alteration.

2.3.2.b Channel Stability and Erosion Potential for Downstream Sections

There was little information provided for streams that were downstream of the PDA. This downstream information is necessary to evaluate the health and stability of the receiving watercourses so that erosion thresholds (extent of resistance to erosion) can be determined. Such information could be used to support monitoring efforts as well as providing data for an erosion threshold analysis.

In particular, the downstream section of Indian Creek, after it crosses Tremaine, was most important to characterize. This is because any changes made upstream will potentially manifest in the downstream portion. Given that significant changes are proposed for the upstream portion, including steepening of the slope, and removal of over 500 m of the stream, significant impacts on the downstream portion are possible. Detailed erosion threshold analyses for the downstream portion should have been done so that the potential for increases in erosion could be understood.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Stream Morphology EIS Guideline Part 1 Section 4.3.3, Part 2 Section 6.2.2 Halton Brief, Table D.3, sensitive surface and groundwater features	Sections 4.3.3, 6.2.2	**WNH19. Characterization and erosion threshold for downstream region** Please characterize the downstream receiving watercourses (Indian Creek downstream of Tremaine, and Bronte Creek) and provide an erosion threshold for the downstream section of Indian Creek.	Downstream sections of watercourses are the portions that are most affected by changes upstream. In terms of the channel alterations proposed by CN, the channels will become shorter, steeper, and will convey more energy downstream. These factors can be significant contributors to downstream erosion. In order to understand the potential impacts, one must begin with a full characterization and description of downstream watercourses, including monitoring stations.

2.3.2.c Design channel and discharge

Within the data collected, there appear to be some inconsistencies with the results provided in the various tables and the flows used in the design. Specifically, there are two referenced lengths for the extent of channel restoration for Tributary A. In the executive summary, a value of 513 m is used, whereas in the technical appendix, the length is reported as 375 m.

In Table 6.1, there appears to be a further error, as the riffle depths are listed as greater than the pool depths. Riffles are the shallower portions of the channel, and typically have broken surfaces of the water flow, whereas the pools are generally the deeper middle portions of the river with a relatively still surface. Given that watercourses are parabolic in cross-section, riffle depths are never greater than the pool depths.

An important geomorphic understanding is ‘bankfull flow’. This is the flow that fills the channel cross-section before spilling onto its floodplain. This flow exerts the greatest influence on the shape and form of the channel due to the high velocity and shear stresses (which proportionally start to decrease their significance on channel form once flow reaches the floodplain). In natural watercourses, this ‘bankfull flow’ has a return period of approximately 1.5 years, although this is a statistical mean. In other words, this flow happens once every 1.5 years. Because of its importance on channel form, this flow is measured in the field (top of bank inflection point, or other indicators) and is used as a ‘design flow’ in restoration projects. There are numerous instances where the reliability of the field measurements are not high and as such, a check from hydrologic models is desired. The closest discharge that is typically modeled is the 2-year return flow; or a flow that may occur once every two years. In practice, the 2-year flow and the bankfull flow usually have similar values, with the 2-year flow obviously higher.

In this instance, the design flows (also called “bankfull flows”) are confusing. In these same tables, the 2-year return flow is 1.96 m^3/s (existing) and 2.01 m^3/s (proposed). The expectation that the design flow would likely be between these two values, although the actual design value is not expressly stated. The information provided in Appendix D, which is from the collected field data, has a bankfull flow of 0.42 m^3/s for Tributary A. The same issue exists for Indian Creek. The reported 2 year return flow is 16.9 m^3/s, whereas the bankfull flow from Appendix D is 3.54 m^3/s. The discrepancies between the measured flows and the modeled flows and the flows used in the channel design require clarification.

As well, within the technical appendix, corridor values (stream widths, following meander belt width delineation procedures) were reported. The values for both Tributary A (25 m) and Indian Creek (68 m) are appropriate and are well supported. That said, additional effort is required to confirm the long-term stable slope line using a 100-year erosion rate and stable slope analyses to confirm the corridor value. This is required due to the degree of confinement of the Indian Creek system. Monitoring should be put into place to make sure the corridor values stay the same after the design.

While most of the design metrics remain consistent between the reference reach and the reach designed to replicate it, there are some inconsistencies. For Tributary A, the sinuosity has changed from 1.12 in the reference reach to 1.2, which is significant. However, the energy gradient (i.e. the slope of the channel) has not changed. The change in sinuosity would be expected to have a corresponding change on the energy gradient.

Also, various claims are made that the newly designed portions will be stable against erosion under varying high flows, but these claims are not substantiated.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Stream Morphology EIS Guideline Part 1 Section 4.3.3, Guideline Part 2 Sections 6.1.4, 6.2.2, 6.3.1 Halton Brief, Table D.3, sensitive surface and groundwater features	Section 6.3.1	**WNH20. Evaluate impacts on channel stability for Indian Creek and Tributary A** Please provide an explanation for the difference in the design flow (bankfull flow) and the 2 year return flow for Tributary A.	The proposed design for Tributary A attempts to mimic the existing conditions in terms of planform, gradient, and cross-sectional dimensions. However, the newly designed channel is shorter and heavily altered in the upstream sections. There has been little discussion on any changes in flows in the downstream direction. The proposed design flow is 0.42m^3/s, which is much smaller than the 2-year return flow of 1.96 m^3/s. More evaluation of the implications of the design to this flow regime is needed.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Stream Morphology EIS Guideline Part 1 Section 4.3.3, Guideline Part 2 Sections 6.1.4, 6.3.1 Halton Brief, Table D.3, sensitive surface and groundwater features	Section 6.3.1	**WNH21. Hydraulics for design channel** Please provide hydraulics for the design channel, both in terms of design flow and two-year return flow.	For Indian Creek, the potential implications on the changes to flows and channel alterations are significant. There are two proposed stormwater management facilities and a loss of 505 m of channel length, resulting in a proposed channel that is twice as steep as the existing channel. The bankfull flow is reported as 3.54 m^3/s and the two-year return flow 16.9 m^3/s.

2.3.2.d Proposed crossings and enclosures

Stantec proposes to add crossings on Tributary A in the form of box culverts, which would enclose portions of the stream. However, the culverts proposed for use appear to be undersized and inappropriate for the existing channel functions, fish passage and scour potential. The culverts should be the same width as the existing watercourse. The proposed culverts are much smaller. This is likely to result in problems because the water flow through a smaller culvert will be accelerated, resulting in erosion and scouring of the bed and banks. Higher velocities can also make it difficult or impossible for fish to swim against the current.

Another issue with the proposed enclosures is their length, which can also cause issues with fish passage. As well, although natural watercourses are parabolic in shape, box culverts are square and this can cause issues with the flow of the stream.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Stream Morphology EIS Guideline Part 1 Section 4.3.3, Guideline Part 2 Section 6.3.1 Halton Brief, Table D.3, sensitive surface and groundwater features	Section 6.3.1	**WNH22. Analysis of proposed crossings** Crossings of certain dimensions are proposed for Tributary A. Please provide the justification for the sizes proposed, including an analysis of channel dynamics, risk, hydraulics, water depth,	The proposed channel design for Tributary A has cross-sectional widths varying from 3.4 m (riffle) to 4.1 m (pool). These dimensions closely match the measured existing conditions from the reference reach. However, the proposed crossings (enclosures) which are 125m and 75m long, consist of twin cell concrete box culverts which are 1.52 m wide,

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
		and velocities at mean annual flow, and 2-year return flow.	resulting in a design width of 3.04m. Using culverts of smaller width than the watercourse may result in problems including increased flow velocity and erosion potential. A more detailed analysis and rationalization of the proposed design is needed.
Stream Morphology EIS Guideline Part 1 Section 4.3.3, Guideline Part 2 Sections 6.3.1 Halton Brief, Table D.3, sensitive surface and groundwater features	Section 6.3.1	**WNH23. Alternate crossing configurations** Assess alternate designs for the crossing structures and enclosures, including single cell options and different configurations.	Splitting flows into two culverts is not recommended based on channel function and maintenance. The width is actually less than the existing and proposed conditions, resulting in a construction which is likely to negatively affect channel functions. Alternate designs that correspond more closely with existing watercourse features should be provided.

2.3.3 Conclusion

As set out above, the most significant issues with the work on stream morphology is the lack of characterization of the existing watercourses, and the lack of consideration of the effects that the proposed changes are likely to have on erosion of downstream portions. It is important to rectify these issues before a fulsome analysis can be done of the proposed changes.

2.4 NATURAL HERITAGE: FISH AND FISH HABITAT

RESPONSIBLE EXPERT: CAMERON PORTT

2.4.1 Documentation overview

Fish and fish habitat was identified as one of the valued components (VCs) for the project in the EIS Guidelines. The approach to the fisheries VC was consistent with that applied to other environmental components in that there was a description of baseline conditions, which consisted of a desktop review and field investigations, prediction of changes to the physical environment, and prediction of effects on fish and fish habitat (the valued component). The detailed description of the methods, results and conclusions for determination of baseline conditions is provided in Appendix E4 of the EIS document, which is entitled *MILTON LOGISTICS HUB - Technical Data Report Fish and Fish Habitat*.

The prediction of changes to the physical environment and effects on fish and fish habitat are contained in the body of the EIS document. There is information relevant to fish and fish habitat in other sections of the report and other appendices; the sections dealing with the proposed channel realignments and Appendix E2 (MILTON LOGISTICS HUB - Technical Data Report Channel Realignment) are of particular significance.

The desktop review included four components: watercourse identification, fish communities and fish habitat, commercial, recreational and aboriginal fisheries, and aquatic Species at Risk. The field investigations included fish sampling and fish habitat characterization in Indian Creek and, to a lesser extent, in the tributaries and associated headwater features. While much of the work was sufficiently documented and performed, there are a few areas of insufficiency in the desktop review and field work that have been addressed in the information requests below.

2.4.2 Comments and Information Requests

2.4.2.a Fish Habitat Rankings

The desktop review references AMEC (2013b) as indicating that no fish were captured in Tributary A at sampling locations between Bronte Road and Britannia Road in fish surveys conducted in 2001 and 2008 (Appendix E4, Section 5.1.2, 30th page). The same document (AMEC, 2013b) indicates that fish were captured <u>upstream</u> in Tributary A, but this is not considered in the EIS. The presence of fish directly upstream in Tributary A suggests the downstream region between Bronte Road and Britannia Road may also contain fish at times. This is an important point because in Technical Appendix E4, pdf pg. 35, it is stated that "Tributary A between Britannia Road and First Line (within the Local Assessment Area (LAA)) is not part of and does not support a CRA fishery as defined under the Fisheries Act." On pdf pg. 21 of the same document it is stated "commercial fisheries are considered to exist in any watercourse where small-bodied fish (i.e. baitfish) have been recorded."

The status of Tributary A between Britannia Road and First Line should be reconsidered, given that it meets the definition of supporting a commercial fishery both upstream and downstream from the reach between Britannia Road and First Line.

Technical Appendix E4 (Section 4.1.2; pdf pg. 20) states that watercourse rankings were "Based on guidance from Fisheries and Oceans Canada (DFO), MNRF, various Ontario Conservation Authorities and generally accepted practices and standards for assessing fish habitat in Ontario, including ratings from CH (2002 and 2009)". The methods used in the two CH references (2002, 2009) do not appear to conform to those used in Appendix E. In order to fully evaluate the watercourse rankings, it is necessary to review the guidance from the various agencies. References to direct the reader to the guidance/standards referred to are required.

Another concern is that the assessment of fish habitat quality by the field investigators appears to differ from the assessment elsewhere in the EIS documents. The field form for the fisheries assessment of Indian Creek indicates that the habitat quality is **good** (the choices on the form are *good*, *moderate*, *poor* or *not fish habitat*) for both large-bodied and small-bodied fish for spawning, overwintering, rearing and migration (Technical Appendix E4; Appendix B, pdf pg. 84). The text of the results section (Section 5.1.2, p. 33) states "Field investigations in 2015 indicate that the main channel of Indian Creek is a permanently flowing watercourse with **moderate** quality spawning, rearing, foraging, and overwintering habitat for large-bodied and small-bodied fish throughout the PDA." This apparent contradiction should be explained.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Fish and Fish Habitat EIS Guidelines Part 2, Sections 6.1.5, 6.3.1 Halton Brief, Table D.4, fish habitat	App. E4, Section 5.1.4, pdf pg. 42; Section 4.1.3, pdf pg. 21	**WNH24. Fish in Tributary A** Please use the complete data from the AMEC 2013b study regarding fish presence in Tributary A, including data collected upstream from Britannia Road, and reconsider the assessment that Tributary A is not part of, and does not support, a CRA fishery.	In respect of potential impact on Tributary A, CN prepared its analysis on the basis that no fish were captured between Bronte Road and Britannia Road in the AMEC 2013b study. However, as documented in the AMEC study, fish were captured in Tributary A just upstream from Britannia Road. The presence or absence of fish in Tributary A is relevant to determining whether Tributary A should be considered to be part of, or support, a commercial fishery.
Natural Heritage: Fish and Fish Habitat EIS Guidelines Part 2, Sections 6.1.5, 6.3.1 Halton Brief, Table D.4, fish habitat	App. E4, section 4.1.2, pdf pg. 20	**WNH25. Fish habitat quality ranking** Please provide references to support the approach used to rank the watercourses with respect to habitat quality.	CN states that watercourse rankings were "Based on guidance from Fisheries and Oceans Canada (DFO), MNRF, various Ontario Conservation Authorities and generally accepted practices and standards for assessing fish habitat in Ontario, including ratings from CH (2002 and 2009)". However, the methods used in the two CH references (2002, 2009) do not appear to conform to those used by CN in Appendix E. In order to fully evaluate the watercourse rankings it is necessary to review the relevant portions of the guidance from the various agencies. References to direct the reader to the guidance/standards referred to, are required to understand the rankings accorded by CN.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Fish and Fish Habitat EIS Guidelines Part 2, Sections 6.1.5, 6.3.1 Halton Brief, Table D.4, fish habitat	App. E4, section 5.1.2, pdf pg. 33 App. B, pdf pg. 84	**WNH26. Indian Creek habitat ranking** Please clarify Indian Creek's fish habitat quality ranking. Among a choice of *good*, *moderate*, *poor*, or *not fish habitat*, Indian Creek has been described in the EIS as both *"good"* and "*moderate*".	The assessment of fish habitat quality by the field investigators appears to differ from the assessment elsewhere in the EIS documents. The field form for the fisheries assessment of Indian Creek indicates that the habitat quality is "good" for both large bodied and small bodied fish for spawning, overwintering, rearing and migration. However, the text of the results section states "Field investigations in 2015 indicate that the main channel of Indian Creek is a permanently flowing watercourse with **moderate** quality spawning, rearing, foraging, and overwintering habitat for large-bodied and small-bodied fish throughout the PDA." The ranking should be clarified so that the analysis of the work based on the ranking can be better understood.

2.4.2.b 2002 Bronte Creek Watershed Study

In the desktop review (Appendix E4 – Section 5.1.1, pdf pg. 30) the discussion of a proposed CN Intermodal facility in the Bronte Creek Watershed Study (CH, 2002) is quoted and the words "Indian Creek" have been inserted into the quotation, apparently to clarify what feature is being referred to by the term "watercourse". In Section 2.0 of Technical Appendix E 4 (Regional Setting, pdf pg. 16), a footnote indicates that statements made in the Bronte Creek Watershed Study refer to an earlier CN proposal for the site which was discussed with Conservation Halton in 2001, and indicates that the current proposal "includes the same lands and is expected to have the same general effects on watercourses." The insertion of the words "Indian Creek" in the quote on pg. 30 implies that the earlier proposal included the realignment of Indian Creek that is currently proposed, but it is not clear from the Watershed Study whether or not this was the case. It would be helpful to know if the Indian Creek realignment was proposed in 2001 in order to place the discussion in the Watershed Study in context.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Fish and Fish Habitat EIS Guidelines Part 2, Sections 6.1.5, 6.3.1 Halton Brief, Table D.4, fish habitat	App. E4, Section 2.0, pdf pg. 16	**WNH27. Confirm whether realignment of Indian Creek was considered in earlier 2002 study** Please confirm whether the expected effects on watercourses that were presented in the earlier CN proposal as discussed in the Bronte Creek Watershed Study done by Conservation Halton in 2002, took into account the realignment of Indian Creek as currently proposed.	The EIS implies that the Bronte Creek Watershed Study in 2002 considered the realignment of Indian Creek that is currently proposed. It is important to confirm this, as CN relies on the data and conclusions from this earlier study to support its current proposal. Knowing whether or not this realignment was included in the material provided to Conservation Halton at that time is important in order to understand the context for the cited study.

2.4.2.c Riparian Buffers

The fish sampling and habitat characterization of Indian Creek itself was conducted using appropriate methods, with the exception of the riparian buffers. The EIS mentions the inadequacy of riparian buffers in several places, frequently referring to the Bronte Creek Watershed Study to support this assertion. The EIS, however, does not provide a quantitative characterization of the riparian buffers and the type of vegetation that they contain. The aerial photographs in Appendix E4 (i.e. Figure 3.2, pdf pg. 59), appear to show vegetated riparian buffers, including some wooded riparian buffers, along a significant portion of the reach of Indian Creek proposed to be eliminated. Since the EIS indicates that enhancement of riparian buffers is a component of mitigation for the loss of over 500 m of creek, it is important to characterize and quantify the existing buffers.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Fish and Fish Habitat EIS Guidelines Part 2, Sections 6.1.5, 6.3.1 Halton Brief, Table D.4, fish habitat	Section 1.2.1 pdf pg. 5; section 6.5.1.9.2, pdf pg. 176; section 7.0, Table 7.1, pdf pg. 311;	**WNH28. Characterization of riparian buffers** Please characterize and quantify the existing riparian buffers and their vegetation communities, as well as the proposed future riparian buffers, and consider how the	The EIS mentions the inadequacy of riparian buffers in several places, but does not provide a quantitative characterization of the riparian buffers and the type of vegetation that they contain. It is necessary to understand the features of the existing riparian

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
	Section 8.2.2, pdf pg. 324. App. E2, section 1.0, pdf pg. 1; section 1.1, pdf pg. 2, section 1.2, pdf pg. 2; section 6.2.1.1, pdf pg. 35; section 6.3, pdf pg. 48. App. E4, fig. 3.2, pdf pg. 59	changes will affect fish productivity.	buffers and what species they contain in order to understand what would be lost in association with the reduction of creek length. In particular, because the EIS indicates that enhancement of riparian habitat is a component of mitigation for the elimination of 1075 m of Indian Creek and its replacement with 571 m of constructed channel, it is necessary to have a comprehensive understanding of the existing riparian habitat in order to assess the ability to mitigate the elimination of 1075 m of Indian Creek and its riparian zone.

2.4.2.d Additional Field Investigations

The characterization of the tributaries and headwater features did not include spring field investigations, which are a required component of the approach described in Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines 2009 (CVC and TRCA 2009), which is identified (Appendix E4, Section 4.2.2; pdf pg. 24) as the method used to assess headwater features.

Appendix E4 (Section 5.1.2, 32nd page) indicates that additional fish collections would be made in Tributary A in 2016. These data are required in order to properly assess the significance of the tributaries and headwater features.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Fish and Fish Habitat EIS Guidelines Part 2, Sections 6.1.5, 6.3.1	App. E4, section 5.1.2, pdf pg. 39 and 40	**WNH29. Conduct spring studies for headwater drainage** Please conduct field investigations of the headwater drainage features	Technical Appendix E4 indicates that headwater drainage feature investigations were undertaken in July and August, 2013, and that these features were classified as "simple contributing" systems to downstream fish habitat, with intermittent or ephemeral flow,

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Halton Brief, Table D.4, fish habitat		in the spring season (April, May and June).	referencing the document Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines (CVC and TRCA, 2009). That document indicates that field investigations should be undertaken during three assessment periods to assess flow in headwater drainage features and that fish sampling should occur if water is present in April/May/June.
Natural Heritage: Fish and Fish Habitat EIS Guidelines Part 2, Sections 6.1.5, 6.3.1 Halton Brief, Table D.4, fish habitat	App. E4, section 5.1.2, pdf pg. 32	**WNH30. 2016 Fish Sampling Data** Please provide fish sampling data from Tributary A collected in 2016.	CN advised in the EIS, which was dated in 2015 that additional fish collections from Tributary A would occur in 2016. This supplemental information should be provided, as it is needed to assess the current significance of Tributary A as a fish habitat.

2.4.2.e Reference to Conductivity

CN seems to imply that the conductivities of Indian Creek and Tributary A, which are reported in Table 5.2 of Appendix E4 (38th page) indicate impaired aquatic habitat. A reference to USEPA (2012) (Technical Appendix E4, 38th page) states that "inland fresh waters capable of supporting diverse fish communities have conductivities ranging between 150 and 500 μmhos/cm ..... Conductivity outside this range could indicate that the water is not suitable for certain species of fish or macroinvertebrates." This reference requires further clarification and additional context. The source appears to be 1997 EPA document EPA 841-B-97-003 entitled Volunteer Stream Monitoring: A Methods Manual. That document actually states "streams supporting good mixed fisheries have a range between 150 and 500 μhos[sic]/cm" and contains no references from the scientific literature to support that statement. The Canadian Water Quality Guidelines for the Protection of Aquatic Life contain no guideline for conductivity.

The relevance of the 1997 EPA document to this study should be clarified, or the reference should be removed.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Fish and Fish Habitat EIS Guidelines Part 2, Sections 6.1.5, 6.3.1 Halton Brief, Table D.4, fish habitat	App. E4, section 5.1.2, pdf pg. 38	**WNH31. Clarify relevance of conductivity** It is requested that CN explain the relevance of the 1997 EPA document to the current study.	CN appears to imply that the conductivity of Indian Creek is indicative of impaired fish habitat. A citation is provided to a US EPA document that is apparently intended for laypersons and that provides no scientific references to support a statement which it contains regarding conductivity. The CCME guidelines do not contain a guideline for conductivity. The rationale for CN's rationale for referencing this EPA document should be clarified.

2.5 NATURAL HERITAGE: TERRESTRIAL SPECIES AND HABITAT

RESPONSIBLE EXPERTS: MIREK SHARP, SARAH MAINGUY, JIM DOUGAN, KARL KONZE

2.5.1 Importance of the Natural Heritage Systems Context and Precautionary Approach

As stated in Section 1.5 to this report, a natural heritage systems approach (often generally referred to simply as a "systems approach") is required in any assessment of components of the natural heritage system to fully understand the role of each component and its overall significance. A systems approach is almost universally accepted as a premise in contemporary, science-based environmental assessment. It was required by the EIS Guidelines, and is outlined in numerous other regional, federal and provincial plans, policies and guidelines. For example:

- ***Halton's Regional Official Plan (ROP)*** explicitly requires a natural heritage system approach to preserve and enhance the biological diversity and ecological functions of natural features, and to undertake evaluation of impacts of development.

- ***Halton's Environmental Impact Assessment (EIA) Guidelines*** require that an EIA demonstrate that a proposed development will not result in a negative impact to the Regional Natural Heritage System affected by the development.

- ***How Much Habitat is Enough (2013)*** is a set of guidelines prepared by Environment Canada, applicable at site-specific to watershed scales, which explicitly embraces the holistic concepts of natural heritage planning for protection, restoration and management of natural systems and biodiversity, based on landscape ecology science.

- The ***Canadian Biodiversity Strategy*** gives further federal direction that an ecosystem context incorporating multiple scales should be considered in protecting biodiversity.

- ***The Canada-Ontario Agreement on Species at Risk*** advises an ecosystem approach to protection and recovery of Species at Risk in Ontario as part of protection and recovery for Species at Risk in Canada. It also endorses the precautionary principle to keep species from becoming at risk.

The lack of a systems approach affects the validity of much of the terrestrial natural heritage work advanced by CN in the EIS. Several information requests are made herein of CN to reframe and reconsider aspects of its work from a systems perspective to reflect current scientific practice.

Another important principle in environmental assessment is a Precautionary Approach. This means that one assumes a “worst case” scenario in terms of negative impacts, when the outcome of an action cannot reasonably be known or estimated. Since much is uncertain about many of the conclusions CN has sought to draw, a precautionary approach is particularly important to follow in this study.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines Part 1, Section 3.3.2, p. 5; Section 4.2 Halton Brief, Section B.3.1, referring to ROP sections 118(2) and 25-30 ROP: policies that protect the Regional Natural Heritage System: s. 27(3), 118.2, 260.2	Part 2, Section 6.2 Part 2, Section 6.2.3 Letter from CCEA to CN July 14, 2016 CEAA IR13, IR16, IR18 and IR25, March 15, 2016 Part 1, Section 3.3.2, p. 5 Part 2, Section 1.4, p. 13	**WNH32. Identify and map natural heritage system features within and adjacent to the study area.** Please identify natural heritage features within and adjacent to the study area that are components in the Regional Natural Heritage System (RNHS). This should include a figure mapping the RNHS in and adjacent to the study area as well as a description of the features and the interrelationships among them, including ecological linkages.	The EIS must assess the potential environmental effects of the project on VCs and to do this the NHS and its components must first be properly and fully identified. The EIS Guidelines note that the value of a component must include its role in the ecosystem and the value placed on it. In Halton, several components are identified as being within the RHNS. This represents one scale (the Regional scale) in which these components operate. Thus the evaluation of VCs identified as within the RNHS, or which if impacted could affect the RNHS, must include 1) an evaluation of their role in the Regional Natural Heritage System, and 2) by extension,

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			the potential environmental effects on the RNHS. This information gap has also been identified in the CEAA requests for additional information (see CEAA IR18), however, the CN responses to date do not reflect consideration of the terrestrial landscape in an ecosystem context as required by the EIS Guidelines and as articulated in the ROP. Thus the CN evaluation of disturbance excludes any synergistic relationship among landscape elements (which is a key characteristic of taking an ecosystem approach), and treats vegetation units as discrete, isolated entities.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines Part 1, Section 3.3.2, p. 5 Halton Brief Section D.4; ROP sections 25-29	Part 2, Section 6.2 Part 2, Section 6.2.3 Letter from CCEA to CN July 14, 2016 CEAA IR13, IR16, IR18 and IR25, March 15, 2016 Part 1, Section 3.3.2	**WNH33. Evaluate the impacts to components of the natural heritage system in a systems context** Please evaluate the potential for impacts to the features and ecological functions of the RNHS both individually and in the context of the overall system. Please use the Regional policies and Region's EIA Guidelines for permanent protection of certain landscapes as one of the tests for impacts, as well as the federal guidance document (How Much Habitat is Enough, 3rd ed.)	The ROP uses the terms "landscapes" and "landscape permanence" (s. 26 and 27) in articulating Halton's Planning Vision. The landscapes that are to be preserved permanently include (but are not limited to) the components of the RNHS as articulated in s.115 of the ROP. Description of landscape disturbance per the EIS Guidelines should include all components of the Region's Natural Heritage System, and they should be evaluated in an ecosystem context per the EIS Guidelines. This information has also been requested by CEAA, however, the CN responses do not reflect consideration of the terrestrial landscape in an ecosystem

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			context as required by the EIS Guidelines and as articulated in the ROP. Thus the CN evaluation excludes any synergistic relationship among landscape elements and treats them as discrete entities.
Natural Heritage: Terrestrial Species and Habitat Halton Brief, Section D4, ROP s. 114, and the policies in the ROP that protect the natural heritage system: s. 118.2, 260.2	Part 1, Section 2.4 Part 1. Section 6.1.6	**WNH34. Apply a precautionary approach** Please evaluate the potential effects of the project on the features and functions of components of the natural heritage system within and adjacent to the study area, both individually and in the context of the overall system, using the Precautionary Approach and the Region's commitment to "increase the certainty that the biological diversity and ecological functions within Halton will be preserved and enhanced for future generations".	A Precautionary Approach involves the assumption of negative impacts (i.e. a worst case scenario) when the outcome of an action is not understood. The EIS has not identified or evaluated natural heritage features and functions in an ecosystem context, nor has there been an assessment of potential effects of the proposal on the Regional Natural Heritage System. In the absence of this description and analysis a Precautionary Approach should be applied with respect to any conclusions regarding the appropriateness of the project. This is especially relevant given the high priority the Region places on protecting landscapes as a fundamental component of the Region's Vision, and the goal of increasing the certainty that natural heritage will be protected.

2.5.2 Local Valued Components, Standards, and Studies

Existing local and regional information on valued components, natural heritage standards used for development and planning, and existing scientific characterization of local watersheds contain the most targeted and comprehensive information available about the local environment in which the project is proposed. Incorporating this existing information in the EIS is critically important and will lead to a more rigorous, science-based assessment that acknowledges and benefits from several years of experience and historical understanding of the diversity and sensitivities in the area.

As well, the watershed and subwatersheds form the basis for the appropriate boundaries for assessing natural heritage. Integrated watershed planning is the provincially-mandated approach for long-term planning, which is applied by all municipalities in the Region.

The EIS did not have sufficient regard for local valued components and contexts, and while there is some limited reference to provincial standards and protocols, such references are inconsistent and incomplete. As a result, there are deficiencies in CN's work that need to be addressed if the goal is to have an accurate and reliable assessment of the risks of the project to the local environment.

In addition, subwatershed boundaries are the widely-accepted defining units for identifying and assessing environmental impacts. The movement of water and its relation to local topography are key driving factors that form and support the natural environment. The natural heritage system's resilience has been found to depend on protection at a watershed level, because when existing natural systems are fragmented, the mere protection of individual features in isolation of each other will be insufficient to maintain biodiversity and ecological function at the watershed or regional scales. Therefore, development and its effects must be considered in a broader context, which is the watershed approach. Halton Region, its member municipalities and relevant regulatory agencies all recognize and support an integrated watershed approach.

CN's definition of its areas of study – the Project Development Area (PDA), Regional Assessment Area (RAA), and Local Assessment Area (LAA) – did not acknowledge or follow watershed boundaries. The definition of these three study areas reflects dated spatial concepts for impact testing that may be appropriate to identify 'sensitive receptors', but which overlooks important local to regional linkages and the synergistic relationship among natural heritage features that may be affected by the development. The LAA and RAA should better reflect sub-watershed conditions in an integrated interdisciplinary manner, using baseline studies, impact avoidance and system enhancements that are consistent with the regional standards.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Terrestrial Species and Habitat	Part 1, Section 3.3.2 pg. 5 and 6 Part 1, Section 3.3.3, pg. 6	**WNH35. Expand VCs considered in consultation with Regional and local agencies** Please specifically consult with 1) Halton Region, 2) local	Halton Region, Conservation Halton, and the member municipalities have in-depth knowledge of the study area and can assist in the identification of a more

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
EIS Guidelines, Part 2, sections 6.1.6, 6.1.7, 6.3.2 Halton Brief, Table D4 How Much Habitat is Enough, 3d. ed.		municipalities and 3) Conservation Halton to complete the identification of VCs and identify those that are considered most valuable in the study area. CN should then provide a table showing all VCs, and either incorporate these in its analysis, or rationalize why a particular VC was not considered relevant to the EIS. Make reference to and ensure that the VCs addressed in the EIS are consistent with the principles and guidance contained within the following relevant Environment Canada documents: How Much Habitat is Enough, 3rd Edition (2013), the Canadian Biodiversity Strategy (1995) and the Canada-Ontario Agreement on Species at Risk.	complete list of VCs that reflect biodiversity at multiple scales.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.6, 6.1.7, 6.3.2 Halton Brief, Appendix B.3.1, and natural heritage policies as defined in ROPA 38 The Sub-watershed study approach defined in ROPA 38 and Town of Milton OP, in concert with regional and provincial policies, specifies Sub-watershed Impact Studies (SIS) for the detailed planning, design and monitoring of major new development.	Part 2, Section 1.4	**WNH36. Evaluate VCs using study standards meeting Regional and local agency requirements** Please revise the EIS, supporting Terrestrial TDR, and the VCs to include the Halton Region's standards, and the Town of Milton's SIS (Subwatershed Impact Studies) framework. Local MNRF protocols for SAR (Species at Risk) inventory should be adopted where they are the most current approaches for specific biota. The TDR should summarize the policy and/or science basis for each standard that is followed or applied. The EIS should predict effects on a full	The Terrestrial TDR and EIS do not uniformly and transparently reference, define, and apply specific federal, provincial or local study guidelines and standards. The narrow scope of VCs considered does not assess other features or functions specifically protected under provincial and regional policies and legislation. Gaps in data coverage (discussed under other issues) also suggest inadequate clarity on scope and standards. In terms of assessment of effects, only very specific VCs are addressed, and the EIS does not account for the full

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
		range of ecological VCs, and address their mitigation in conformity with provincial and regional standards.	range of ecosystem effects that are of concern to the Province, Region and local municipalities.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 1, section 4.3.3 The Region of Halton, Environmental Impact Assessment Guidelines, required by ROP Section 141.3 and 192(5) Canadian Biodiversity Strategy (1995) How Much Habitat is Enough, 3rd Ed. (2013)	Part 2, Section 1.4	**WNH37. Consideration of Relevant Local Subwatershed and Monitoring Studies** Please consult with (1) Halton Region, (2) local municipalities, and (3) Conservation Halton to ensure all local and site-specific sources of information and studies, including guidelines for assessing impacts, are considered in the background review.	A number of relevant, site-specific subwatershed studies and monitoring documents were not considered by CN, and the documents that were assessed were either too general in geographic coverage or focused only on Species at Risk. The lack of adequate review and integration of available background information sources is problematic since it likely results in the underestimation of the presence and extent of significant species (from local to national scale), overall biodiversity and the ecosystem functions on which they rely.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 1, section 4.3.3 Appendix B Part A of the Halton Municipalities Brief Provincial Policy Statement Section 2.2 Town of Milton Official Plan Sect. 4.8.1.6 How Much Habitat is Enough, 3rd Ed. (2013)	Part 1, section 3.3.3, pg. 6	**WNH38. Use the sub-watershed framework to define the study scale** Please revise the EIS and supporting TDRs to reflect an integrated, interdisciplinary sub-watershed-focused approach to refine study scales, supported by approaches based on provincial, Regional and Town standards, for baseline characterization, impact assessment, and system enhancement where the	The EIS and Terrestrial TDR define the PDA, LAA and RAA in rudimentary terms that do not adequately reflect scales of potential negative effects on the ecosystem within and beyond the PDA. Sub-watersheds contain topography and surface water system definition that provide critical linkages for ecosystems.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
		project site and operations intersect with environmental features and systems.	

2.5.3 Biodiversity, linked habitats and mitigation

The systems approach requires the identification and analysis of the interdependency among individual species, and their ecological role, including their contribution to local and regional biodiversity. This includes the identification and role of linkages between wildlife and their habitats. However, the TDR data were not presented in a way that allowed ease of interpretation; the juxtaposition of species and habitat was not shown so that concentrations of biodiversity could be determined. The relationships among habitats was poorly characterized such that the role of intervening lands in providing critical movement linkages could not be determined. As well, survey locations should have been mapped showing locations of federally, provincially and regionally significant species of flora and fauna. Without this integration of findings, the method lacks transparency and its efficacy cannot be verified. The EIS appears to assume that habitat identification is not required for species that are not already Threatened or Endangered, but this is not the case.

There are several guidance documents that emphasize the importance of these concepts. The **Significant Wildlife Habitat Technical Guide (MNR 2000)** and the associated **MNRF Ecoregion Schedules (MNRF 2015)**, together with guidance provided by the **Natural Heritage Reference Manual (2010)** should be used to identify, assess and classify habitat as Significant Wildlife Habitat (SWH). This is habitat that is important to protect as it provides the needs of wildlife communities. SWH is not directly related to habitat for Endangered species; it is recognized by provincial policy that even commonly encountered species may be vulnerable to habitat effects because they congregate at important times in their life cycle. Regard should have been had to such guidance documents in conducting and interpreting wildlife studies. The failure to use the guidance studies has resulted in information deficiencies which should be remedied to provide reliable, science-based, meaningful results for this EIS assessment.

The Province's Natural Heritage Reference Manual (NHRM) provides guidance on identifying areas of concentration for animals and plants that contribute to regional biodiversity, such as SWH, which in turn are important in protecting diversity at larger scales. There are also some rare vegetation communities in the study area that, if evaluated using the NHRM, would likely be considered SWH. These are all further illustrations of why it is important to understand Species at Risk in the context of the biodiversity at a landscape scale. The W/NH Team is virtually certain that SWH is present in the CN study area (Ecoregion 7E), but CN did not consider SWH in its work.

Non-native invasive species should also have been studied and mapped as they are important to the understanding of local conditions and the interplay of species in the local ecosystem. For example, sites with low concentrations of non-native invasive species or other indications of high quality may be exceptional and contribute to the prioritization of habitat for conservation or restoration.

The W/NH team identified an issue with the anticipated broader effects on wildlife, and the sufficiency of the mitigation proposals. For instance, the construction schedule and subsequent operations should be configured and scheduled so that they avoid or minimize disruption to the local fauna, particularly during key periods of their life cycles (e.g., breeding periods). This would need to start with better characterization of the species' life cycles, key habitats, and movement patterns. Particularly, the EIS in its role of informing the overall project should provide recommendations for refinements to the proposed undertaking that will avoid impacts, with mitigation being a secondary strategy.

As well, the mitigation measures and potential residual impacts have not been sufficiently explained as to how they will account for the sensitivities of the local species, particularly for bird species. For example, one of the mitigation measures provided for enhancement of wetlands to "improve breeding opportunities for wetland birds." More detail is necessary to understand how the wetlands would be enhanced. Moreover, consistent with the W/NH Team's comments on a systems approach, any mitigation should be developed and assessed in the context of the watershed and the Regional Natural Heritage System.

Similarly, when discussing residual environmental effects on migratory birds, adequate explanation has not been provided. For instance, the potential for residual effects is described according to the criteria presented in EIS Table 6.20. One of the criteria is the magnitude of the effect; a "Negligible", "Low", "Moderate", and "High" scale is applied to define magnitude. One of the distinctions between Low and Moderate magnitude of effects is whether sensitive species may be displaced, however, it is not clear how sensitive species are defined and which ones qualify. Additionally, the four levels of magnitude do not address effects at multiple scales, as previously described.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.2, 6.3.3 Natural Heritage Reference Manual (2010) Halton Municipalities Brief Section D4, referring to Regional Official Plan 115.3 (2) identifies Key Features that include	Part 2, Section 1.4, pg. 13 EIS Guidelines Part 2, Section 1.3 Project location, page 12	**WNH39. Identify Significant Wildlife Habitat and other concentrations of biodiversity and function** Please indicate where concentrations of biodiversity are located, focusing on areas that meet the qualifications for Significant Wildlife Habitat as defined by the "Significant Wildlife Technical Guide", (2000)	Areas of concentrated biodiversity are critical for maintenance of local and regional biodiversity and by extension, other scales up to and including global biodiversity. If populations are not maintained in local and regional areas of habitat, extirpation of the species can eventually occur over larger areas. Information needs to be provided on the significance and function of local populations and landscape

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
enhancements to the Key Features including Centres for Biodiversity		published by the Ontario Ministry of Natural Resources, and supporting Ecoregion Schedules. This should include identifying habitat where there are concentrations of provincially or regionally rare species, as these may also meet the criteria for SWH.	(Regional and watershed) scales.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.2, 6.3.3 Town of Milton OP Policy 5.4.3.2, requires Subwatershed Impact Studies, with current guidelines requiring consideration of construction timing and phasing on natural heritage system attributes and functions.	Section 3.4, p. 53: Construction timing and phasing effects on biota	**WNH40. Identify effects of Construction on Wildlife** Please provide a summary of how construction and operations will correlate with key activity periods of significant biota.	There is no information on how construction and operations will impede or prevent species movements and utilization of habitats for critical life processes. Critical habitats need to be adequately documented to prevent negative effects.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.2, 6.3.3 Halton Municipalities Brief Section D4, Halton ROP 118 (3), Halton Region Environmental Impact Assessment Guidelines (2009)	EIS Table 6.20	**WNH41. Explain sensitivity of bird species** Table 6.20 of the EIS refers to the likelihood of disturbance or displacement of “sensitive” species of migratory birds. Please explain how bird species were classified as “sensitive”.	It is not clear how sensitive migratory bird species were defined and which species qualify, whether it is based on “area sensitivity”, use of specialized habitats, sensitivity to development and disturbance, species that are experiencing population declines, or any other factor. Sensitivity needs to be defined in order to verify the conclusions that residual effects will not be significant.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.6, 6.2.3, 6.3.2 Halton Brief Appendix B, Section B.3.1	Section 6.5.2.9.1, Table 6.20	**WNH42. Clarify the mitigation proposal to enhance wetlands and compensate for grassland loss** Please provide more detail on how wetlands will be enhanced to improve breeding opportunities for wetland birds. Please provide more detail on configuration and location of grassland compensation habitat.	This information is necessary in order to understand whether the proposed mitigation measure will be effective. Moreover, the appropriateness of the mitigation needs to be determined with reference to the Regional Natural Heritage System.

2.5.4 Species at Risk (SAR) and Other Species of Conservation Concern - Identification and Screening

The EIS omits consideration of all scales of significance other than federal Species at Risk. However, there is federal direction that biodiversity should be considered at multiple scales, including provincial, regional, and local scales of conservation status. Assessing habitat for other species of conservation concern provides, beyond their own inherent value, additional information on habitat on which Species at Risk may depend, as well as habitat that provides the resources (e.g. prey species) on which Species at Risk depend.

Background resources that could have provided useful information on the occurrence of these significant species, such as subwatershed studies, were not mentioned. Several other SAR and other species of conservation concern have been reported in local sub-watershed studies, and several additional species should have been searched for, given existing records showing confirmed or likely presence in the area.

In addition, a review of MNRF's Natural Heritage Information Centre records (NHIC 2016) indicated that there were several potential vascular plant species of provincial conservation concern within the area that encompasses the project site. These should have been noted in the report as they inform the timing of surveys that should be performed on the site.

At the federal and provincial levels, it appears that an insufficient screening and identification was done in respect of Species at Risk, primarily due to a lack of consultation of local resources. As detailed further in the following section, studies of any given species should take place at the correct time of year for that species and with a sufficiently rigorous review of the species' habitat. It is particularly important to do thorough work if sightings of some more secretive species are difficult to achieve. A conclusion that the species is not found in the area must be supported by evidence of a thorough, properly done search. Such precautionary measures and diligence in conducting the studies were not documented for many of the individual studies.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.3 Halton Municipalities Brief Appendix B Section B.3, referring to ROP Section 101 (1.9) and ROP 115 (3) Article 7 of Canadian Biodiversity Strategy Canada-Ontario Agreement on Species at Risk Articles 2.4, 2.6 and 2.7	Part 2, Section 1.4 Part 1. Section 6.1.6	**WNH43. Consider locally listed Species at Risk, as well as local, regional and provincial species of conservation concern.** Please consult local authorities and review the provincial, regional, local status of species. An analysis of significance of habitat is needed based on status of species at all levels of significance.	The EIS omits consideration of all scales of significance other than federal; however, there is federal direction that biodiversity should be considered at multiple scales. The Canadian Biodiversity Strategy and Canada-Ontario Agreement on Species at Risk support the consideration of status at a subnational level in preventing species from becoming at risk. The Region and the province both incorporate protection of regional and provincial biodiversity into natural heritage planning, acknowledging the importance of protecting biodiversity at multiple scales (federal, provincial, regional and local) in order to protect biodiversity at a global scale.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.3 Halton Environmental Impact Assessment Guidelines Appendix E (endorsed by ROP Section 141 (3) Natural Heritage Reference Manual (Section 5.3)	App E16 Part 1, Section 4.3.3, Existing information, page 9	**WNH44. Consult lists of significant species in the area to screen for other Species at Risk** Please prepare a complete list of significant species and features that have been noted in the larger study area (the RAA), and preferably within the watershed. At a minimum, the list should include all significant species and features in the Regional Natural Heritage System on and adjacent to the site.	The Terrestrial TDR notes that "consultation with MNRF regarding SAR records in the RAA is ongoing", but there is no record of results of this screening being used in preparation of the report. A table of surveys and generic targets was provided but there is no inclusion of Species at Risk that are known to occur in the area based on records compiled by MNRF's Natural Heritage Information Centre (NHIC). This means that groups of species for which specialized surveys are required were likely missed, such as for hawthorns, and cryptic wetland bird species such as Least Bitterns.

2.5.5 Studies of Individual Species

i. Jefferson Salamander

The Jefferson Salamander is an Endangered species. The field technique documented in the EIS consisted of visual searching for egg masses, but this is considered to be inadequate, as eggs may be laid singly or in small clusters, and can therefore be very difficult to detect. As well, the eggs hatch in early spring so it is important to conduct such a study early enough in the spring that the eggs will be available for viewing. Given this important factor and the later timing of CN's field study, the results of the egg mass surveys done by CN cannot be used to assess whether Jefferson Salamanders are present. A more reliable method of determining presence of Jefferson Salamanders is trapping, but whether this was considered is not indicated. Much study has occurred on this species in Ontario and there are proven and well-documented protocols for locating and assessing populations.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.3 Halton's Regional Natural Heritage System policies, as defined in ROPA 38, supported by the Region's EIA Guidelines (2009) which are endorsed in Section 141 (3)	Part 2, Section 1.4 Part 1, Section 1 Part 1. Section 6.1.6	**WNH45. Jefferson Salamander – justify lack of trapping** Conduct trapping for Jefferson Salamanders or provide a clear explanation why trapping was not undertaken. Acknowledge any potential gaps or deficiencies in survey coverage.	According to the Ministry of Natural Resources and Forestry protocols, trapping surveys should be conducted to detect the presence/absence of Jefferson Salamander (designated nationally and provincially Endangered), instead of area searches, as was conducted as part of the CN study.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.3 Halton's Regional Natural Heritage System policies, as defined in ROPA 38, supported by the Region's EIA Guidelines (2009) which are endorsed in Section 141 (3)	Part 2, Section 1.4 government Part 1, Section 1 Part 1. Section 6.1.6	**WNH46. Jefferson Salamander – review adequacy of study timing** CN's study to detect egg masses was done on April 30 and May 14. Please utilize accepted protocols for this species and provide any rationale and assumptions behind the choice of these dates in the context of the approved protocols.	Egg masses are very difficult to detect, are often concealed in dense vegetation, and are only visible for a short period in the early spring until the eggs hatch. The dates of the egg mass surveys were April 30 and May 14, 2014, which were likely too late. In 2014 amphibian movement to breeding ponds was on April 2-3 in the Milton area; eggs hatch in 3-14 weeks so they may have hatched before surveys were conducted. The

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			CN conclusion that Jefferson Salamanders are not found in the study area is not supportable if the searches for egg masses were conducted too late.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.3 Halton's Regional Natural Heritage System policies, as defined in ROPA 38, supported by the Region's EIA Guidelines (2009) which are endorsed in Section 141 (3)	Part 2, Section 1.4 Part 1, Section 1 Part 1. Section 6.1.6	**WNH47. Jefferson Salamander – clarify field study approach** Please advise if the established search protocols were used. For example, how long was spent surveying habitat, how were bodies of water searched, were polarized sunglasses used, and were individual twigs submerged in the water closely inspected by hand?	Field study details were not provided. They are necessary so that the thoroughness of the study and validity of its conclusions can be assessed.

ii. Western Chorus Frog: Great Lakes-St. Lawrence Population

This is a Species at Risk, and is designated as Threatened in Canada. Call surveys and egg mass surveys were done. While the call surveys were done at appropriate times of year, evidence of the proficiency of the surveys was lacking. The Western Chorus Frog can call for short periods, and calling times vary according to timing of spring thaws; calling abundances differ significantly between years. In addition, many portions of the site were not surveyed, and potential habitat for Western Chorus Frog appears to have been missed (e.g. there is a gap at the point where Tributary B meets Indian Creek), and the northern part of the study area was not surveyed).

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.3 Halton's Regional Natural Heritage System policies, as defined in ROPA 38,	Part 2, Section 1.4 Part 1, Section 1 Part 1. Section 6.1.6	**WNH48. Repeat Western Chorus Frog Surveys** Please conduct early spring surveys that include areas of flooded fields and thickets to ensure appropriate detection of the species. Also conduct	Western Chorus Frog is a Species at Risk and is designated Threatened in Canada. Potentially suitable habitat at the south end of the LAA was not surveyed at the

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
supported by the Region's EIA Guidelines (2009) which are endorsed in Section 141 (3)		nocturnal amphibian call surveys adjacent to the most likely breeding habitats.	appropriate time of year to detect the species calling. The point count station associated with the south end of the LAA was not actually located next to either of the most likely breeding habitats. Existing data on file with the Town and Conservation Halton from local subwatershed and long term monitoring studies were not consulted.

iii. Snapping Turtle

To conduct searches for Snapping Turtles and their nesting habitats, it is important to implement accepted detailed protocols to set up the study correctly, otherwise any conclusions are suspect. Basking specimens can be seen in the spring and summer, but further studies during very specific periods of the year are necessary to find their nesting and overwintering sites. It is important to identify such habitats, as the turtle's life cycle depends on the maintenance of these habitats and the linkages between them.

The Snapping Turtle was studied by CN using a visual scan for basking specimens. The field researchers reported searching for evidence of nesting, but did not provide details of how this was done. As well, it is unclear how much time and effort was used to conduct the turtle surveys. No reference was made to the turtles' oviposition or overwintering needs. It appears that only three surveys of basking turtles were conducted, most of them too late to determine overwintering sites.

There are numerous guidelines that provide detail on how turtles in the region should be studied, providing information on habitat, biology, timing of critical habitat use (e.g. breeding, overwintering) and survey methods:

- **Conservation Halton 2005.** Conservation Halton Environmental Impact Study Guidelines, November 2005.
- **COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2008.** COSEWIC assessment and status report on the Snapping Turtle Chelydra serpentine in Canada.
- **Regional Municipality of Halton. 2014.** Environmental Impact Assessment Guidelines: Regional Official Plan Guidelines. Halton Region. 44 pp.

- **Guelph District MNRF** Blanding's Turtle Survey Protocol - updated May 2015.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.3 Halton's Regional Natural Heritage System policies, as defined in ROPA 38, supported by the Region's EIA Guidelines (2009) which are endorsed in Section 141 (3) Halton Region Environmental Impact Assessment Guidelines, 2009: endorsed by ROP Section 141 (3) Various guidelines for surveys of Species at Risk	Part 2, Section 1.4 Part 1, Section 1 Part 1. Section 6.1.6	**WNH49. Turtles – Identify Nesting Habitat** Please conduct additional turtle nesting activity surveys and ensure all potentially suitable nesting areas are searched in the appropriate season, time of day and under acceptable weather conditions, using the detailed guidelines specific to studies of turtles in Ontario.	Snapping Turtles are highly dependent for their life cycle on specialized habitat for their oviposition and overwintering needs. It is therefore not sufficient to count basking specimens; it is equally important to document the full extent of the habitats required for their survival. However, this was not done. As well, searches for turtle nesting activity were deficient because they were limited to sand/gravel outcrops and roadsides. Turtles utilize additional substrates and/or habitats in which to nest, some of which are likely present within the study area.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.3 Halton Region Environmental Impact Assessment Guidelines Appendix E; endorsed by Section 141 (3) of the ROP Natural Heritage Reference Manual Section 5.3.1	Part 1, Section 4.2, Page 7 Part 2, Section 1.4 Part 1, Section 1	**WNH50. Turtles – Conduct Additional Basking Surveys** Conduct additional basking turtle surveys in April and early May when basking activity is greatest.	Turtle basking surveys were conducted in May, but it is most effective to survey for basking turtles immediately after they emerge from hibernation, as this provides important information on overwintering sites. Basking turtle surveys should have been conducted in April and early May when basking activity is highest. Five surveys in ideal conditions are needed in order to provide reliable results, but only three were conducted.

iv. Bats

The *myotis* species of bats are all Species at Risk and are listed as Endangered. Two types of studies were undertaken by CN: 1) surveys for maternity roosts, which were performed by visually scanning trees on two survey dates (April 30, 2015 and June 16, 2014), and 2) acoustic surveys (in the woodland south of the LAA only) using software to interpret recordings. Based on these studies, CN concluded that maternity roosts do not occur in the area. However, there are deficiencies in how and where both types of studies were conducted that warrant supplemental studies, to support the initial conclusion that maternity roosts do not occur in the area.

First, searching for maternity roosts must be done in the spring when leaves are not yet out on the trees as the roosts are otherwise difficult to discern. As set out in the locally relevant guidelines for surveying bats, the **Guelph District Guidelines (Bat and Bat Surveys of Treed Habitats)** and the **Aurora District MNRF (SAR Bat Survey Methodology),** certain types of trees should be surveyed during leaf-off conditions. Therefore, the most significant problem with the visual study was that the June 16, 2014 date was not in compliance with accepted protocols.

Second, not all candidate maternity roost habitats within the PDA or LAA were subject to acoustic monitoring. Eight potentially suitable maternity roost trees were identified within the deciduous thicket community along Indian Creek. However, despite the proposed Indian Creek realignment occurring within this community, the area was not surveyed acoustically for bats. Potentially suitable maternity roost habitat also occurs directly adjacent to the proposed retaining wall next to Indian Creek.

Third, the acoustic surveys that were conducted were not in compliance with the MNRF guidelines. The guidelines recommend a minimum period of 10 days of recordings; whereas only a few hours of recordings were obtained. As well, the software used by the consultants to interpret the recordings was obsolete and does not differentiate sufficiently among bat species.

Therefore, the conclusion that there is ‘no critical habitat’ (i.e. maternity roosts) present, even within the acoustically studied area, is not supportable given the field methods employed. It is suggested that additional field studies be undertaken so that reliable conclusions can be reached.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.3 Halton’s Regional Natural Heritage System policies, as defined in ROPA 38,	Part 2, Section 1.4 Part 1, Section 1 Part 1. Section 6.1.6	**WNH51. Bats – Conduct Additional Acoustic Surveys** To confirm absence of Species at Risk, conduct passive monitoring over at least ten nights, in all potentially suitable locations and under acceptable weather conditions using “SonoBat” or “Kaleidoscope” bat call	Acoustic monitoring of bats was deficient because the amount of time spent surveying was too limited, resulting in inconclusive documentation. Analook software, used to identify bat calls, is inferior technology and unreliable. The significance of the timing of the calls detected appeared to have been

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
supported by the Region's EIA Guidelines (2009) which are endorsed in Section 141 (3)		analysis software and vet calls manually. Unless conclusive evidence is available, apply a more conservative interpretation to the monitoring data.	misinterpreted and unsubstantiated, rendering the conclusion that there is 'no critical habitat' (i.e. maternity roosts) present within the acoustically studied area, unfounded.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.3 Halton Region Environmental Impact Assessment Guidelines Appendix E; endorsed by Section 141 (3) of the ROP Natural Heritage Reference Manual Section 5.3.1	Part 1, Section 4.2, Page 7 Part 2, Section 1.4 Part 1, Section 1	**WNH52. Bats – Conduct Additional Visual Habitat Surveys** Surveys for candidate maternity roosts should be conducted in the spring when the leaves are not yet out on the trees. As well, please conduct surveys of habitat that may contain bats, especially the treed communities bordering and in close proximity to Indian Creek (e.g. the deciduous thicket community located just north of the intersection of Lower Base Line Road and Tremaine Road) and the cultural woodland along the main branch of Indian Creek.	Maternity roosts in trees are very difficult to detect if the visual inspections are done when the trees are in leaf. Also, not all potentially suitable bat roost habitat with the study area was surveyed, thereby rendering the results inconclusive.

v. Snakes

No snakes were observed during the studies in the LAA or PDA, and CN's conclusion stated that there are no potential hibernacula or nesting sites for snakes in these areas. However, the methods employed to survey snake habitat were conducted at the wrong times to detect snake hibernacula. As well, snakes often use building foundations or debris as hibernacula sites, but no indication was given if such sites were searched.

The searches for snakes and their hibernacula were conducted in June and July. However, the guideline documents for snake surveys, such as the ***Milksnake Survey Protocol*** **- MNR Guelph District (2013)**; and ***The Snakes of Ontario – Natural History, Distribution, and Status*** **by J.C. Rowell (2012)**, indicate that hibernacula surveys need to be conducted at two times of year: immediately after emergence, which is usually in April, and in the fall when snakes congregate near the hibernation sites. The survey periods in June and July did not overlap with either of these crucial times.

Therefore, even though no snakes or their hibernacula were observed, further work needs to be done before CN can evaluate whether these species occur in the area. The current conclusions in the EIS that there are no snakes and no hibernacula are not supportable based on the survey methods used. Snakes are very difficult to find and survey effort and planning are key to surveying snake species adequately.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.3 Halton's Regional Natural Heritage System policies, as defined in ROPA 38, supported by the Region's EIA Guidelines (2009) which are endorsed in Section 141 (3)	Part 2, Section 1.4 Part 1, Section 1 Part 1. Section 6.1.6	**WNH53. Snakes – Redo Studies with Proper Timing and Methods** Please re-do the snake surveys at the appropriate times of the year (spring and fall) as set out in the guideline documents. Please conduct active hand searches as also specified in the guideline documents.	Snake surveys were generally conducted too late in the season to detect Eastern Milksnake. None of the snake surveys took place in spring or fall, the appropriate times to detect the presence of snake hibernacula according to accepted protocols.

vi. Birds

The surveys for birds were done at a suitable time of year. However, there were two problems as noted in the information requests to CN. First, the study was limited to the southern half of the CN lands; the northern portion should have also been covered as even though it is mainly cropland, there are areas of potentially suitable habitat for breeding birds, including some Species at Risk. Second, the study locations appeared to be biased towards roadside locations, which is likely to have led to under-detection of birds, especially those with weak calls, due to the increased background noise and distance from potential breeding habitats.

There are two additional bird species and groups that should be addressed in supplemental studies: the Grasshopper Sparrow, which has been detected in the area in the first year of studies but not detected subsequently; and wetland birds, which may include Species at Risk.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.6, 6.3.2 Halton's Regional Natural Heritage System policies, as defined in ROPA 38, supported by the Region's EIA Guidelines (2009) which are endorsed in Section 141 (3)	Part 2, Section 1.4 Part 1, Section 1 Part 1. Section 6.1.6	**WNH54. Breeding Birds – Extend Geographical Survey Coverage** Please undertake breeding bird surveys in the northern half of the study area, and ensure that coverage is not biased to roadsides.	Breeding bird surveys conducted in 2014 and 2015 focused almost entirely on the southern half of the study area. As well, roadside monitoring would result in under-detection of many species due to increased background noise.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.6, 6.3.2 Halton Region Environmental Assessment Guidelines, endorsed by Regional Official Plan 141 (3). Significant Wildlife Habitat Technical Guide (MNR 2000) and supporting Ecoregion schedules for Ecoregion 7E	Part 1, Section 1 Introduction Part 2, Section 6.1.7 Species at Risk,	**WNH55. Conduct Grasshopper Sparrow Surveys** Please conduct surveys in all areas of potentially suitable habitat within the study area to determine the presence/absence of the Grasshopper Sparrow. Note that owing to the nature of the species' call, road-side surveys are inadequate to detect it.	The Grasshopper Sparrow is a Species at Risk. It was detected in the study area within the last 5 years, in 2013. This means that this species could potentially be breeding in the area but could have been overlooked. This species also has a very high pitched song that doesn't carry very far, making it difficult to discern, especially from a closely related, but much more common species. Specific searching is needed to detect the Grasshopper Sparrow.
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.6, 6.3.2 Halton's Regional Natural Heritage System policies, as defined in ROPA 38, supported by the Region's EIA Guidelines (2009)	Part 2, Section 1.4 Part 1, Section 1 Part 1. Section 6.1.6	**WNH56. Wetland Bird Survey** Please conduct specific surveys of wetland birds.	Habitat for Least Bittern (a nationally and provincially Threatened species) and other wetland species of conservation concern occurs in wetlands within the study area. Wetland species are difficult to detect and require additional surveys using playback techniques.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
which are endorsed in Section 141 (3) Significant Wildlife Habitat Technical Guide (MNR 2000) and supporting Ecoregion schedules for Ecoregion 7E			

vii. Monarch

The Monarch is known to occur in the area and has recently been designated as a federally Endangered species. Inventories of butterflies should be undertaken and mitigation for affected habitats addressed. Survey methods should be determined through consultation with experts, but should include description of the habitat requirements, key habitat areas, and identified critical habitat and/or recovery habitat in the project area, or area affected by the project.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Natural Heritage: Terrestrial Species and Habitat EIS Guidelines, Part 2, sections 6.1.7, 6.3.3 Halton Region Environmental Assessment Guidelines, endorsed by Regional Official Plan 141 (3). Natural Heritage Reference Manual (2010)	Part 1, Section 1 Introduction Part 2, Section 6.1.7 Species at Risk	**WNH57. Monarch Survey** Please conduct surveys in all potentially suitable habitat within the study area.	The Monarch was designated Endangered in Canada by COSEWIC in November 2016; it has yet to be upgraded from Special Concern to Endangered on the Federal Species at Risk Act. It is known to occur in the study area so its presence should be investigated, as well as the extent of its habitat on the site.

3.0 CONCLUSIONS

As set out in the foregoing, in Section 2, there are numerous areas in which CN is requested to provide more information or to re-do surveys using appropriate, accepted protocols that are scientifically defensible. The information requested is considered needed by the W/NH Team in order to reach reliable, defendable conclusions, to adequately understand the study results and to determine the likelihood of significant adverse environmental effects from the project. It should be noted that in some cases, the impact of certain deficiencies affect multiple disciplines.

On the grounds as expressed in this report, the W/NH Team requests that the Panel ask CN to remedy these sufficiency issues by providing the requested information.

Signed this 11th day of March, 2017

Ron Scheckenberger

Signed this 11th day of March, 2017

Bill Blackport

Signed this 10th day of March, 2017

John Parish

Signed this 10th day of March, 2017

Cameron Portt

Signed this 10th day of March, 2017

Mirek Sharp

Signed this 10th day of March, 2017

Sarah Mainguy

Signed this 10th day of March, 2017

Jim Dougan

Signed this 10th day of March, 2017

Karl Konze

APPENDIX A
DOCUMENTATION PROVIDED TO THE W/NH TEAM

- Cover Letter from CN (December 7, 2015)
- Milton Logistic Hub Environmental Impact Statement – Summary of the Environmental Impact Statement, Stantec Consulting Inc., Dec. 7, 2015
- Milton Logistics Hub Environmental Impact Statement, Stantec Consulting Inc., December 7, 2015
    - Appendices A – G
- CEAA Additional Information Requirements #1 (March 15, 2016)
    - CN Response to Canadian Environmental Assessment Agency on Information Request 1 Received March 15, 2016 (CEAR File No. 80100), Stantec Consulting Inc., May 18, 2016 response and June 17, 2016 response
- CEAA Additional Information Requirements #2 (July 14, 2016)
- CEAA Additional Information Requirements #3 (July 28, 2016)
    - CN Response to Additional Information Requirements #2 and #3 (September 30, 2016)
- 2016 Halton Brief ["Role of Halton Planning Framework within CEAA Panel Review of the CN Milton Logistics Hub Project"] and Appendices
- EIS Guidelines, dated July 2015
- February 10, 2017 letter from Ministry of Natural Resources and Forestry to Review Panel for the Milton Logistics Hub Project re: Species at Risk Information

Region of Halton

Environmental Impact Study Review

CN Multi-modal Yard

10 March 2017

B000609

Partners in excellence

Region of Halton

Environmental Impact Study Review

CN Milton Multi-Modal Yard
Road Safety and Traffic Flow Review

File nº B000609

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B000609

March 10, 2017

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Executive Summary

CIMA+ was engaged by the Regional Municipality of Halton, the City of Burlington, the Town of Halton Hills, the Town of Milton and the Town of Oakville (the "Halton Municipalities") to review the Environmental Impact Study (E.I.S.) and associated documents and reports submitted by CN for the proposed CN Multi-Modal Yard with regards to traffic safety and traffic operations (traffic flow and congestion). We focused on the sufficiency of the traffic assessment in terms of the technical validity of the information, methods, analysis, and conclusions regarding the significance of any environmental effects, any proposed mitigation measures, and any plans for related follow-up programs. This report presents our findings, recommendations, and requests for additional information.

On an overall basis, CN's documentation as presented lacks sufficient information and detail to determine if there is the potential for significant environmental effects. As such, it does not meet the requirements of the EIS Guidelines as we understand the requirements.

In our opinion, CN has not used the correct timeframe upon which to base its measurements or assess impacts, which may result in certain conclusions being understated or not being indicative of the expected impacts. CN bases its transportation and traffic assessment on assumptions regarding yard capacity, traffic flow, road safety, rail safety and traffic congestion without providing sufficient (or any) data, information, and rationales to allow us to assess the validity of the assumptions. CN has also failed to discuss several safety issues including overall collision effects of the additional truck trips, the effects on pedestrian and cyclist collisions and the effects of additional hazardous goods movements. CN's methods and analysis are not consistent with the municipal requirements as set out in the Region's Transportation Impact Study Guidelines (TISG).

Accordingly, we have set out 15 information requests that we suggest be made to CN in respect of traffic safety and traffic operations. Most of these requests would be fulfilled if CN prepared a Transportation Impact Study for the proposed development in accordance with the Region's TISG.

1. INTRODUCTION

1.1 Purpose of Review and Scope of Report

Canadian National Railways (CN) proposes to build a multi-modal rail facility in the Town of Milton, which is in the Regional Municipality of Halton ("Halton", the "Region") in an area bounded by Britannia Road, Tremaine Road, First Line and Lower Base Line. It has been directed by the Minister of the Environment that this project will be subject to a review under the Canadian Environmental Assessment Act and also under section 98(2) of the Canada Transportation Act.

In response, CN has submitted documents to both the Canadian Environmental Assessment Agency (CEAA) and the Canadian Transportation Agency (CTA) in support of their application.

The purpose of the CIMA+ review was to determine if the Environmental Impact Study (E.I.S.) and associated documents and reports includes sufficient information and data to assess the environmental and transportation impacts of the proposed CN Multi-Modal Yard on traffic safety (including that of non-motorized road users), traffic flow/roadway congestion and other roadway associated effects. We considered whether the CN documents include the technical information and data required by the CEAA "Guidelines for the Preparation of an Environmental Impact Statement," dated July 2015 (E.I.S. Guidelines). We focused on the sufficiency of the traffic assessment in terms of the technical validity of the information, methods, analysis, and conclusions regarding the significance of any environmental effects, any proposed mitigation measures, and any plans for related follow-up programs.

The physical scope included roads immediately adjacent to the site as well as the more general road system in the Region of Halton. Also considered were railway at-grade crossings that might be impacted by the development.

We have also reviewed whether sufficient information has been provided in the E.I.S. to determine whether the project meets the requirements of the standards set out in the Halton Brief.

1.2 Qualifications

Hart Solomon, P.Eng., M.Eng.

Hart Solomon has been a Licensed Professional Engineer since 1977, specializing in traffic engineering, road safety, traffic operations, road operations and systems development. He has Bachelor of Applied Science and Master of Engineering degrees from the University of Toronto, the latter specializing in Transportation. Hart has a Diploma in Public Administration from Western University.

Hart has a wide range of experience in detailed design, traffic safety, project management of traffic engineering/traffic operations projects and in providing traffic engineering input to development, construction and major civic projects. Hart has extensive "hands-on" experience in the public sector, having spent almost his entire career at the municipal level, prior to joining CIMA+ in 2011. He led the City of Hamilton's Traffic Engineering and Traffic Operations groups for almost the entire period from 1985 to 2011, with secondments to direct the Roads and Traffic Division and to manage a major maintenance management software development and installation project. As Manager, Hart's section was responsible for reviewing the traffic aspects of all new developments in the City, which included developing the City's first Traffic Impact Study Guidelines in 2009. More recently at CIMA+, Hart has

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prepared or participated in the preparation of a number of road safety studies, including those focused on pedestrians and cyclists and has been involved in assessing the safety of at-grade rail crossings.

Ali Hadayeghi, Ph.D., P.Eng.

Ali Hadayeghi, P.Eng., is a partner and vice-president of transportation group with CIMA+. Ali completed his PhD and Master's degree in Transportation Engineering at the University of Toronto and his Bachelor's degree in Civil Engineering at Ryerson University. He is a licensed professional Engineer in the provinces of Ontario, Manitoba and Saskatchewan. Dr. Hadayeghi has over 17 years of academic and practical experience in the fields of transportation planning, traffic engineering, statistical modeling and road safety. Ali has managed projects that involve transportation planning, road safety analysis, rail crossing safety, roadway capacity analysis and methodologies for analyzing collision data. Ali is currently the Chair of Road Safety Standing Committee for the Transportation Association of Canada.

2. ASSESSMENT OF CN E.I.S. REPORT, CTA APPLICATION AND TECHNICAL APPENDICES

2.1 Traffic and the EIS

The EIS Guidelines require CN to address traffic-related items including: approved transportation corridors and routes for truck traffic (Part 2, s. 2.2), forecast of volumes of truck traffic, rail transport seasonal schedules, and transportation of employees (Part 2, s. 3.2.2), socio-economic conditions (which would include the impact of the addition of truck traffic) (Part 2, s. 6.1.10 and 6.3.5), and the environmental effects of malfunctions or accidents that may occur in connection with the project (Part 2, s. 6.6.1).

Traffic impacts are also relevant to section 98(2) of the Canada Transportation Act, taking into consideration the "interests of the localities" that will be affected by the line.

2.2 Region's Transportation Study Guidelines

The Region's Transportation Impact Study Guidelines are applicable to this project and the requirements of the EIS Guidelines and s. 98(2) of the CTA. The E.I.S. does not reference the TISG. In the BA Group's assessment of the impacts of terminal-generated heavy truck traffic (Appendix E.17) it is stated that there "are no stipulated or fixed criteria applicable to undertaking the assessment provided in this study"[1]. In fact, the TISG provide clear directions for evaluating the effects of facilities.

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The Regional Official Plan, in section 173 (22), "Requires the proponent of any development considered to have a transportation impact to carry out a detailed study to assess the impact of the proposal and to recommend necessary improvements to the transportation network and services consistent with goals, objectives and policies of this Plan." The TISG is an approved Regional guideline which applies to all significant developments in the Region and gives specific direction as to how to conduct such a study.

[1] Appendix 17, p. 23

The Region has prepared, published and requires development proponents to follow the TISG, latest version dated January 2015. The TISG provide a logic framework for describing the effects on roadway flows and roadway safety, resulting from the establishment of a new development either adjacent to a road, or in the general region. The TISG requires that the study area “should extend far enough, within reason, to contain all municipal, regional and provincial roadways that will be noticeably affected by trips generated by the proposed development.”

The BA Group study is not consistent with the methods, criteria or analysis requirements set out in the TISG.

2.3 Horizon Year

The term “horizon year”, as per the TISG, refers to the point of time in the future on which the predictions of traffic impacts are based. The TISG allow for 5 year, 10 year or longer planning horizons, as the Region deems appropriate. The planning horizon is projected forward based on the date of the study. For a major facility such as this the time frame would be at least 10 years. **Therefore, all discussions of roadway capacity and traffic safety should be based *on the horizon year*, and not 2020.** Given the rapid traffic growth in the Milton area, the difference of seven to ten years or more in terms of the background traffic to which the multi-modal year traffic will be added, could be quite significant, especially if the current roadways are already reaching the limits of their abilities to carry traffic. As well, use of the horizon year, means that increases in use (and therefore truck traffic) at the multi-modal yard after a number of years of operation will be reflected.

Note: While the use of the Horizon year for traffic analysis was not considered in the E.I.S. or supporting documents, traffic volumes for the year 2031 were calculated for 166 road segments for air quality assessments in Attachment IR13-2 – Cumulative Air Quality Effects Assessment.

Freight flows are seasonal, and vary considerably with consumer demand, peaking in time for the December holiday season. The E.I.S. and Appendix E.17 refer to 800 entering and 800 leaving trucks per day by the year 2020. However, these volumes appear to be an average and do not account for seasonal peaking. It is known that container flows follow consumer buying trends and are heavier at peak times such as the holiday season. It would be appropriate to have the seasonal variation stated, so that the peak flows would be known. This variation should be part of the calculation of the horizon year volumes.

Topic	Reference to CN E.I.S. and Information Responses	Requested Information	Rationale
Planning Horizon E.I.S. Guidelines Part 2 s. 2.2, 3.2.2, 6.1.10, 6.3.5 and 6.6.1 Halton Brief Table D.5	Appendix E.17 states that the flows of 800 trucks in and 800 trucks out will be reached by 2020, and	T1. Horizon year Prepare and provide all calculations and conclusions based on a horizon year.	The impact of the proposed development may be significantly greater based on a time a number of years into the future, given

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Topic	Reference to CN E.I.S. and Information Responses	Requested Information	Rationale
CTA s. 98(2)	this is considered "full operation"		background traffic growth, and the possibility of growth within the facility beyond opening day.
Traffic Flow E.I.S. Guidelines Part 2 s. 2.2, 3.2.2, 6.1.10 and 6.3.5 Halton Brief Table D.5 CTA s. 98(2)	The E.I.S. and Appendix E.17 both state that the expected daily truck volumes will be 800 in and 800 out.	T2. Seasonal Variations in goods movement Provide a projection of seasonal variations in truck flow in and out of the intermodal facility, including data in support.	Freight flows are seasonal and vary considerably with consumer demand, peaking in time for the December holiday season. The 800/800 volume does not appear to account for seasonal peaking.

2.4 Truck and Train Volume Assumptions

The E.I.S. on pages 2, 26 and 61 as well as in Appendix E.17, states that the expected truck traffic volumes will be 650 in plus 650 out per day, rising to 800 each way by 2020. The latter is based on 450,000 containers annually. Conversely, page 4 of E.17 suggests that the terminal will become operational in the year 2020.

Section 4.3.3 of the E.I.S. Guidelines provides: "When relying on existing information to meet requirements of the E.I.S. guidelines, the proponent with either include the information directly in the E.I.S. or clearly direct the reader to where it may obtain the information i.e., through cross-referencing). When relying on existing information, the proponent will also comment on how the data were applied to the project, separate factual lines of evidence from inference, and state any limitations on the inferences or conclusions that can be drawn from the existing information."

The truck traffic volumes were provided to the BA Group by CN, and relate back to the capacity of the yard to service containers. Appendix E. 17 does not provide any further background information, calculation or basis for these assumptions.

No fundamental basis for the stated container truck volumes is presented, nor is an upset limit presented. It is not clear if "full operation", the term used to note the 800/800 scenario, means the expected demand based on business projections, or the true capacity of the yard, operated 24/7 at maximum throughput. Appendix E.17 suggests traffic flows for the 800 (times 2) truck volumes are centered on the 0600 to 2100 time period, which would seem to suggest the potential for greater overall truck usage on a 24 hour basis. However, this report again simply states that these were the flows provided by CN developed through an analysis of data of hourly gate volumes at the Brampton Intermodal Terminal (BIT). No background information or data was provided regarding the volumes at the Brampton Intermodal Terminal. The report simply states that the container traffic to be accommodated at the Milton project is to derive from a transfer of container traffic from the BIT.

Appendix E. 17 provides no logical foundation for this volume transferring from the BIT or being created from growth. It would be appropriate to know what the expected flows are relative to the absolute capacity of the site as proposed.

Since existing information and data regarding the BIT is used as the basis for the assumptions regarding truck and train volume and the capacity of the proposed Milton Intermodal, CN should provide the information and data it is relying on. This should be structures to provide a comparison to the proposed Milton yard, assuming no change in loading/unloading equipment type or capacity.

While the E.I.S. recognizes that there will be service-related flows (that is, employees, materials necessary to operate the yard and maintenance vehicles; non-container traffic flows) entering from Tremaine Road (as versus the container truck traffic from Britannia), these flows or their effects are not quantified anywhere in the documentation. These flows will add to the impact of the container trucks on Regional Road traffic.

Page 3 of the E.I.S. states that four trains per day will use the site, but that two of them would be existing trains, so that the overall increase in train traffic would only be two trains. It is not clear how this is to be achieved. Are two of the trains already carrying containers to the Brampton Yard and will be diverted? Will two trains be greatly extended in length? Or will CN somehow divert two existing trains completely away from the Region to be replaced by container trains destined for the new yard?

Topic	Reference to CN E.I.S. and Information Responses	Requested Information	Rationale
Yard Capacity E.I.S. Guidelines Part 2 s. 4.3.3, Part 2, s. 2.2, 3.2.2, 6.1.10, 6.3.5 Halton Brief Table D.5 CTA s. 98(2)	Appendix E. 17, sections 1.0	T3. Brampton Intermodal Terminal information and data Please provide all data and information regarding the Brampton Intermodal Terminal in support of the assumptions regarding truck and train volumes and the capacity of the proposed Milton Intermodal. Include the size of the	Existing information and data regarding the Brampton Intermodal Terminal is used as the basis for the assumptions regarding truck and train volume and the use/capacity of the proposed Milton Intermodal Hub. CN should provide the information and data it is relying on as required by Section

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Topic	Reference to CN E.I.S. and Information Responses	Requested Information	Rationale
		Brampton yard, the number of truck trips generated by that facility, and data and information forming the basis of the transfer of traffic from the Brampton Intermodal to the Milton facility.	4.3.3 of the E.I.S. Guidelines.
Yard Capacity E.I.S. Guidelines Part 2, s. 2.2, 3.2.2, 6.1.10 and 6.3.5 Halton Brief Table D.5 CTA s. 98(2)	Appendix E. 17, sections 1.0, 6.1	T4. Yard capacity projections of truck and train trips Please provide yard ultimate capacity, in terms of trains and containers, and when capacity may be achieved, so an understanding of the absolute traffic can be projected along with a projection of the actual proposed truck and other user vehicular and train flows for the design horizon.	It is important to understand the true capacity of the facility, and expected flows at the design horizon date so that mitigation can be determined in advance.

2.5 Traffic Flow Distribution – Temporal and Spatial

Page 2 of the E.I.S. states that the 800/800 truck flows will have "the predominant flow of truck traffic occurring on weekdays, during the daytime." On page 61, a slightly different statement is made: "More specifically, it is estimated that approximately 85% of truck movements will occur between 06:00 and 21:00 as identified in the Review of Terminal-Generated Truck Traffic (Appendix E.17)".

No foundation is provided for the assumption that the time of arrival/departure of the trucks will be the same as for the Brampton Intermodal Terminal. Appendix E.17 bases the temporal distribution on the demand and usage of the BIT, based on data provided by CN of inbound and outbound gate movements at the BIT over the course of a year. This data was not provided or described in any detail in the E.I.S, nor is any foundation provided for the assumption that the time of arrival/departure of trucks will be the same as for the Brampton Intermodal Terminal. The BA Group assumes: “Since container traffic to be accommodated at the proposed Terminal is to derive from a transfer of container traffic from the BIT, BA Group determined that the pattern of hourly truck movements would be a reasonable proxy for the estimation of future heavy-truck movements at the Terminal.”

CN states that the BIT is approaching capacity, while the Milton Yard is to be newly opened. Using the travel profile from a yard that is approaching capacity (E.I.S. 1.2, page 2) and applying it to one that is being developed to accept new and overflow business may not portray the true yard usage accurately. Also, by using the BIT profile, truck traffic is spread out across the day and smaller volumes are assumed to travel the roads during peak hours, thereby minimizing the effect of the new truck traffic on the road system, which may not reflect the pattern if the Milton Yard were implemented.

The basis for the travel patterns to and from the proposed Milton Yard is not sufficiently documented or substantiated. With regard to the directional distribution of terminal-generated heavy-truck trips, the BA Group relied on information collected through a comprehensive Commercial Vehicle Survey undertaken by the Ministry of Transportation of Ontario (MTO) at the existing BIT. The data and results of this survey were not provided in the E.I.S. The BA Group adopts the origin-destination information collected through the MTO survey at BIT as “suitably representative of the distribution of truck trips generated” by the Milton Yard based on CN’s advice that the “same customer base will be served by the relocation of container traffic from the BIT to the proposed Terminal in Milton in 2020.” No evidence or support for this assumption is provided.

Further, it is not clear in Appendix E.17 whether the same pattern as the Brampton Terminal was used or whether it was customized for the Milton Yard. The travel patterns leaving the yard seem oriented toward Toronto. Page 1 of Appendix E.17 states, in regard to the proposed terminal, that “The local movement of containers, primarily within the western Greater Toronto and Hamilton area (“GTHA”), is facilitated by truck.” This implies that the truck flows would have a westerly orientation rather than toward Toronto as evidenced by the information such as Figure 4 or Appendix E.17. The basis for the geographic distribution needs to be substantiated and described in more detail.

Topic	Reference to CN E.I.S. and Information Responses	Requested Information	Rationale
Heavy Truck Traffic Time of Day Flow Distribution E.I.S. Guidelines Part 2, s. 2.2, 3.2.2, 6.1.10, 6.3.5, and 4.3.3 Halton Brief Table D.5 CTA s. 98(2)	Appendix E. 17, sections 1.0, 6.1	T5. Hourly flow of trucks Please provide the BIT hourly flow rates and provide the foundation for the assumption that the pattern of hourly truck movements at BIT is an accurate projection of the hourly flow rates of trucks in and out of the Milton facility.	CN does not provide any foundation for its assumption that the time of arrival/departure of trucks will be the same as for the Brampton Intermodal Terminal. Using the Brampton Intermodal provides potentially misleading results if that yard is in fact near capacity.

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Topic	Reference to CN E.I.S. and Information Responses	Requested Information	Rationale
		Please provide an in-depth and accurate projection for the hourly flow rates of trucks in and out of the Milton Intermodal facility, for start-up and for the horizon year, including seasonal variations.	
Geographic Distribution of Heavy Truck Trips E.I.S. Guidelines Part 2, s. 2.2, 3.2.2, 6.1.10, 6.3.5, and 4.3.3 Halton Brief Table D.5 CTA s. 98(2)	Appendix E. 17, sections 3.0 to 5.0	T6. Origin/destination of truck trips Please provide the comprehensive Commercial Vehicle Survey undertaken by MTO at the existing BIT, including all data and results. Please provide additional information on the way the origin/destination of truck trips for the proposed facility was calculated. Are those the same as the Brampton Yard, or have they been customized, taking into the account the location of the proposed Milton site relative to its customers ?	The foundation for the BA Group's assumptions regarding travel patterns to and from the Milton Yard is not provided. CN should provide the information and data it is relying on as required by Section 4.3.3 of the E.I.S. Guidelines.

2.6 Road Safety for the Roads/Intersections Immediately Adjacent to the Site and In the Area

2.6.1 Road Safety for the Intersections Immediately Adjacent to the Site

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Two new entrances are planned for the facility: one for the container trucks (off Britannia Road) and one for employees/service vehicles off Tremaine Road. It is proposed that the Britannia Road entrance be signalized and the Tremaine Road entrance be stop-controlled for the entrance only. The E.I.S. concludes that the risk of motor vehicle collisions at the two intersections is low, and that risk of traffic accidents and the long-term effect is not significant[2]. No numerical analysis is provided to compare predicted collision patterns with other Regional intersections. As required in the TISG, a thorough evaluation of the collision potential of the two new proposed intersections adjacent to the site should be provided.

Three mitigation measures are noted in the E.I.S.: the installation of traffic signal control for the main truck access, creation of a left turn lane at the truck access, and creating a queueing area inside the facility so that trucks waiting to enter do not back up onto the public roadway system. No connection between the potential risk and the mitigation measures is provided. The report places all other (and future) responsibility for mitigation on the users and the local road authorities. Under mitigation, it also mentions "Project-specific and standard mitigation, including on-going communication with local and regional service providers, including emergency services". Section 6.6.2.6.2 of the E.I.S. refers to the Ontario legislation *Making Ontario's Roads Safer Act*, and implies that by local authorities implementing these new provisions that the roads around the Milton Yard will be made safer. The new legislation has provisions about distracted driving, pedestrian crossing facilities and passing of cyclists. If either of these latter two measures are expected to reduce collisions, this needs further explanation since the collision data was not provided, nor was the connection to the legislation made clear.

2.6.2 Road Safety for Roadways Immediately Adjacent and the Regional Road System on a Wider Scale

No assessment of the safety impacts of the additional truck trips through the LAA and RAA (Local Assessment Area and Regional Assessment Area) parts of the system was provided. The LAA is the area around the proposed facility while the RAA is the broader regional road system. For Tremaine Road and Britannia Road, it is stated that: "standard traffic safety measures will be implemented."[3] While the starting point is 1600 trips per day, it is not clear what the horizon year volumes might be, and there is the potential that they are much larger. The safety impacts on Tremaine and Britannia Roads should be quantified.

No safety analysis is provided for the broader Regional road system, between the proposed facility and the provincial 400 series highways which are the major origin or destination. As per the TISG, key intersections in the LAA and the RAA should be checked to see the effect of the added trucks, based on the horizon year background volumes as projected. As required in the TISG, these effects should be analyzed, summed and defined, and mitigation proposed, as required.

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2.6.3 Road Safety for the Cyclists and Pedestrians

No assessment of the impacts of the additional truck and general purpose traffic on the cycling and walking network is provided. The Halton Active Transportation Master Plan[4] was adopted by Halton Regional Council in November of 2015. It includes proposed cycling lanes and proposed multi-use

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[2] Summary of E.I.S., 6.6.3., page 57
[3] E.I.S, Summary section 6.6.3, page 56
[4] Halton Active Transportation Master Plan, Report PW-17-15 to the Planning and Public Works Committee, as amended and approved by Regional Council.

boulevard trails on both Britannia Road and Tremaine Road beside the proposed facility. The interaction of the increased truck traffic with the cycling lanes, in particular, should be addressed.

2.6.4 Road Safety at At-Grade Rail Crossings

No safety assessment of grade crossings is provided. The requirement for grade separation (underpass or overpass) for the rail crossings at Lower Base Line and Britannia Road are recognized and discussed. However, the additional train and road traffic may raise the risk levels at other at-grade level crossings in the Region. Each of the level crossings impacted by either increased train or increased truck traffic needs to be assessed and the overall effect identified and summed. It may be that the added road and train traffic is sufficient to change the requirements for crossing protection type under Transport Canada requirements.

2.6.5 Hazardous Goods Movement

The E.I.S.[5] indicates that approximately 2.7% of shipments contain goods classified as hazardous. This equates to over 12,000 new hazardous loads being introduced annually to either the rail lines or roads in Halton, or both. It is indicated that these would be handled in accordance with the *Transportation of Dangerous Goods Act.* No indication of the potential increase in risk associated with these goods is defined, nor is any mitigation discussed.

2.6.6 Information Requests regarding Road Safety

Topic	Reference to CN E.I.S. and Information Responses	Requested Information	Rationale
Road Safety – Adjacent Intersections and Adjacent Roadways E.I.S. Guidelines part 1, s. 3.2, Part 2, s. 2.2, 6.1.10, 6.3.5, 6.4 and 6.6.1 Halton Brief Table D.5 CTA s. 98(2)	E.I.S. p. iv., sections 6.6.2.6, 10.1.2, Tables 6.5.1, 10.1 and 10.2 Appendix E. 17, sections 1.0 and 5.0	T7. Collision prediction for two adjacent intersections and two adjacent roadways Please provide a collision prediction for the two new proposed intersections based on detailed intersection information. Please assess the effects of the additional truck and service traffic on Tremaine and Britannia Roads. Please provide data and analysis in support of the mitigation measures proposed.	Stated as being "not significant", but not quantified or compared to any standard.

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[5] E.I.S., Section 3.4.2

Topic	Reference to CN E.I.S. and Information Responses	Requested Information	Rationale
		Please provide any additional proposed mitigation for collisions based on the expected performance of the two adjacent intersections and roadways, compared to typical intersections/roadways carrying the same flows.	
Road Safety – Region-wide E.I.S. Guidelines part 1, s. 3.2, Part 2, s. 2.2, 6.1.10, 6.3.5, 6.4 and 6.6.1 Halton Brief Table D.5 CTA s. 98(2)	Not addressed in the E.I.S.	T8. Expected vehicular collision occurrence overall across the Region Please provide an analysis of the collision effects across the Region as a result of traffic generated by the yard, and proposed mitigation, for the horizon year.	On a broader base, the collision effects are much smaller at individual intersections but may add up to a significant amount in total.
Road Safety _ Vulnerable Road Users E.I.S. Guidelines part 1, s. 3.2, Part 2, s. 2.2, 6.1.10, 6.3.5, and 6.6.1 Halton Brief Table D.5 CTA s. 98(2)	Not addressed in the E.I.S.	T9. Expected safety impact on cycling and walking on roads bordering the proposed facility Please provide an analysis of cyclist and pedestrian safety on Tremaine Road and Britannia Road adjacent to the facility, with emphasis on the entrance intersections, accounting for the proposed Regional cycling and trail facilities.	The E.I.S. Guidelines at section 6.3.5 require an assessment of the safety impacts on cycling and walking at the two entrance points of the facility. Given the Region's plan to upgrade facilities in the area to provide bicycle lanes and multi-use paths, safety around the west and north sides of the property for cyclists and pedestrians should be assessed.
Road Safety – Rail Crossings E.I.S. Guidelines part 1, s. 3.2, Part 2, s. 2.2, 3.1, 6.1.10, 6.3.5, and 6.6.1 Halton Brief Table D.5	Not addressed in the E.I.S.	T10. At-grade rail crossing review Please provide analysis of all at-grade rail crossings impacted by the increased rail and/or truck flows,	The requirement for grade separation (underpass or overpass) for the rail crossings at Lower Base Line and Britannia Road are recognized and discussed.

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Topic	Reference to CN E.I.S. and Information Responses	Requested Information	Rationale
CTA s. 98(2)		based in the horizon year.	However, the additional train and road traffic may raise the risk levels at other at-grade level crossings in the Region.
Road Safety – Hazardous Goods E.I.S. Guidelines part 1, s. 3.2, Part 2, s. 2.2, 6.1.10, 6.3.5, 6.4 and 6.6.1 Halton Brief Table D.5 CTA s. 98(2)	E.I.S. 3.4.2, 6.6.2, 6.6.2.4, 6.6.2.5, 6.6.2.7	T11. Hazardous goods movement Please provide an assessment of the Region-wide risk of incidents involving hazardous goods, and propose mitigation measures.	No indication of the potential increase in risk associated with these goods is defined, nor is any mitigation discussed.

2.7 Road Operations for the Roads/Intersections Immediately Adjacent to the Site and In the Greater Regional Area

2.7.1 Truck Percentage Calculations

The effects of heavy trucks on key intersections is presented in a way that appears to understate the effect. Appendix E.17, the BA Group Assessment of Truck Traffic Flows, provides a depiction of the travel patterns and time of day of heavy vehicle flows. The presentation of the data in Tables 2 through 9 of the change in truck percentages is somewhat misleading. In each there is a column are headed "Change in Percentage of Heavy Vehicles". The numbers presented are calculated as if considering trucks to be the same as light vehicles as a percentage of the total traffic stream entering an intersection. It is not the change in the volumes of heavy vehicles itself, so the numbers shown are much smaller. An example: in Table 5, the fifth entry shows truck volumes entering the Britannia/RR 25 intersection as rising from 43 to 144 in the afternoon peak hour, but defines this as a 4.31% increase. In reality, this is 165% increase in truck traffic.

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Even if it was preferred to show the truck traffic as a proportion of total traffic, the tables are still misleading, as the effect of a heavy truck on intersection operation is typically evaluated as being 2.5 to 3.5 passenger car units. The Canadian Capacity Guide for Signalized Intersections (which is not referenced in the E.I.S.) defines procedures for evaluating the performance of intersections under the control of traffic signals and includes a table[6] showing the equivalency between passenger cars and heavier vehicles, including laden trucks (for multi-unit trucks, the equivalency ranges from 2.5 to 3.5

[6] Canadian Capacity Guide for Signalized Intersections, Canadian Institute of Transportation Engineers, February 2008, Table 3.2.

depending on how heavily loaded the truck is). This equivalency is understandable due to the performance (acceleration and braking) characteristics of heavy vehicles, so the 4.31% increase noted above is in reality the same as a 10 to 15 % increase in light vehicle traffic. Truck flows should be converted to passenger car equivalents when considering capacity effects.

The impacts of heavy trucks have been quantified in Appendix E.17 for both road sections and intersections. This was done for both by categorizing the flows into three levels of change: Imperceptible, Noticeable and Considerable. As noted above, in the appendix the criteria were based on the authors' engineering judgement rather than any accepted standard. The assessment was done on an absolute basis, not in comparison to the existing background truck volumes. However, the recognized calculation technique required by the TISG, the use of volume-to-capacity ratios, was not undertaken.

2.7.2 Road Operations for the Roads/Intersections Immediately Adjacent to the Site

No numerical assessment (level of service, delay) is presented for the operation of the two new proposed intersections, or how they will impact on flows on the road other than to note that the extended entry length will provide sufficient storage that truck traffic will not back up onto the Regional road system. Capacity and sight-distance calculations should be performed for the adjacent signalized and stop-controlled intersections and these should be done in the context of the horizon year, or even yard capacity.

CN proposes mitigation measures for the entry intersections[7]: to "seek collaboration with Halton Region to install a signalized intersection, as necessary, on Britannia Road with a turning lane for trucks entering the terminal from the east, to manage vehicle movements and the safety of other road users, including motor vehicle operators, cyclists and pedestrians." No confirmation or calculation as to the need for a traffic signal or the effect on Britannia Road flows is provided, nor are any other measures presented. Similarly, one-way stop control is proposed for the service entrance on Tremaine Road, but no assessment of the applicability or expected impacts of this form of control is presented. It is stated that "Improvements associated with this entrance will be determined at a later stage through discussions with Halton Region."[8]

The E.I.S. expects noticeable and considerable change to be experienced along Britannia Road and Tremaine Road[9]. This reflects the proposed increase in traffic, although the effects are not quantified in terms of level of service changes. The E.I.S. assumes that the impacts can be mitigated through:[10] "reasonable and convention traffic engineering and operational control measures that would not result in a significant increase in road congestion". The E.I.S. states that these measures would be developed in consultation with Halton Region and could include signal timing changes, signage, adjustment to queuing lanes, new turn lanes and the provisions to ensure the safety of pedestrians and cyclists."[11] A detailed list of measures is provided in Attachment IR23[12], but no analysis is given as to whether or the degree to

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[7] Appendix G, page G.7
[8] E.I.S. page 48.
[9] E.I.S. page 28.
[10] E.I.S. page 28.
[11] Appendix E.17, page 24
[12] CN Response to CEAA Information Request 1, May 18, 2016, Attachment IR23, Supplemental Mitigation Measures, page 7

which these measures would be effective. The combination of the horizon year background traffic flows and possibly more intensive use of the facility may present a different scenario from that in the E.I.S. which requires a revised analysis. A clear statement of the mitigation measures expected to be needed for the horizon year should be presented along with their predicted effectiveness in addressing congestion.

2.7.3 Road Operations for the Roads/Intersections in the Greater Regional Area

No mention is made in the E.I.S. of the socio-economic effect of adding 1600 (or many more) heavy vehicles trips daily to the overall traffic flow. For intersections close to the site, as depicted in Figures 11 and 12 of Appendix E.17, the impact of the additional heavy truck traffic may be sufficient to cause significant additional congestion. Under the TISG requirements, these intersections should be assessed under initial and expanded development conditions for current and horizon time periods, to ensure that the additional truck traffic does not push these intersections into unsatisfactory levels of service. Truck volumes should be properly expanded to passenger car equivalents.

2.7.4 Restricted Load Roadways

Appendix E.17 (page 3) discusses the issue of roadways which have reduced load restrictions (which are defined by the Region as 5 metric tonnes per axle). Some are restricted from March 1 to April 31 each year due to spring thaw conditions while others have permanent, 12 month restrictions. Both Britannia Road and parts of Tremaine Road are in this category. In fact, Britannia Road across the proposed entrance all the way to Highway 407 has a spring-time restriction, while Tremaine Road from Britannia Road south to Highway 407 has a permanent restriction. These are two of the major paths from the proposed facility toward the 400-series highways that are the expected origin and destination of much of the facility truck traffic (as presented in Appendix E.17). The stated assumption is that all roads scheduled for upgrading under the Halton Transportation Master Plan will be completed by the time the Milton Multimodal Yard is operational. No contingency plan is presented, nor is any plan discussed for construction access of construction vehicles either during the half-load periods or until the adjacent roads are upgraded.

2.7.5 Information Requests regarding Road Operations

Topic	Reference to CN E.I.S. and Information Responses	Requested Information	Rationale
Road Operations – Truck Volumes E.I.S. Guidelines Part 2, s. 3.2.2, 6.1.10 and 6.3.5 Halton Brief Table D.5 CTA s. 98(2)	Appendix E. 17, Tables 2 through 9	T12. Increase in truck traffic Please provide calculations regarding the increase in truck traffic as a result of the Milton Facility, considering horizon year and appropriate	Tables 2 through 9 in Appendix E. 17 are misleading as they do not correctly show the change in volumes of heavy vehicles, nor are they based on the horizon year.

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Topic	Reference to CN E.I.S. and Information Responses	Requested Information	Rationale
		(stated) truck equivalency factors.	
Road Operations – Congestion, Adjacent Roads E.I.S. Guidelines Part 2, s. 3.2.2, 6.1.10,6.3.5 and 6.4 Halton Brief Table D.5 CTA s. 98(2)	E.I.S. page 28, Appendix E. 17, sections 6.2, 6.3, and 7.0	T13. Expected congestion increases (adjacent roads and intersections) Please provide an analysis of the two new intersections and the two adjacent roadways in terms of their level of service, based on the horizon year, to determine level of service and delay, and whether there are any flow or queuing effects beyond the intersections. Use passenger car equivalents for truck volumes. Capacity and sight-distance calculations should be performed for the adjacent signalized and stop-controlled intersections. Please provide a clear statement of the mitigation measures expected to be required for the horizon year, along with details, data and analysis regarding their predicted effectiveness in addressing congestion	An assessment of the new intersections to be built adjacent to the site as well as the boundary roadways should be conducted for the horizon year. Mitigation actions may follow from this assessment.
Road Operations – Region-wide Intersections	E.I.S. page 28, Appendix E. 17, sections 6.2, 6.3, and 7.0	T14. Expected congestion increases (area-wide roads and intersections)	No assessment of the socio-economic impacts of the additional truck traffic generated by the

Topic	Reference to CN E.I.S. and Information Responses	Requested Information	Rationale
E.I.S. Guidelines Part 2, s. 3.2.2, 6.1.10, 6.3.5 and 6.4 Halton Brief Table D.5 CTA s. 98(2)		Please provide an analysis of major Regional intersections in terms of their level of service, based on horizon year, and using truck volumes expanded to passenger car equivalents. Please provide proposed mitigation measures.	proposed facility is provided.
Road Operations – Reduced Load Roadways E.I.S. Guidelines Part 2, s. 3.2.2, 6.1.10 and 6.3.5 Halton Brief Table D.5 CTA s. 98(2)	Appendix E. 17	T15. Reduced load roadway requirements. Please provide an assessment in the event that all roads in the area have not been reconstructed and that load restrictions are in place during spring thaw. Please provide contingency plans and assessment of construction traffic management during reduced load periods.	Contingency and construction plans.

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3. MUNICIPAL STANDARDS

I have been asked to list any technical information within my expertise that is necessary to apply the standards in the Halton Brief relevant to my area of expertise. The municipal standards and definitions below are from the Halton Brief. My commentary is limited to the second, third, and fourth columns of the below table.

Municipal Standard with references to Halton Brief Appendices A & B	Additional Information required to apply the standard	Does CN propose mitigation relevant to this standard?	Does CN propose any follow-up relevant to this standard?
Major Transportation Facilities To adopt a functional plan of *major* transportation *facilities*[13] for the purpose of meeting travel demands for year 2021 as well as protecting key components of the future *transportation system*[14] to meet travel demands beyond year 2021 (ROP Reference 173(1)) Halton Brief, Table D.5 Halton Brief, App. B, Part C.3.1 Halton Brief, App. A, fig 23: Major Transportation Facilities	Complete assessment of all effects, safety and congestion, predicted to occur as a result of the development, conducted as per the Region's TISG. Please see **T1-T4, T5, T6, T7 – T11, T12 – T15** in this report. Base assumptions must be properly substantiated, and put correctly in the context of this site, based on a horizon year. Please see **T1-T4** in this report.	Yes, but it is not possible to determine if the mitigation will be sufficient. With respect of two adjacent intersections, CN has proposed the installation of traffic signal control for the main truck access off Britannia (if required), creation of a left turn lane at the truck access, and creating a queueing area inside the facility. CN also proposes stop control for the service entrance off Tremaine. CN noted that "The residual effect on road safety for road users will largely be managed through Project-specific and standard mitigation including on-going communication with local and regional service	No. CN deferred follow-up to local authorities after the Project is built, with intent to communicate.

[13] **Major facilities (PPS):** Facilities which may require separation from sensitive land uses, including but not limited to airports, transportation infrastructure and corridors, rail facilities, marine facilities, sewage treatment facilities, waste management systems, oil and gas pipelines, industries, energy generation facilities and transmission systems, and resource extraction activities. **Major goods movement facilities and corridors (PPS):** Transportation facilities and corridors associated with the inter- and intra-provincial movement of goods. Examples include: intermodal facilities, ports, airports, rail facilities, truck terminals, freight corridors, freight facilities, and haul routes and primary transportation corridors used for the movement of goods. Approaches that are freight-supportive may be recommended in guidelines development by the Province or based on municipal approaches that achieve the same objectives.

[14] **Transportation system (GP):** A system consisting of corridors and rights-of-way for the movement of people and goods, and associated transportation facilities including transit stops and stations, cycle lanes, bus lanes, high occupancy vehicle lanes, rail facilities, park-and-ride lots, service centres, rest stops, vehicle inspection stations, inter-modal terminals, harbours, and associated facilities such as storage and maintenance (Provincial Policy Statement, 2005).

Municipal Standard with references to Halton Brief Appendices A & B	Additional Information required to apply the standard	Does CN propose mitigation relevant to this standard?	Does CN propose any follow-up relevant to this standard?
	Effects identified should not only be immediate to the site (**T7, T9, T13)**, but Region-wide (**T8, T10, T11, T14)**, as appropriate. Mitigation can then be identified and validated based on a thorough understanding of the expected impacts. Requests **T7, T11, T8, T13** and **T14** discuss mitigation measures.	providers, including emergency services," For Tremaine Road and Britannia Road, CN states that: "standard traffic safety measures will be implemented…All traffic is expected to conform to the *Highway Traffic Act of Ontario*. It is anticipated the new *Making Ontario's Roads Safer Act* will also be enforced by local authorities where appropriate to reduce potential accidents. To further reduce potential interactions between truck traffic entering the Terminal site, 6 queuing lanes to accommodate approximately 140 trucks will be built.." The standard safety measures referred to include adjusted traffic signal timing, provision of advisory or regulatory signage, adjustments to the length of vehicle storage lanes, addition of auxiliary left or right turn lanes and provisions to address safety of pedestrians and cyclists. See also the proposed grade separations referred to in the next section. **Response:** No specifics for number, or location, of these measures is stated. No justification for or validation of the sufficiency of these measures has been provided. In fact, the main safety measure proposed, that of a traffic signal at the main entrance is noted as "if required".	

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Municipal Standard with references to Halton Brief Appendices A & B	Additional Information required to apply the standard	Does CN propose mitigation relevant to this standard?	Does CN propose any follow-up relevant to this standard?
		No mitigation of safety impacts or road congestion effects is proposed beyond the immediate area of Tremaine and Britannia Roads Much of the mitigation noted is deferred to local authorities.	
Railway Networks and Crossings To support the provision of a safe and efficient railway network by securing grade separations of railways and *arterial roads*[15] where warranted, supporting the monitoring and necessary actions to improve the safety of the movement of dangerous goods by rail, and ensuring where possible compatible uses adjacent or in proximity to *railway corridors*[16] and terminal facilities including railway yards and intermodal facilities (ROP Reference 147(18)) Halton Brief, Table D.5 Halton Brief, App. B, Part C.3.3 Halton Brief, App. A, fig 24: Train Lengths North Halton Brief, App. A, fig 25: Train Lengths South	Safety impacts of increased road and rail traffic on at-grade crossings across the Region, compared to Transport Canada standards for crossing protection. Please see **T15** in this report.	Yes. CN proposed grade separations on Lower Base Line and Britannia Road. No mention is made of any other at-grade crossing in the Region which might be impacted. Response: The changes to other at-grade crossings in the Region (increased train or traffic volumes) as a result of this Project may result in the requirement to upgrade at-grade crossing protection – this is not considered in the E.I.S.	None discussed.

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[15] **Arterial roads (ROP):** A Major Arterial, a Multi-Purpose Arterial, or a Minor Arterial as shown on Map 3 of this Plan (the ROP).
[16] **Transportation corridors (GP):** A thoroughfare and its associated buffer zone for passage or conveyance of vehicles or people. A transportation corridor includes any or all of the following: a) Major roads, arterial roads, and highways for moving people and goods; b) Rail lines/railways for moving people and goods; c) Transit rights-of-way/transitways including buses and light rail for moving people.

4. CONCLUSIONS

The proposed Project will create additional traffic flows in the Region, particularly heavy truck traffic. These flows will have impacts, perhaps significant, on human health (motor vehicle collisions) and socio-economically (roadway congestion). While the E.I.S. and associated documents address some of the potential issues, the approach taken to predict the effects is neither rigorous enough, nor complete enough to understand the expected impacts, especially a number of years into the future.

Mitigation measures are discussed, but with the exception of two railway grade separations, the mitigation measures are presented as potential actions, without clear commitment to numbers, locations or details. The mitigation measures are often defined as the responsibility of the road authority, and left to be worked out after the development has opened.

Complete, in-depth analyses done according to accepted industry and Regional standards are required to assess the effects on traffic safety and traffic flows resulting from the proposed development. This would allow the development, more accurately, in advance, of any necessary mitigation measures, thereby protecting human health and the socio-economic base from the outset.

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APPENDIX A

Region of Halton

Transportation Impact Study Guidelines,

January 2015

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TRANSPORTATION IMPACT STUDY GUIDELINES

Dated: January 2015

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Transportation Impact Study

The goal of a Transportation Impact Study (TIS) is to assess the potential effects of traffic caused by a proposed development on Regional and local roadways and to identify the required roadway and access improvements needed to ensure that the roadway system will operate at an acceptable level upon completion of the proposed development.

Transportation Impact Studies are an important part of the development review and approval process to assist developers and public agencies in making land use decisions, such as Official Plan amendments, re-zonings, subdivisions, site plans, planning approvals and other development reviews, where the proposal may have a significant impact on traffic and transportation operations.

Transportation Impact Studies benefit the municipality by:

- Providing decision makers with a basis on which to assess transportation implications of proposed development applications;
- Providing a rational basis on which to evaluate if the scale of development is appropriate for a particular site and what improvements may be necessary, on and off the site, to provide safe and efficient access and traffic flow;
- Providing a basis for assessing existing or future localized transportation system deficiencies that should be improved;
- Addressing transportation-related issues associated with development proposals that may be of concern to neighbouring residents, businesses and property owners; and

A Transportation Impact Study may vary in scope and complexity depending on the type and size of the proposed development.

1.2 Need and Justification

Halton Region has prepared these guidelines in order to streamline the approval process and provide a standardized framework for consultants to follow when submitting traffic/transportation studies for review and should be complemented with appropriate transportation engineering judgement.

1.3 Purpose of Guidelines

The purpose of these guidelines is to ensure that Transportation Impact Studies prepared for the Region's review meet the following criteria:

- Objective assessment – the study will evaluate the impacts of proposed new development in a rational manner;
- Consistency – the study will utilize assumptions consistent with the Region's accepted methodologies and parameters and thus be comparable to other transportation studies in the Region;

- Recognized by developers and consultants – the guidelines will provide a standard approach to be followed and will reduce confusion and delay in processing development proposals;
- Promote understanding of process – the steps outlined in these guidelines will enable proponents, reviewers and elected officials to understand the process more effectively; and
- Ease of review by staff – a standardized set of guidelines will aid the efficiency of staff in reviewing Transportation Impact Studies.

1.4 Transportation Demand Management

Transportation Demand Management (TDM) is a term used to describe a wide variety of initiatives aimed at reducing the amount of travel by single occupant vehicles and achieving a more balanced mode split in the transportation system, particularly during the commuter peak hours.

The Region launched the Smart Commute Initiative in 2006 which is a program of Metrolinx and the municipalities in the GTHA. Smart Commute Halton encourages active and sustainable transportation by offering services and tools designed to make commuting easier for the employees of local organizations. Smart Commute is continuing to expand across the Region in partnership with Metrolinx, the local municipalities and local employers.

Traffic Impact Studies should consider TDM initiatives such as:

-Promotion and support for reduced single occupant vehicle use through carpool programs,
-Promotion of transit and employer subsidized transit programs,
-Implementation of bicycle/pedestrian infrastructure and bikeshare programs,
-Multi-modal marketing programs (web site, access guides, individualized marketing programs, information kiosks, way-finding signage, emergency ride home),
-Parking Programs (transportation allowance, preferential parking, unbundled parking),
-Alternative Work Programs (compressed work weeks, flexible work schedules, telework programs)

2.0 GENERAL TRANSPORTATION IMPACT STUDY REQUIREMENTS

2.1 Staff Consultation

It is imperative that prior to commencing a Transportation Impact Study, the consultant meet with Regional and area municipal staff, as appropriate, in order to review the level of detail and confirm the Scope of Work for the TIS, arrange contacts with the various affected road jurisdictions and to determine data requirements and its availability.

In addition to Halton Region requirements, the area municipal and provincial roadway authorities may require additional information or analysis to satisfy their requirements for a development/redevelopment proposal. The proponent should contact these roadway authorities, where applicable, to determine these requirements.

2.2 Study Updates

Generally, a Transportation Impact Study will have a "shelf life" of five years. Major changes within the study area may reduce the "life" of the document if they were not considered in the impact assessment. Where the timing of subsequent development approvals exceeds five years, a new study will generally be required.

2.3 Data Collection

The applicant must provide both electronic and hard copies of all raw data collected for the TIS. This includes but is not limited to the following:

- Turning Movement Counts;
- Traffic signal timings;
- ATR & AADT counts;
- Collision records;
- Gap Study observations;
- Queue Studies;
- Proxy site surveys;
- Cordon counts;
- Transit information
- Pedestrian and Cyclist circulation plan;
- Other data as requested

3.0 Transportation Impact Study Outline

The following sections outline the format and requirements of the Transportation Impact Study. Area municipal or provincial roadway authorities may require additional information or analyses beyond the Regional requirements outlined in these guidelines. The contents and extent of the TIS generally depend on the location and size of the proposed development/redevelopment and the conditions prevailing in the surrounding area.

3.1 Description of the Proposal and the Study Area.

A description of the development proposal, its location and the proposed Transportation Impact Study area is required to permit Regional Staff to identify the site location, its anticipated operation and area of potential impact. In addition, this information allows timely review of key study assumptions ranging from the study area limits and horizon years to the trip assignment assumptions.

3.1.1 Description of the Development or Redevelopment Proposal

The Transportation Impact Study should provide a full description of the proposed development. This may include the following elements, as applicable:

- Municipal address;
- Existing land uses or permitted use provisions in an Official Plan, Official Plan Amendments, Zoning By-law etc.
- Proposed land uses and relevant planning regulations to be used in the study;

- Total building size and building locations;
- Floor space including a summary of each type of use/number of residential units;
- Anticipated date of occupancy;
- Approximate hours of operations;
- Planned phasing of the development;
- **Near-by intersections and accesses to adjacent developments and those on the opposite side of the road including type of control;**
- Proposed access points and type of access (full movement, right-in-right-out, turning movement restrictions, etc.);
- Nearby transit facilities/stops;
- Near-by Active Transportation Facilities – sidewalks, multi-use trails, bike lanes, etc.,

It is a requirement to provide a site plan, of a suitable scale, for consideration in the review of the Transportation Impact Study. If the proposed development/redevelopment is to be constructed in phases, describe each phase and the proposed timing of implementation.

3.1.2 Study Area

The study area should extend far enough, within reason, to contain all municipal, regional and provincial roadways that will be noticeably affected by the trips generated by the proposed development. The study area should be determined through the Scope of Work and the Region reserves the right to establish the study area as may be deemed necessary.

A description of the existing transportation system in the study area, using a combination of maps and other documentation should identify relevant information, such as the following:

- All adjacent and nearby roads, indicating the number of lanes, and posted speed;
- All adjacent/across and affected intersections/access, indicating type of control, access type, lane configurations, lane widths, and any turning or similar restrictions;
- If appropriate, on-street parking spaces/standing/stopping restrictions in the vicinity of the development site and those which would affect the operation of key intersections being analyzed;
- Transit routes and stops;
- Heavy vehicle prohibitions and restrictions;
- All pedestrian and cyclist routes; and
- Other transportation facilities as appropriate.

Potential future transportation improvements that are currently being considered and may facilitate the traffic demand produced by the development/redevelopment should be identified. These improvements should be described to a level of detail sufficient to assess their implications for travel to/from the development. In each case, the status and anticipated date of implementation should be identified.

3.2 Horizon Year and Time Periods for Analysis

3.2.1 Horizon Year

In general, the horizon year for impact analysis must be **five (5),** and, depending on the development size and phasing periods, ten (10) years (to be determined by Halton Region) from the date of the transportation impact study unless an earlier date for full occupancy of the project can be identified and justified in consultation with Regional staff.

3.2.2 Peak Periods

The critical time period for traffic generated by a given project is directly associated with the peaking characteristics of both the development related traffic and the transportation system traffic. Typically, the AM and PM peak traffic period will constitute the "worst case" combination of site related and background traffic; however, in the case of retail, entertainment, religious, institutional, sports facility uses, golf courses or as determined by Halton Region, the Saturday, Sunday and/or site peak may require analysis. As part of the consultation process prior to commencing the study, the consultant should determine in conjunction with Regional staff the selected time periods for analysis.

3.3 Existing Traffic Conditions

To provide a representative picture of the existing transportation conditions with exhibits showing the existing traffic volumes and turning movements for all modes of transportation for roadways and intersections in the study area including pedestrian/cyclist volumes and heavy truck movements, should be included.

Traffic volumes may be acquired from the Region, local municipalities or previous transportation planning, traffic operation or traffic impact studies undertaken in the study area. Traffic counts more than two years (2) old or counts that appear not to be reflecting existing conditions should be updated to ensure that they reflect current traffic levels. All data requests are at the cost of the Developer/Owner.

A field observation (peak one hour count at minimum) should be undertaken to verify that traffic volumes through an intersection reflect actual demand and to determine the necessary adjustments to level-of-service calculation so that actual conditions are fairly represented.

3.4 Background Traffic Growth

3.4.1 Background Traffic

The background growth in traffic should be established in consultation with Regional staff through one of the following methods:

- Estimation of roadway growth factors from a calibrated traffic forecast model;
- A growth rate based on area transportation studies.

In some situations, alternative assumption or methods, such as the application of development absorption rates may be appropriate. In the absence of these methods, rates provided by the municipality should be used.

An Applicant will also be required to work in conjunction with the Local Municipality and Transit Authorities, as well as the Province.

3.4.2 Other Area Developments

All significant developments under construction, approved, or in the approval process within the study area and are likely to occur by the specific horizon years should be identified and recognized in the study. The land-use type and magnitude of the probable future developments in the horizon years should be identified through consultation with Regional and area municipal staff. In some cases, the traffic impact of other area developments will need to be explicitly considered in the analysis of the traffic impact of the proposed development.

3.4.3 Transportation Network Improvements

Changes to the present or planned transportation network should be determined from the approved Regional, Provincial and local capital improvement programs. A realistic assessment of timing and certainty should be made. The impacts of the transportation system changes should be identified; in particular, diversion of volumes from other facilities to new or improved facilities should be estimated.

3.4.4 Transit/HOV Considerations

A TIS should evaluate the impacts of site generated transit demand for the relevant time periods and scenarios on all transit services and transit stops/stations/terminals where ridership will be increased by 5% or more by site generated transit demand.

For HOV analysis, the lane analyses must use a lane utilization factor of 0.80 for the assumption that 20% is assumed as the HOV lane usage.

3.5 Estimation of Travel Demand

3.5.1 Trip Generation

Traffic volumes expected to be generated by the proposed development shall be forecast using the latest edition of the ITE Trip Generation Manual, unless local & more reliable trip generation data is available.

Trip generation parameters shall be selected using the principles as described in Chapter 3 of the ITE Trip Generation Handbook.

The estimation of traffic volumes shall be based on the full build-out condition and/or maximum land use intensity allowed under existing or proposed zoning regulations.

Adjustments to trip generation rates and generated traffic volumes to account for internal traffic, pass-by traffic and increased modal splits is permitted provided that assumptions are clearly documented and justified, and illustrated in separate diagrams.

All trip generation assumptions and adjustments assumed in the calculation of "new" vehicle trips should be documented and justified in terms of previous research or surveys. Sensitivity analysis should be undertaken where trip generation parameters have the potential to vary considerably and most probable values cannot be readily identified.

A table should be provided in the study report identifying the categories and quantities of land uses, with the corresponding trip generation rates or equations and the resulting number of trips. For large developments that will be phased in over time, the table should identify each significant phase separately.

3.5.2 Trip Distribution

All trip distribution assumptions must be documented and justified. Due consideration should also be given to potential differences in trip distribution patterns associated with different time periods, days of the week and development land-use types.

Engineering judgement should be utilized to determine the most applicable of the above methodologies for each particular application. Halton Region staff may have data available that assists in determining appropriate trip distribution.

3.5.3 Trip Assignments

Traffic assignments should consider logical routings, available and projected roadway capacities, and travel times. Traffic assignments may be estimated using a transportation planning model or "hand assignment" based on knowledge of the proposed/future road network in the study area. Halton Region can provide assistance with confirming growth rates. All data requests are at the cost of the Developmer/Owner.

3.5.4 Summary of Traffic Demand Estimates

Figure(s) should be presented indicating the assignment of all site-generated traffic volumes and pass-by volumes (if applicable) separately to the local road network, as well as to the individual site access locations by direction and by turning movement where required.

For each time period, include figures that summarize:

- Existing traffic/transit volumes;
- Existing plus background growth for each horizon year; and,
- Existing plus background growth plus site generated volumes for each horizon year

A summary of the future traffic demands (each combination of horizon year and peak period for both site generated and total future traffic conditions) should be provided in the form of exhibits. Pass-by traffic assumptions should be clearly identified and illustrated on an exhibit, which summarizes the reassignment of pass-by traffic.

3.6 Evaluation of Impacts of Site Generated Traffic

The evaluation of impacts shall be conducted for all of the time periods of each horizon year. The existing volumes, existing plus background growth and existing plus background growth plus site-generated traffic by direction and by turning movement should be included, as well as the scenarios with and without any relevant major transportation system improvements.

Supplementary surveys or analyses may be needed to assess saturation flows, gap availability, projected queue lengths and possible blocking queues.

3.6.1 Capacity Analysis at Intersections

Capacity analysis at intersections will assess the operations of individual intersections and movements anticipated to be impacted by the proposed development. The adequacy of operations before and after the proposed development will be determined based on the analysis methodology and Regional thresholds as described below.

The evaluation of signalized and unsignalized intersections affected by site generated traffic volumes is required for all relevant time periods and scenarios and summaries are to be provided in a tabular format. The objective should be to maintain existing levels of service.

Documentation in the TIS appendix is required to detail all assumptions used in the analysis concerning lane configuration/use, pedestrian/cyclist activity, saturation flows, traffic signal cycle length, phasing and timing, utilization of the inter-green phase and other relevant parameters. Existing signal timings must be used for existing intersections and signal timing modifications may be considered as a measure to address capacity or level of service deficiencies.
Supplementary surveys or analyses may be needed to assess saturation flows, gap availability, projected queue lengths and possible blocking queues.

The summary should include the level-of-service including average vehicle delay and volume to capacity (v/c) ratios for overall intersection operations and individual critical movements, for all analysis periods and time horizons. Full documentation of the results of all level of service analyses should be provided in an appendix.

The Region accepts both the Highway Capacity Manual (HCM) and Canadian Capacity Guide (CCG) methodologies of intersection analysis. Specific software packages include CCG/CALC2, InterCalc HCS Version 3.0 or higher, Synchro 7.0 or higher. Analysis parameters should be confirmed with Halton Region staff through the pre-consultation and the submission of a scope of work. Should a consultant wish to utilise a software package other than these listed above, prior approval from the Region must be obtained.

The analysis should include the mitigation of impacts to signalized intersection operations where:

- Volume/capacity (V/C) ratios for overall intersection operations, through movements, or shared through/turning movements increased to 0.85 or above:
- V/C ratios for exclusive movements increased to 0.95 or above; or
- Queues for an individual movement are projected to exceed available turning lane storage.

The analysis should also include unsignalized intersections where:

- Level of service (LOS), based on average delay per vehicle, on individual movements exceeds LOS "D", or
- The estimated 95^{th} percentile queue length for an individual movement exceeds the available queue storage.

Conventional signal timing plans should be used and all proposed adjustments to traffic signal timing, phasing and cycle lengths should be evaluated in terms of pedestrian crossing time, effect on queue lengths, adequacy of existing storage and effects on the existing signal co-ordination.

3.6.2 Safety Analysis

Potential safety or operational issues associated with the following, as applicable, should be identified:

- Weaving;
- Merging;
- Transit operational conflicts
- Corner clearances;
- Sight distances;
- Vehicle-pedestrian conflicts;
- Traffic infiltration;
- Access conflicts;
- Cyclist movements;
- Heavy truck movement conflicts;
- Queuing

3.6.3 Traffic Collision Analysis

Where the development is adjacent to an area with identified problems, existing collision data (available from the Region) should be reviewed and an assessment of the impact of the proposed development provided. Such information may be helpful to minimize any additional problems through the design or location of access points.

3.7 Site Access and Circulation

Site access location and design shall be determined with respect to the operational analysis in conjunction with Halton Region's "Access Management Guidelines."

All site access points on Regional roads shall be evaluated in terms of capacity, safety and sight distance & adequacy of queue storage capacity. This evaluation shall be similar in scope to that for the signalized and unsignalized intersections described previously.

Proposed access points shall be evaluated with respect to existing access points and intersections, on-street weaving problems, need for acceleration or deceleration lanes and pedestrian and cycling safety. As development occurs within the Nodes and Corridors (reference Regional Right-of-Way Guidelines), especially those adjacent to future HOV/transit corridors networks; Halton Region will work with the local Municipality to ensure that there is proper integration between pedestrian walkways, cycling paths and transit routes and vehicular access to development. Halton Region will also support any Municipal initiatives to encourage and increase safety for pedestrians and cyclists. Additional studies to review active transportation strategies for development proposals within Node and Corridor areas may be required and will be done in consultation with the local Municipality.

On-site parking and circulation systems shall be evaluated to demonstrate appropriate clear throat distances and avoid any possible queuing onto the Regional roads.

Sight lines should be evaluated to ensure safe conditions in accordance with Halton Region's "Access Management Guidelines" and based on Decision Sight Distance as identified in Transportation Association of Canada – 1999 Geometric Design Guide for Canadian Roads (TAC Manual).

Proposed truck/courier loading facilities and access to these facilities shall be evaluated to ensure that they are adequately sized, designed and provided with suitable access so that they will not adversely affect traffic and transit operations on Regional roads.

Any required turning or other restrictions should be identified.

Generally, it is preferable to minimize the number of private site accesses to regional roads, in order to maintain the integrity of the arterial road network. Site access should be provided only to the local road network wherever possible. Benefits to the Regional road network should be demonstrated when an access is proposed. Any additional accesses above minimum shall be justified as described in Halton Region Access Management Guideline for Regional Roads.

3.8 Sight Distance Evaluation

At each proposed access and/or at each intersection where a new road is proposed, the sight distance requirements should be determined based on Decision Sight Distance and Turning Sight Distance as identified in Transportation Association of Canada – 1999 Geometric Design Guide for Canadian Roads (TAC Manual). The availability of sight distance shall be determined from actual field measurements. Additional information available can be found in Halton Region's "Access Management Guidelines."

3.9 Transportation System Mitigation Measures

This section outlines the process of identification of operational transportation system improvements and other measures required to ensure that acceptable operation of the transportation system is maintained. The improvements must incorporate recommendations and standards outlined in previous Regional transportation or corridor studies.

3.9.1 Required Roadway Improvements

The physical and operational road network deficiencies that have been identified in the Transportation Impact Study must be addressed and solutions provided that are feasible and economic to implement.

Functional design plans or detailed design drawings may be required for identified physical improvements to ensure their feasibility.

3.9.2 Required Traffic Signal Improvement

Any traffic signal operational deficiencies that have been identified in the Transportation Impact Study must be addressed and solutions provided that are feasible to implement. The design requirements for traffic signals are outlined in the "Design Information for Proposed Road and Traffic Signal Works on Region of Halton Roads."

3.9.3 Preliminary Cost Estimate

A preliminary cost estimate must be provided for all identified infrastructure improvements.

3.10 Recommendations

A summary of the key findings with respect to the transportation impact of the proposed development shall be presented along with a summary of the recommended improvements if necessary.

It is important to structure recommendations for improvements within appropriate time perspectives. Recommendations should be sensitive to the following issues:

- Timing of short-range and long-range network improvements that are already planned and scheduled;
- Anticipated time schedule of adjacent developments;
- Size and timing of individual phases of the proposed development;
- Logical sequencing of various improvements or segments;
- Right-of-way needs and availability of additional right-of-way within the appropriate time frames;

4.0 Documentation and Reporting

The structure and format of the Transportation Impact Study should follow the guidelines outlined in this document, as applicable. The following is a suggested study structure:

- Executive Summary
- Site/Development Description (Site plan if applicable);
- Study Area (Map identifying the study area and site);
- Existing Conditions (Exhibit required);
- Analysis Periods;
- Background Traffic Demand – Existing and Future Background (Exhibits required);
- Site Generated Traffic (Exhibits required);
- Level of Service Analysis;
- Total Traffic Demand – Future Background plus Site Generated Traffic (Exhibits required);
- Improvement Alternatives Required to Mitigate Traffic Impacts
- Traffic Impacts for Future Background and Total Traffic with and without mitigation measures (Tabular Summaries);
- Access Considerations; and
- Recommendations.

This format will facilitate review, discussion and communication. Relevant maps, graphs and tables should be placed adjacent to the relevant text.

The Transportation Impact Study should consist of a main document, supplemented by technical appendices containing detailed analyses as required. The Region reserves the right to request digital copies of the analysis.

Documentation in an appendix to the traffic impact study of all assumptions used in the analysis concerning lane configuration/use, pedestrian activity, saturation flows, traffic signal cycle length, phasing and timing, utilization of the inter-green phase and other relevant parameters. Existing signal timings should be used for existing intersections and signal timing modifications may be considered as a measure to address capacity or level of service deficiencies.

All information submitted to Regional staff in connection with any Transportation Impact Study will be considered to be in the public domain.

Two (2) copies of the “draft” and two (2) copies of the final Transportation Impact Study complete with supporting documentation should be submitted to Regional staff for review.

APPENDIX B

List of Documents Reviewed

B000609

List of Documents Reviewed

- Milton Logistics Hub, Environmental Impact Statement, prepared for Canadian National Railway Company by Stantec Consulting, December 7, 2015.
- Appendices to the Environmental Impact Statement
  - Appendix E.17, Review of Terminal-Generated Truck Traffic, BA Consulting Group Ltd. November 30, 2015
  - Appendix G Mitigation Measure and Commitments
- Milton Logistics Hub, Environmental Impact Statement, Summary of the Environmental Impact Statement, prepared for Canadian National Railway Company by Stantec Consulting, December 7, 2015.
- Guidelines for the Preparation of an Environmental Impact Statement, pursuant to the Canadian Environmental Assessment Act, 2012, Milton Logistics Hub Project, Canadian National Railway Company, Canadian Environmental Assessment Agency, July 2015.
- Milton Logistics Hub Project Environmental Assessment Requirements for Additional Information, CEAA, March 11, 2016
- Response to CEAA Request for Information, CN Rail, May 18, 2016
  - Attachment IR1 – Amended Concordance Table 1.2
  - Attachment IR2 – Amended E.I.S. Tables
  - Attachment IR5 – Conceptual Project Schedule
  - Attachment IR6 – Site Selection Alternatives Addendum
  - Attachment IR23 – Supplemental Mitigation Measures
- Response to CEAA Request for Information, CN Rail, Additional Information Request 2 Received – July 14 and July 28, 2016
  - Attachment IR13-2 – Cumulative Air Quality Effects Assessment

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Environmental Impact Statement
Milton Logistics Hub Project
Transportation & Municipal Finance

EllSo Consulting Inc.

March 10, 2017

www.ellsoconsulting.com

March 10, 2017

Curt Benson, MCIP RPP
Manager, Community Planning
Halton Region
1151 Bronte Road
Oakville, Ontario
L6M 3L1

Dear Mr. Benson,

Milton Logistics Hub Project
Environmental Impact Statement
Transportation & Municipal Finance

EllSo Consulting Inc. is pleased to submit this report presenting our examination of the Canadian Environmental Assessment Agency Guidelines for the Preparation of an Environmental Impact Statement regarding the Milton Logistics Hub Project dated July 2015, the Canadian National Railway Company Milton Logistics Hub Environmental Impact Statement dated December 7, 2015 and related technical appendices as it pertains to Transportation and Municipal Finance.

Sincerely,
EllSo Consulting Inc.

Alvaro L. Almuina, P.Eng., M.Eng., PMP, DCE
Director

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Acronyms

CEAA: Canadian Environmental Assessment Act

D-1-3: Ontario, Ministry of the Environment, "D-1-3 Land Use Compatibility: Definitions" (Ontario, Queen's Printer: July 1995), online: MOECC <https://www.ontario.ca/page/d-1-3-land-use-compatibility-definitions>

EA: Environmental Assessment

EIS: an "Environmental Impact Statement" that a proponent of a "designated project" under CEAA must prepare EIS Guidelines

ET#: A tracking number for Information Requests related to Employment Lands and Transportation

GP: Ontario, Ministry of Municipal Affairs and Housing, Growth Plan for the Greater Golden Horseshoe, 2006

PCE: Passenger Car Equivalent – a unit of measure to equate heavy vehicle traffic (trucks) with automobile traffic

PPS: Provincial Policy Statement, 2014

ROP: Halton Region's Official Plan, as amended by ROPA 38

TMP: Halton Region Transportation Master Plan 2031 – The Road to Change, October 2011

1. INTRODUCTION

1.1 Summary of Findings

The CN EIS did not undertake an assessment of the Municipal Finance and Transportation impacts on Halton Region in accordance with established Regional Standards.

CN needs to provide more data and analysis to determine the impacts of the proposed development on the Regional and Provincial roadway system and undertake a traffic impact study in accordance with the Region's Traffic Impact Study Guidelines.

1.2 Purpose and Scope of Review

EllSo Consulting Inc. (EllSo) examined the Canadian Environmental Assessment Agency ("CEAA") Guidelines for the Preparation of an Environmental Impact Statement regarding the Milton Logistics Hub Project dated July 2015 ("EIS Guidelines"), the Canadian National Railway Company ("CN") Milton Logistics Hub Environmental Impact Statement dated December 7, 2015 ("CN EIS") and related technical appendices as it pertains to Transportation and Municipal Finance.

EllSo has been asked to provide expert findings, opinions and conclusions regarding:

1) Review of the Halton Brief (including appendices);
2) Review:
    i. relevant aspects of the EIS submitted to CEAA by CN,
    ii. relevant comments of the Federal Agencies on the EIS, and
    iii. relevant aspects of the CN response to the Federal comments
3) Provide a written opinion and comments summarizing the review of the materials;
4) Identify any additional information required from CN to adequately assess the significance of adverse environmental effects; and,
5) Review CN's application to the Canadian Transport Agency.

1.3 Qualifications

The review was conducted by Alvaro L. Almuina, P.Eng. Alvaro Almuina:

- is a Professional Engineer, licensed to practice in the Province of Ontario;
- is a Designated Consulting Engineer by Professional Engineers Ontario (PEO);
- has a Bachelor of Applied Science and Engineering (Civil) degree from the University of Toronto;
- has a Master's of Engineering degree from the University of Toronto with a specialty in Transportation;

- has been providing transportation planning and engineering services for over 28 years in the areas of Strategic and Master Planning, Policy Development, Capital and Operations Programming, Economics and Finance (including Development Charges Technical Background Studies) and as an Expert Witness at the Ontario Municipal Board and Ontario Civil Court Proceedings on transportation matters; and,
- has been a consultant to the Regional Municipality of Halton (the "Region") for more than a decade. Amongst the services provided to the Region, I have been the primary author of the Region's last three Transportation Master Plans and the last four Transportation Development Charges Technical Background Studies.

2. ASSESSMENT OF CN EIS AND TECHNICAL APPENDICES ANALYSIS AND CONCLUSIONS

The review focused on two areas of analysis – Municipal Finance and Transportation Impact.

Municipal Finance
The review considered municipal finance in the context of transportation infrastructure, the costs associated with proposed public infrastructure and the allocation/cost sharing proposed by CN.

Transportation
CN proposes to introduce 800 truck trips per day to the regional road network, specifically along the Britannia Road and Tremaine Road corridors.

Trucks have considerably different size and performance characteristics than passenger cars. Trucks can have a significant impact on traffic operations. Signalized intersections are sensitive to the presence of commercial truck traffic. It is important account for this impact in the traffic operations analyses of proposed developments to define the operational performance of a roadway/network as accurately as possible.

2.1 Municipal Finance (Transportation Infrastructure)

There was no reference to the cost of the road infrastructure projects CN's proposed development requires, the source of the funding and cost allocation sharing of projects, within Halton Region's jurisdiction in any of the material reviewed, nor in the table of contents of the EIS.

The Official Plan Standards pertaining to municipal finance specific for transportation are defined in the Halton Region Transportation Development Charges Background Technical Report (1).

A review of the EIS showed no reference to cost or cost allocation for any Regional transportation infrastructure assumed or required for this development. Section 2.2.3.3 of the EIS does reference that CN would fund the costs for the proposed grade separation at Lower Baseline. There is no reference to cost or cost allocation for any other transportation infrastructure assumed for this development. The question was raised in the consultation process, as presented in Table 4.2 of the EIS – "What further road development/ improvements will be needed to accommodate the increased truck traffic?". CN's response was to refer to Chapter 8 and to Appendix E.17. However, these references did not provide answers to these questions.

There was no methodology and data to review with regards to municipal financing, as none was provided.

Overall, the EIS does not present an infrastructure, staging and costing plan for the proposed development. Accordingly, it was not possible to assess the Significance and Mitigation of Adverse Environmental Effects with regards to Municipal Finance as there was no assessment conducted.

Table 1 presents Information Requests with regards to Municipal Finance for transportation infrastructure.

Table 1 – Information Requests for Municipal Finance (Transportation)

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Transportation and Municipal Finance EIS Guidelines Part 1 s. 3.2, Part 2, s. 3.2.2, 6.1.10, 6.3.5 and 6.4 Halton Brief Table D.5 Halton Brief Table D.8 ROP sections 77(12) and 210(7)(d)	EIS section 2.2.3.3 and Table 4.2, Appendix E. 17	**ET#1 Details about Transportation Infrastructure to support the project** Please provide detailed information about the transportation infrastructure required to support CN's development, the cost to implement this infrastructure and the funding source, based on the undertaking of a transportation impact study in accordance with the Region's guidelines.	In accordance with the Region's Traffic Impact Study Guidelines, an analysis of the required road infrastructure to support a proposed development is to be analysed and associated costing to be identified. This was not undertaken by CN.
	EIS section 2.2.3.3 and Table 4.2, Appendix E. 17	**ET#2 Significance and Mitigation Effects on Municipal Finance.** Please provide an assessment of the significance and mitigation effects on Municipal Finance the CN development will have based on the undertaking of a transportation impact study in accordance with the Region's guidelines, considering Halton's Roads Capital Plan Budget and Development Charges By-Law.	To assess the financial impact on the required infrastructure, the costs of this infrastructure is to be compared against the existing financial plan per the Region's Roads Capital Plan.

2.2 Transportation

The traffic assessment was not undertaken in accordance with standard industry guidelines or in accordance with the Halton Region's Transportation Impact Study Guidelines (2).

Essential to the undertaking of a traffic assessment for the proposed development are:

- number of employees and transportation of employees;
- on-site logistics and traffic plan (on and off-loading rates, site capacity for trucks, anticipated daily volumes);
- anticipated daily, monthly and seasonal schedules for rail transport;
- anticipated quantities of transported materials by type; and
- number of employees, transportation of employees, work schedule, lodging requirement on site and off site.

The above data is specifically required by the EIS Guidelines (Part 2, sections 3.2.1, 3.2.2 and 6.4), but was not provided in the EIS or in relevant Appendices.

There were no standards referenced in Appendix E.17 as it pertained to Municipal Finance and Transportation. In Section 7.0 of Appendix E.17 (Discussion of The Impact of Terminal-Generated Heavy-Truck Traffic), pg. 23, 1st para, it is noted *"it is acknowledged that there are no stipulated or fixed criteria applicable to undertaking the assessment provided in this study. The criteria applied herein are entirely based on the traffic planning experience and judgement of the authors of the study."*

There are industry standards and Regional Guidelines for the assessment of transportation impact study. These standards and guidelines were not used by CN in Appendix E.17 or the EIS.

The Regional Official Plan Standards pertaining to transportation are defined in the Halton Region Transportation Master Plan (2031) – the Road to Change and the Region's Road Capital Projects. A review of the EIS regarding these standards was conducted.

Halton Region Transportation Master Plan ("TMP") (2031) – the Road to Change

There are many references throughout the EIS of the Halton Region Transportation Master Plan (TMP) (2031) (3).

The development proposed by the EIS was not fully considered in the Halton TMP. CN needs to clearly indicate how the TMP accounted for the proposed development and how the current Roads Capital Projects can accommodate CN's transportation needs.

Halton Region Roads Capital Projects

The Region prepares a Roads Capital Budget (4) to ensure funds are available to pay for the construction of future capital projects. The list of projects is reviewed and updated annually to reflect updated project timing. Major updates are also undertaken after the completion of Transportation Master Plans and during the completion of the Development Charges Transportation Technical Report.

There are many instances throughout the EIS and Appendix E.17 where the Region's data/document referenced was misinterpreted. For example, In Section 6.3.9 Socio-Economic Conditions (pg.152, 5th para) the EIS states:

> *The Halton TMP lays out capital road projects in the LAA, including the widening of Britannia Road, Tremaine Road and Regional Road 25. As part of the Regional Road Improvement Program, the following road improvements are scheduled to be completed by 2016:*
> - *widening of Britannia Road between Tremaine Road and Highway 407, with the creation of a grade separation at the CN rail crossing;*
> - *widening of Tremaine Road between Britannia Road and Campbellville Road, with a grade separation at the CP rail crossing; and,*
> - *widening of Regional Road 25 between Derry Road and Highway 407 (Halton Region n.d. b).*

The reference to the Region's capital improvement plan is not consistent with the current plan. CN needs to present the infrastructure needs in the context of CN's proposal, needed transportation capacity and its timing regarding construction and implementation.

CN has not provided a plan to demonstrate if the Region's Capital Plan improvements to 2021 will support CN's proposal.

Key Deficiencies in Report

An assessment of the full impact of traffic generation from the site and the effect of this site on the area roadway networks and intersections was not undertaken by CN in accordance with industry standards or in accordance with Halton Region guidelines for traffic impact studies.

Assumptions

Appendix E.17 made many assumptions. An overview of the assumptions and commentary is provided below:

- "CN has specified that the truck entrance/exit for the Terminal is planned to be located on Britannia Road at a location approximately 250 metres west of First Line at the base of the east slope of the new grade separation over the CN Rail line"
  - There is no supporting analysis by CN that this location conforms to geometric designs standards and that it would operate acceptably and safely.
- "It is anticipated that the Britannia Road intersection with the Terminal truck entrance will be signal controlled, and configured with an auxiliary westbound left turn lane and an eastbound right turn if required."
  - There is no supporting analysis by CN that this location conforms to geometric designs standards and that it would operate acceptably and safely.
- "It is further assumed that the traffic control at the driveway intersection will be operated in an optimal manner to permit sufficient capacity for movements in and out of the entrance and satisfactory traffic operations on Britannia Road."
  - The driveway operation was not assessed in the EIS.

- "Consideration will be given in subsequent work to identifying specific traffic engineering operational and design measures to ensure that trucks waiting to turn left from Britannia Road and the westbound approach to the Terminal driveway will not exceed the available capacity of the queue storage lane."
  - The EIS needs to include this analysis to provide an appropriate description of impacts and requirements in accordance with the terms of reference of the EIS.
- "Detailed design specifications for roads affected by the truck entrance requirements will be provided for the consideration of Halton Region and the Town at a later stage."
  - The EIS needs to include this analysis to provide an appropriate description of impacts and requirements in accordance with the terms of reference of the EIS.

Trip Generation

There is no basis for the derivation of the 800 truck per day trip generation other than that is the number provided to the transportation consultant by CN (based on the Brampton Yard experience). There is no indication if this is a peak condition, an average, an interim or an ultimate trip generation. The trip generation is not supported by any market analysis or business plan, as indicated in the EIS Guidelines.

In a typical traffic operational analysis, heavy trucks are "converted" to Passenger Car Equivalents (PCEs) as the analytical methods in traffic engineering are based on a "passenger car". For heavy trucks the conversion factor is in the range of 2.5 to 3.5 PCEs depending on the truck type (5).

CN has indicated (per Table 1 of Appendix E.17), that 99 trucks will be accessing/egressing the site during the peak PM Peak hour. "For the purpose of this assessment, and consistent with standard transportation impact study methods, the relative impact of the Terminal-generated heavy-truck traffic has been compared with morning and are peak hour traffic conditions when volumes of background traffic on the arterial road network are generally highest."

The forecasted PM Peak period site generation of 99 heavy trucks has a PCE of 297 (99 x 3.0[1]). CN did not conduct its analysis based on this PCE.

In addition to the heavy truck traffic, employee traffic would also be generated by the site. This trip generation was not analysed in the EIS. The employee traffic analysis would also contribute traffic to the same intersections to be used by the heavy trucks (thus having a cumulative effect).

Further, there is reference in the EIS to this development providing direct and indirect local jobs. Section 8.3.2 – Regional and Local Benefits, states: "The Project will create more than 1,000 opportunities for employment (including 130 direct jobs and indirect and induced effects) locally during operation." The trips generated by these indirect area jobs would generally be presented as part of the "Other Area Developments" per Chapter 3.4.2 of the Region's Transportation Impact Study Guideline (2) and would contribute to the overall trip generation to be analysed. CN did not provide an analysis of this type of traffic as required by the Region's guidelines.

[1] Assumed a PCE of 3.0; mid-point in the range of 2.5 to 3.5 provided per the Canadian Capacity Guide (5)

Trip Distribution

The proposed truck routes are not justified and the EIS did not undertake an analysis of interchange operations at the points where trucks would access/egress the 400 series highways. The comments from the Ministry of Transportation Ontario (MTO) on their expectations from the EIS are noted in their letter of February 6, 2017 (per CEAA website) in which they state:

> *"MTO is interested in the following:*
> - *The Operational and safety impacts of the intermodal terminal-generated traffic on any affected provincial highways/interchanges need to be assessed as part of the traffic analysis given that access to/from the proposed terminal will be by 400 series highways.*
> - *Traffic flows to and from the proposed intermodal facility.*
> - *Impacts to affected ramp terminals.*

Further, the EIS states in Section 2.2.2 Transportation Corridors (Truck Routes), that:

> *CN has further indicated that in order to reduce potential impact of project-generated truck traffic on the Town of Milton, it would direct trucks within their care and control (i.e., those operated by CNTL), to utilize Highway 407 when its use would be practical and feasible. According to CN, these trucks are estimated to constitute approximately 20% of the total project-generated truck trips.*

However, CN does not provide an explanation about how the non-CNTL[2] truck routes are going to be enforced or what the impact may be of these trucks, which represent 80% of the truck traffic from the terminal.

Analysis

A standard traffic impact assessment addresses the level of service (LOS) or volume to capacity ratio (v/c) at nearby or select intersections. This type of analysis was not conducted by CN.

The analysis presented by CN with regards to the impact of site traffic is insufficient. Table 8 of Appendix E.17, "Change Arising from The Addition of Terminal-Generated Heavy-Truck Traffic at Key Intersections Within the Planned Road Network with Forecast Year 2020 Background Traffic Volumes (PM Peak Hour)" presents the net change in heavy vehicles on various area intersections but only as a function of truck volume, not from the point of view of level of service (LOS) or volume to capacity ratio (v/c) as is typically undertaken in traffic impact assessments.

The table does not reflect the true change in truck traffic. For example, at the intersection of Britannia Road and Regional Road 25 (RR25) CN notes that the net change in the percentage of heavy vehicles because of the proposed development is 1.10%. However, based on CN's numbers, as presented in this table, the <u>truck only</u> change is 46% (162/111-1).

CN would need to properly assess intersection impact through standard traffic signal operations level of service methodology. Trucks have considerably different size and performance characteristics than passenger cars. Trucks can have a significant impact on traffic operations.

[2] CNTL is a CN subsidiary. CNTL handles container pickups and deliveries between CN intermodal terminals and customer locations. (www.cntl.com)

Conclusions & Recommendations

CN, without assessment to support its conclusions, noted:

"In both scenarios, on all sections of Britannia Road and Tremaine Road, including those that are anticipated to experience the considerable change, it is anticipated that reasonable and conventional measures can be implemented to mitigate the changes in roadway operating conditions resulting from the addition of Terminal-generated heavy-truck traffic. Such measures may include:

- Adjustment to traffic signal control timing and phasing plans;
- Provision of advisory and/or regulatory signage;
- Adjustments to the lengths of let tum lanes for added vehicular queue storage length;
- Addition of auxiliary right tum lanes or let tum lanes; and
- Provisions to accommodate and address the safety of pedestrians and cyclists"

CN notes that "Consideration was given to meaningfully characterize the impact of Terminal-generated heavy-truck traffic on the road system in the vicinity of the Terminal. Again, it is acknowledged that there are no stipulated or fixed criteria applicable to undertaking the assessment provided in this study. The criteria applied herein are entirely based on the traffic planning experience and judgement of the authors of the study."

There is an industry acceptable methodology for undertaking traffic impact studies as published on the Region's website and widely accepted in the industry.

The EIS and supporting documentation do not provide the sufficient analysis to conclude on significant impact and mitigation of adverse effects.

Table 2 presents Information Requests with regards to Transportation analysis for the project.

Table 2 – Information Requests – Transportation Analysis

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale

Traffic Assessment
EIS Guidelines Part 2, s. 3.2, 3.2.2, 6.1.10, and 6.3.5
Halton Brief Table D.5
 	
(ROP Sections 173(1.1) and 173(22))
	Appendix E. 17	**ET#3 Complete Traffic Assessment.**
		Please complete the following:
		• undertake a traffic assessment, for the proposed development, in accordance with Halton Region's Transportation Impact Study Guidelines (2).
		• address the following in its methodology:
		  ◦ Non-CN Truck operations. How are Non-CN trucks going to be controlled to follow the operations plan and routing requirements established by CN for its trucks
		  ◦ Traffic control and traffic improvements in specific terms
		  ◦ Preliminary design to present the proposed measures required to support the proposed development
			Professional judgement was used in lieu of available guidelines.
			
			The EIS did not follow the Region's Guidelines for the undertaking of a Traffic Impact Study and there was insufficient analysis conducted to conclude whether there are significant impacts.
			
			A traffic impact study needs to be undertaken in accordance with the Region's Traffic Impact Study Guidelines to define the traffic impacts of the proposed development.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Data	Final EIS Guidelines 3.2 Project Activities, pg. 15 5th para The EIS will include a schedule including time of year, frequency, and duration for all project activities.	**ET#4 Provide a Schedule for all project activities** Please provide, per the EIS Guidelines: • Number of employees and transportation of employees • On site logistics and traffic plan (on and off loading rates, site capacity for trucks, anticipated daily volumes) • Anticipated daily, monthly and seasonal schedules for rail transport • Anticipated quantifies of transported materials by type • Number of employees, transportation of employees, work schedule, lodging requirement on site and off site	This information is fundamental to the undertaking of a traffic impact study. The material reviewed did not have schedules for key traffic impact study data, essential for analysis including: – anticipated daily, monthly and seasonal schedules for rail transport; – anticipated quantities of transported materials by type; – number of employees, transportation of employees, work schedule, lodging requirement on site and off site – number of employees and transportation of employees;

3. ASSESSMENT OF STANDARDS

EllSo was asked to list any technical information, within its area of expertise that is necessary to apply the standards in the Halton Brief. Table 3 presents the municipal standards from the Halton Brief. Commentary is limited to the second, third and fourth columns of the table.

The methodology and results of the analysis are insufficient to determine the impacts of the proposed development. CN provided no technical support to the various measures it proposes to validate that these measures will in fact mitigate the traffic impact.

Table 3 – Municipal Standards from the Halton Brief

Municipal Standard	Information required to apply the standard	Does CN propose mitigation relevant to this standard?	Does CN propose any follow-up relevant to this standard?
Major Transportation Facilities To adopt a functional plan of *major* transportation *facilities*[3] for the purpose of meeting travel demands for year 2021 as well as protecting key components of the future *transportation system*[4] to meet travel demands beyond year 2021 (ROP Reference 173(1)) Halton Brief, Table D.5 Halton Brief, App. B, Part C.3.1 Halton Brief, App. A, fig 23: Major Transportation Facilities	A traffic assessment for the proposed development completed in accordance with the Transportation Impact Study Guidelines. **(ET3)** Provide a Schedule for all project activities. **(ET4)**	Yes. However, professional judgement was used in lieu of available guidelines. The EIS did not follow the Region's Guidelines for the undertaking of a Traffic Impact Study and there was insufficient analysis conducted to conclude whether there are significant impacts.	No

[3] **Major facilities (PPS):** Facilities which may require separation from sensitive land uses, including but not limited to airports, transportation infrastructure and corridors, rail facilities, marine facilities, sewage treatment facilities, waste management systems, oil and gas pipelines, industries, energy generation facilities and transmission systems, and resource extraction activities. **Major goods movement facilities and corridors (PPS):** Transportation facilities and corridors associated with the inter- and intra-provincial movement of goods. Examples include: intermodal facilities, ports, airports, rail facilities, truck terminals, freight corridors, freight facilities, and haul routes and primary transportation corridors used for the movement of goods. Approaches that are freight-supportive may be recommended in guidelines development by the Province or based on municipal approaches that achieve the same objectives.

[4] **Transportation system (GP):** A system consisting of corridors and rights-of-way for the movement of people and goods, and associated transportation facilities including transit stops and stations, cycle lanes, bus lanes, high occupancy vehicle lanes, rail facilities, park-and-ride lots, service centres, rest stops, vehicle inspection stations, inter-modal terminals, harbours, and associated facilities such as storage and maintenance (Provincial Policy Statement, 2005).

Municipal Standard	Information required to apply the standard	Does CN propose mitigation relevant to this standard?	Does CN propose any follow-up relevant to this standard?
Planned Transportation Corridors To plan for and protect *planned corridors*[5] and rights-of-way for transportation and transport *facilities*[6] to meet current and projected needs (ROP Reference 173(1.1)) Halton Brief, Table D.5 Halton Brief, App. B, Part C.3.2	A traffic assessment for the proposed development completed in accordance with the Transportation Impact Study Guidelines. **ET3** Provide a Schedule for all project activities. **ET4**	No	No

[5] **Planned corridors (ROP):** Corridors identified through Provincial Plans, this Plan, or preferred alignment(s) determined through the Environmental Assessment Act process which are required to meet projected needs.
[6] **Facility (D-1-3):** A transportation, commercial, industrial, agricultural, intensive recreational or utilities/services building or structure and/or associated lands (e.g. abattoir, airport, railway, manufacturing plant, generation stations, sports/concerts stadium, etc.) which produce(s) one or more 'adverse effect(s)' on a neighbouring property or properties. For specific details on some of these facilities, see Procedure D-1-2.

Municipal Standard	Information required to apply the standard	Does CN propose mitigation relevant to this standard?	Does CN propose any follow-up relevant to this standard?
Municipal Finances Ensure that the *development*[7] *industry*[8] absorbs the cost of providing services to new development or *redevelopment*[9] and that any financial impact be based on a financing plan (ROP Reference 210(6)) Halton Brief, Table D.8 Halton Brief, App. B, Part F.3.5	A traffic assessment for the proposed development completed in accordance with the Transportation Impact Study Guidelines. **ET3** An assessment of the Significance and Mitigation Effects on Municipal Finance. **ET2**	No	No

[7] **Development (ROP):** The creation of a new lot, a change in land use, or the construction of buildings and structure, any of which requires approval under the Planning Act, or that are subject to the Environmental Assessment Act, but does not include: 226(1) activities that create or maintain infrastructure authorized under an environmental assessment process, 226(2) works subject to the Drainage Act, or 226(3) within the Greenbelt Plan Area, the carrying out of agricultural practices on land that was being used for agricultural uses on the date the Greenbelt Plan 2005 came into effect.
Development (PPS): The creation of a new lot, a change in land use, or the construction of buildings and structures requiring approval under the Planning Act, but does not include: a) activities that create or maintain infrastructure authorized under an environmental assessment process; b) works subject to the Drainage Act; or c) for the purposes of policy 2.1.4(a), underground or surface mining of minerals or advanced exploration on mining lands in significant areas of mineral potential in Ecoregion SE, where advanced exploration has the same meaning as under the Mining Act. Instead, those matters shall be subject to policy 2.1.5(a)
[8] **Industry, Industrial Land Use or Industrial Facility (D-1-3):** A facility or activity relating to: the assemblage and storage of substances/goods/raw materials; their processing and manufacturing; and/or the packaging and shipping of finished products.
[9] **Redevelopment (PPS):** The creation of new units, uses or lots on previously developed land in existing communities, including brownfield sites.

4. OTHER STANDARDS

4.1 Transportation Impact Study Guidelines, Halton Region (January 2015)

In addition to the Standards presented in the Halton Brief, and the many requirements under the Official Plan, Halton Region has a set of traffic impact study guidelines (1) prepared *“in order to streamline the approval process and provide a standardized framework for consultants to follow when submitting traffic/ transportation studies for review and should be complemented with appropriate transportation engineering judgement.”*

The guidelines generally require that the analysis of a proposed development consider and address the following:

“Transportation Impact Study Outline”[10]

3.1 Description of the Development Proposal and the Study Area
3.1.1 Description of the Development or Redevelopment Proposal
3.1.2 Study Area

3.2 Horizon Year and Time Periods for Analysis
3.2.1 Horizon Year
3.2.2 Peak Periods

3.3 Existing Traffic Conditions

3.4 Background Traffic Growth
3.4.1 Background Traffic
3.4.2 Other Area Developments
3.4.3 Transportation Network Improvements
3.4.4 Transit Considerations

3.5 Estimation of Travel Demand.
3.5.1 Trip Generation
3.5.2 Trip Distribution
3.5.3 Trip Assignments
3.5.4 Summary of Traffic Demand Estimates

3.6 Evaluation of Impacts of Site Generated Traffic
3.6.1 Capacity Analysis at Intersections
3.6.2 Safety Analysis
3.6.3 Traffic Collision Analysis

3.7 Sight Access and Circulation

3.8 Sight Distance Evaluation

3.9 Transportation System Mitigation Measures
3.9.1 Required Roadway Improvements
3.9.2 Required Traffic Signal Improvements
3.9.3 Preliminary Cost Estimate

3.10 Recommendations

None of these sections of the guideline are appropriately addressed by CN in the EIS.

[10] The chapter numbers refer to the section in the Transportation Impact Study Guidelines, Halton Region (January 2015)

5. CONCLUSIONS

The purpose of the review was to assess whether the conclusions of the EIS could be supported given what is presented in terms of the data, methodology and analyses.

Based on the review conducted, the conclusions of the EIS with regards to Municipal Finance and Transportation cannot be supported. Additional data and analysis is required.

Therefore, the EIS does not meet the requirements of the EIS Guidelines, the Halton Brief and Halton Region related Standards.

REFERENCES

1. 2017 Transportation Development Charges Technical Report (Halton Region), September 2016
2. Transportation Impact Study Guidelines (Halton Region), January 2015 - Regional website under "Halton Region » Living in Halton » Roads & Transportation » Development Impacts"
3. Halton Region Transportation Master Plan 2031 – The Road to Change, October 2011 - Regional website under "Halton Region » Planning & Sustainability » Environmental Assessments (EAs) » EA Studies » Transportation Master Plan"
4. Roads Capital Project Map (2016 - 2031) (Halton Region) - Regional website under Halton Region » Planning & Sustainability » Demographics & Maps » Maps » Capital Project Maps
5. Canadian Capacity Guide for Signalized Intersections, 2008; Table 3.2

APPENDIX A: LIST OF DOCUMENTS REVIEWED

To fulfil the scope of the assignment, EllSo reviewed the following information:

- Cover Letter from CN (December 7, 2015)
- Environmental Impact Statement Summary
- Environmental Impact Statement (EIS)
- Appendix A (Final EIS Guidelines)
- Appendix B (Figures)
- Appendix C (Renderings)
- Appendix G - Mitigation Measures and Commitments
- Appendix E.17 - Milton Logistics Hub Technical Data Report – Terminal-generated Truck Traffic - BA Group
- CEAA Additional Information Requirements (March 15, 2016)
- CN Response to CEAA on Information Requirements (May 18, 2016)

A review was also conducted of the Halton Brief in the context of Halton's requirements for development and future growth and how these were addressed in the EIS.

The Canadian Transport Agency application by CN pursuant to subsection 98(2) was reviewed as well.

Milton CN Intermodal Logistics Hub Development Project
Review of Environmental Impact Statement (EIS)
and Supporting Documents

Impacts of Outdoor Lighting

Submitted to:
Region of Halton

Prepared by:
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March 9, 2017

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1. INTRODUCTION

1.1 Summary of Findings

Dark Sky Partners, LLC ("DSP") has reviewed the Environmental Impact Assessment provided by CN in support of the proposed Milton Logistics Hub and associated documentation (the "EIS") and MILTON LOGISTICS HUB - Technical Data Report Light (Appendix E.8) (the "CN Light Report")[1] which provides an assessment of the environmental impacts of the nighttime lighting due to the proposed CN Milton Logistics Hub (the Project).

The CN Light Report provides a first step toward a comprehensive evaluation of the Project's lighting impact on the local environment, however more evaluation is required. Accordingly, we recommend 12 information requests in the report below that we suggest be made to CN in respect of its work on light impacts.

Purpose of Review and Scope of Report

Dark Sky Partners, LLC was retained by the Regional Municipality of Halton, the Corporation of the City of Burlington, the Corporation of the Town of Halton Hills, the Corporation of the Town of Milton and the Corporation of the Town of Oakville (collectively, the "Halton Municipalities") to conduct a review of the EIS to determine whether the project meets the requirements of the EIS Guidelines dated July 2015, as well as the standards set out in the Halton Brief. As directed by the Joint Panel, we have considered sufficiency in the context of whether adequate information has been provided to allow a proper assessment of the technical validity of the information, methods, analysis, and conclusions regarding the significance of any environmental effects, mitigation, and proposed follow-up programs.

Expert Qualifications

Donald R. Davis has a Ph.D. in Physics and over 25 years' experience in the field of dark sky preservation. He is the Past President of the International Dark-Sky Association and a former Chair of the City of Tucson/Pima County Outdoor Lighting Code Committee. He is the author or co-author of over 100 publications in the refereed literature including many in the field of the impacts of nighttime outdoor lighting. He is a co-founder of Dark Sky Partners LLC and is the Managing Partner of that organization.

Christian B. Luginbuhl has a B.S. in Physics and over 30 years' experience in the field of light pollution assessment and mitigation. He is the author or co-author of over 60 publications in the refereed literature including many in the field of the impacts of nighttime outdoor lighting. He is a co-founder of Dark Sky Partners LLC.

1.2 Documents Reviewed

Please see Appendix **A** for a list of the documents we reviewed in preparing this report.

[1] Note: all references in this review preceded by § refer to sections within the document MILTON LOGISTICS HUB – Technical Data Report Light (Appendix E.8) ("CN Light Report").

2. ASSESSMENT OF CN EIS AND TECHNICAL APPENDICES ANALYSIS AND CONCLUSIONS

2.1 Review of Methodology, Data Used, Standard Reference, Results and Conclusions regarding Significance and Mitigation of Adverse Environmental Effects

This section discusses and summarizes principal deficiencies in the CN Light Report and includes requests for additional information.

In the CN Light Report, three areas of potential impact were assessed: light trespass, glare and sky glow and criteria were identified to establish acceptable levels for the first two parameters. Current levels of these quantities were then measured at selected locations and times in order to provide a baseline against which to judge future impacts due to the Project. Calculations were next carried out based on the Project's proposed lighting plan to determine the impact of the lighting on the surrounding environment.

a) Selection of the Area to Be Assessed for Potential Impact:

Setting the Local Assessment Area ("LAA") boundary at 1 km distance from the Project Development Area ("PDA") boundary is not justified quantitatively in relation to environmental impact, consistent with the CEAA guidelines. An assessment of quantitative lighting impacts (such as line-of-sight light fixture visibility or predicted glare level or sky glow impact, or all three) should underlie the determination of the LAA and Regional Assessment Area ("RAA").

DSP suggests that a quantitative estimation of total all-sky or zenith sky glow increase of 10% above current (measured) conditions, arising from Project lighting, be used to set the LAA, and that the RAA be extended to all areas from which the proposed Project lighting fixtures could be directly visible.

The following information is required in order to assess the impact of project lighting:

Information Requests:

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Selection of Assessment Area: LAA and RAA Boundaries EIS Guidelines, s. 6.1.1, 6.2.1 Halton Brief, Table D.7, Night-Time Light on Residential Receptors	EIS Appendix E.8. Lighting Report, Section 3.2	**RL.1** **Re-evaluate LAA and RAA Boundaries** Please provide a re-evaluation of LAA and RAA boundaries based on estimations of the geographical extent of significant lighting impacts. We suggest a quantitative estimation of total all-sky or zenith sky glow increase of 10% above current (measured) conditions, arising from Project lighting, be used to set the LAA, and that the RAA be extended to all areas from which the proposed Project lighting fixtures could be directly visible.	Definition of LAA and RAA at 1 km beyond PDA is arbitrary and not based on lighting impacts. An assessment of quantitative lighting impacts (such as line-of-sight light fixture visibility or predicted glare level or sky glow impact, or all three) should underlie the determination of the LAA and RAA.

b) Selection of Criteria to Measure Project Impact

There have been no legally binding criteria, thresholds or standards widely established for assessing or limiting the impact of outdoor lighting impacts. The International Commission on Illumination (“CIE”), and other organizations such as the International Dark-Sky Association (“IDA”), note three principal aspects of outdoor lighting that can be used to gauge "obtrusive" or "off-site" impacts: light trespass, glare, and sky glow. These are appropriate for the analysis of Project lighting impacts, and have been employed in the CN Light Report (§4.1.3). The CIE, in Technical Report 150:2003, suggests recommended limits to the first two of these (light trespass and glare): CN’s analysis has partially employed these measures.

Regarding the basis of its recommendations, CIE Technical Report 150:2003 (pg. 8) notes:

> *The limiting values recommended for the control of obtrusive effects have been developed taking account of the following:*
> a) *the level of brightness existing in the area;*
> b) *the times that the proposed lighting is to operate;*

c) the type of lighting technology available to light the activity; and

d) the use of readily available and easily understood technical data on the lighting installations that can easily be verified the design and assessment stages.

Thus, while the CIE provides "recommended limits" for light trespass and glare (there are no recommended limits for sky glow), it is important to note that these 1) are not based on a quantitative understanding of aesthetic, biological, health or other effects of the lighting; 2) are influenced by the "level of brightness in the area" (not necessarily characterized by sky glow brightness), and 3) are based on the capabilities of lighting technologies available in 2003.

The implications of this for evaluating Project impacts are:

1) Other reference values should be considered when assessing the levels of impact. An important reference value is the current condition. Thus, beyond noting that all light trespass levels are below the maximum CIE E3 recommendation of 2 lux[2] (or 1 lux, see below), it should be noted that the impacts represent a dramatic increase above the current values.

2) The most appropriate CIE recommendations should be those appropriate to currently existing local conditions in the Project area, which DSP feels are more accurately considered as "Rural" (E2).

---

[2] 1 lux = 1 lumen per square meter

Information Requests:

Topic	Reference to CN EIS, EIS Guidelines and Information Responses	Requested Information	Rationale
Assessment of Light Trespass and Glare EIS Guidelines, s. 6.1.1, 6.2.1 Halton Brief, Table D.7, Night-Time Light on Residential Receptors	EIS Appendix E.8. Lighting Report, Section 4.1	**RL.2 Characterization of Project Area** Please expand rationale and assessment to include assessment of impacts relative to CIE E2, in addition to E3 assessment already performed	Though the region is affected by significant sky glow arising primarily from distant light sources in the Toronto region, the local environment near the Project is much darker than would be indicated by the "suburban" "medium district brightness" classification, and if continued to be developed for residential uses can be expected to stay so. The Project area may more appropriately be characterized as "rural" and "low district brightness," or CIE E2.

3) Lighting technologies have dramatically changed since 2003, and what is possible and practical in light pollution mitigation today should not be limited by lighting technologies available in 2003.
Regarding the most appropriate CIE environmental zone, the CN Light Report uses sky glow measurements along with descriptions of the environment used by CIE and Berry to assign the CIE "suburban" and "medium district brightness" environmental zone (E3) to the Project area. The CIE identifies recommended limits for light trespass (2 lux) and glare (1000 candela[3]) for this zone.

DSP believes that, considering all aspects of the lighting environment in the LAA, as well as expected characteristics under future (residential) development, that the Project area would be more appropriately characterized as "rural" and "low district brightness," or CIE E2. Though the region is affected by significant sky glow arising primarily from distant light sources in the Toronto region, the local environment near the Project is much darker than would be indicated by the "suburban" "medium district brightness" classification, and if continued to be developed for residential uses can be expected to stay so. We note that CIE does not propose a quantified relation between sky glow measurements

[3] 1 candela (cd) = 1 lumen per steradian

and environmental zone classification. Thus, a more comprehensive assessment of "district brightness" is needed.

The consequences of utilizing CIE E2 versus E3 recommended limits will not affect the light trespass analysis, since all predicted light trespass levels fall substantially below both recommended limits. It can be expected however that the differing glare recommended limits will have some consequence when the needed glare evaluations are performed (see below).

c) Adequacy of Field Survey Data Characterizing the Current Lighting Environment

The characterization of current lighting conditions is inadequate for all measures of impact.

- Light Trespass: The light meter used is insufficiently sensitive to detect low illumination levels that may be significant, particularly after the Project lighting is constructed.
  The CIE recommended glare limit for E3 is 1000 cd (500 cd in E2) per luminaire; this luminous intensity will produce an illuminance at 500m distance of 0.004 lux. Though the Extech EA33 meter will show this as 0.00 lux, a single source at this brightness and distance will illuminate surfaces more brightly than a quarter moon, and appear 40 times brighter than the planet Venus at its brightest. DSP estimates that the proposed high-mast fixtures may exceed 1000 cd when viewed from off-site; there are 300 such fixtures shown in Appendix C of the CN Light Report.
- Glare: The photographs (§5.1.1) show glare sources, but provide no measures.
- Sky Glow: Measures are reported from eight sites for only one sky position (that is not adequately described). The meter employed for these measurements, the Unihedron Sky Quality Meter with lens ("SQM-L"), while sufficiently sensitive to measure the low brightness of the night sky, has a field of view characterized by a "full width to half maximum sensitivity" (FWHM) of 20°. It remains significantly sensitive however to much larger angles, making it important to ascertain that no glare sources exist even to angles as large as 60° to 80° from the pointing direction. We presume that the reported measures are with the meter pointed toward the zenith (though this is not stated in the report), but the meter pointing direction and presence of nearby glare sources is not described. Nonetheless, sky glow conditions and predictions for other parts of the sky are important. Early measures by Berry in the Toronto region (the same paper referenced in the CN Light Report) show the significant variation in sky brightness:

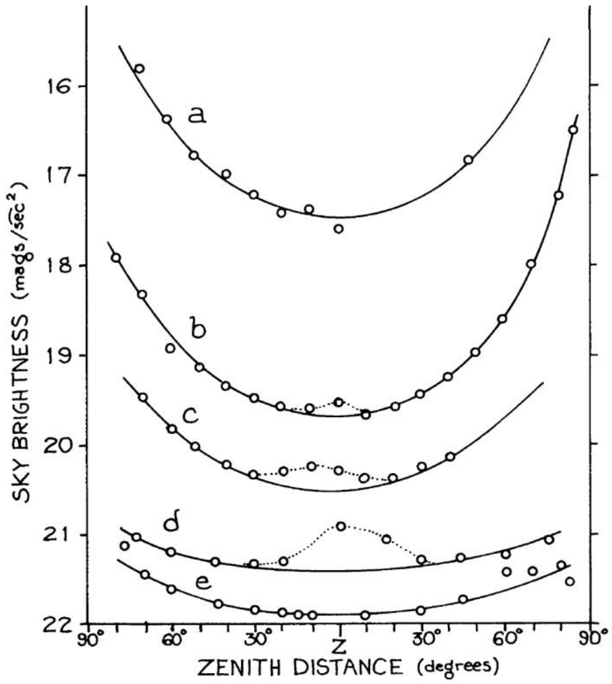
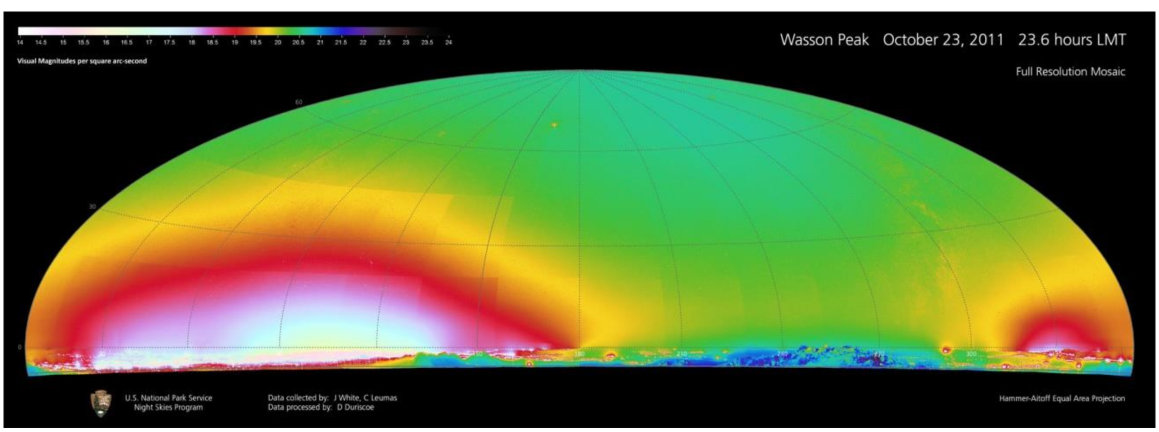


Fig. 2—Horizon-zenith-horizon scans, on the meridian, of five night skies: a) downtown Toronto, March 20, 1975; b) Palermo, Ontario, September 16, 1974; c) Lynden, Ontario, September 14, 1974; d) Cyprus Lake Provincial Park, September 6, 1975; e) Junipero-Serra Peak, California, from Walker (1973).

These measures were made along a great circle crossing the sky from horizon to horizon, passing through the zenith. Particularly in regions like that under consideration here (cf. profile b), the contribution of artificial lighting to the sky glow is dramatically greater toward the horizon. All-sky panoramic measures made with modern instrumentation show the effect even more dramatically, as shown by this map made by the US National Park Service near Tucson Arizona:



The impacts of the Project lighting can be expected to be much more significant away from the zenith in the direction toward the Project. The SQM-L meter is not suitable for measuring sky glow away from the zenith, as its large field of view means that it will begin to include portions of the landscape in the measurement which will bias the measures low. Any directly visible (glare) sources will also contaminate the measures.

Finally, sky glow arising from artificial sources is known to vary not only seasonally (as noted in the CN Light Report), but also by time of night. Studies have shown that variations of as much as 30% or more are observed. It is therefore important that time of night information be included with the measures in the CN Light Report.

The following information is required in order to assess the impact of the project lighting:

Information Requests:

Topic	Reference to CN EIS, EIS Guidelines and Information Responses	Requested Information	Rationale
Sky Glow Levels EIS Guidelines, s. 6.1.1, 6.2.1 Halton Brief, Table D.7, Night-Time Light on Residential Receptors	EIS Appendix E.8, Lighting Report, Section 4.2.1	**RL.3** **Assessment of Baseline Sky Glow over Entire Sky** Please execute measures documenting sky brightness of the whole sky, from zenith to horizon.	The Unihedron Sky Quality Meter with lens ("SQM-L") is not adequate for total sky assessment. An evaluation of the entire night sky is needed to determine current sky glow levels, not just measurements in a limited portion of the sky.
Glare Sources EIS Guidelines, s. 6.1.1, 6.2.1 Halton Brief, Table D.7, Night-Time Light on Residential Receptors	CN EIS, s. 4.2.1	**RL.4** **Measure Current Glare Conditions** Please document pertinent camera exposure/sensitivity information for photographs; employ High Dynamic Range (HDR) techniques to quantify current glare conditions.	Though photographs are qualitatively useful to document baseline, specific exposure/sensitivity information must be recorded, as well as potentially High Dynamic Range (HDR) techniques employed to quantify glare.

Topic	Reference to CN EIS, EIS Guidelines and Information Responses	Requested Information	Rationale
Light Trespass (Illuminance) EIS Guidelines, s. 6.1.1, 6.2.1 Halton Brief, Table D.7, Night-Time Light on Residential Receptors	CN EIS, s. 5.1.1	**RL.5** **Use All-Sky Brightness Measures To Evaluate Baseline Light Trespass.** Please measure horizontal illuminance (light trespass) through all-sky sky brightness measurements. The measurements requested under IR.6 will provide these data.	Measurement of 0.00 lux is not the same as "no incident light is shining within the area." The meter employed is insufficiently sensitive to measure the impacts, having been designed for use in different circumstances.

d) Assessment of the Project Lighting Plan

Details of the project lighting plan (overall site lighting design criteria; fixture photometric characteristics; fixture spectral characteristics; mounting geometry; etc.) should be examined to assess potential for specification changes that can reduce impacts while still meeting design criteria. For example, narrower photometric lighting distributions of the high-mast lighting may provide needed illumination while reducing impacts in the region. Further, the potential for headlights from truck operations during evening or night hours to cause off-site glare and light trespass must be assessed.

Information Requests:

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Design Criteria and Lighting Plans EIS Guidelines, s. 6.1.1, 6.2.1 Halton Brief, Table D.7, Night-Time Light on Residential Receptors	EIS Appendix E.8. Lighting Report, Section 4.4 Predictive Modeling	**RL.6** **Design Criteria and Lighting Plans** Please provide design criteria and lighting plan details including position coordinates of each individual fixture, lamp type, and manufacturer cut sheets, needed to evaluate the proposed lighting from the perspective of environmental protection. Vehicular movement patterns must be evaluated to assess potential off-site impacts of headlights.	This information is needed to assess the impact of the project lighting on future light trespass, glare and sky glow, and the potential to mitigate these impacts through changes in the lighting design.
Roadway Lighting EIS Guidelines Halton Brief, Table D.7, Night-Time Light on Residential Receptors	EIS Appendix E.8. Lighting Report, Section 3.2 Local Assessment Area	**RL.7** **Design Criteria for Roadway Lighting** Please provide design criteria for roadway lighting in the Region Official Plan and the locations of planned future lighting.	This information is needed to assess the impact of the Project lighting on future sky glow, and potential changes to the reference (background) condition.

e) Adequacy of the Predictive Assessment of Project Impacts

- Sky Glow: There is no quantitative assessment of the magnitude of the sky glow increase due to Project lighting.
- Glare: There is no quantitative prediction of glare resulting from Project lighting.
- Light Trespass: The trespass assessment is insufficient.
  The predictive light trespass assessment should include reflections from ground surfaces within the Project, as well as contributions from line-of-sight emissions from the luminaires, and must be executed with instrumentation capable of detecting light trespass levels below 0.005 lux.

The following information is required in order to assess the impact of project lighting:

Information Requests:

Topic	Reference to CN EIS, EIS Guidelines and Information Responses	Requested Information	Rationale
Sky Glow EIS Guidelines, s. 6.1.1, 6.2.1 Halton Brief, Table D.7, Night-Time Light on Residential Receptors	CN EIS, s. 5.2.2	**RL.8 Future Sky Glow Assessment** Please include at a minimum: change to sky glow over entire sky from Project lighting. This assessment should include ground reflection (both summer and winter conditions) together with the berm mitigation.	Assessment is missing. Assessment should include at a minimum: change to sky glow over entire sky from Project lighting.
Glare EIS Guidelines, s. 6.1.1, 6.2.1 Halton Brief, Table D.7, Night-Time Light on Residential Receptors	EIS, s. 4.1.4.1	**RL.9 Future Glare Assessment** Please provide an assessment of the predicted future glare resulting from Project lighting. This assessment should include number and brightness of directly visible light sources due to Project lighting, ground reflectance (both summer and winter conditions) together with the berm mitigation.	A glare assessment is a required in order to understand potential impacts.

Topic	Reference to CN EIS, EIS Guidelines and Information Responses	Requested Information	Rationale
Predicted Trespass (Illuminance) EIS Guidelines, s. 6.1.1, 6.2.1 Halton Brief, Table D.7, Night-Time Light on Residential Receptors	CN EIS, s. 5.2.1	**RL.10** **Predicted Light Trespass** Please compare predicted illuminance to existing condition as well as CIE maximum. This assessment should include ground reflectance (both summer and winter conditions) together with the berm mitigation.	Predicted light trespass is compared only to CIE maximum recommended limits.
Sky Glow EIS Guidelines, s. 6.1.1, 6.2.1 Halton Brief, Table D.7, Night-Time Light on Residential Receptors	EIS, s. 4.1.4.1	**RL.11 Spectral Impacts on Sky Glow** Please assess sky glow brightness arising from proposed Project lighting using both photopic and scotopic metrics.	Low levels of illumination and sky glow indicate an assessment of human scotopic impacts should be assessed. All measures/predictions in the current analysis have used only standard luminance/illuminance (i.e. photopic) responses.

f) Mitigation

The CN proposed mitigation is vaguely described and not quantified.

Information Requests:

Topic	Reference to CN EIS, EIS Guidelines and Information Responses	Requested Information	Rationale
Mitigation EIS Guidelines, s.6.4 Halton Brief, Table D.7, Night-Time Light on Residential Receptors	EIS, s.6.4	**RL.12** **Mitigation Strategies** Please provide quantitatively assessed mitigation strategies for the Project lighting plan.	Mitigation strategies are not quantitatively assessed. The proposed Project lighting plan should be reviewed to minimize environmental impact consistent with the lighting design criteria. The effectiveness of berms should be explicitly evaluated.

3. CONCLUSIONS

The EIS Appendix E.8 Light Report contains a number of deficiencies that preclude a quantitative assessment of the effects of the outdoor lighting for the proposed CN Project on light trespass, glare and sky glow. The most significant of these are:

1) the boundaries of the LAA and RAA are arbitrarily set, and not based on any quantitative assessment of realistic impacts;
2) there is no or insufficient quantitative assessment of the existing or glare or sky glow baseline condition – the photographic documentation and the SQM-L measurements are inadequately documented, and the wide-field nature of the SQM-L precludes accurate assessment over the entire sky – a quantitative all-sky assessment using modern instrumentation is needed;
3) there is no quantitative assessment of the predicted future glare or sky glow impact;
4) assessment criteria for light trespass and glare are based upon old technology and were devised before modern lighting technologies, including the LED fixtures proposed for this project, became available;
5) mitigation strategies suggested (lighting equipment specification and berms) must be quantitatively assessed for their ability to reduce impacts; and
6) an assertion in the CN Light Report that impacts from future roadway lighting in the region will greatly exceed the expected impacts from Project lighting is not substantiated – quantitative impacts from future roadway lighting in the area should be included in the assessment.

We request that the Joint Panel ask CN to remedy the sufficiency issues we have identified in this report by providing the requested information.

Signed this 9th day of March, 2017

Donald R. Davis

Donald Davis, Dark Sky Partners, LLC

Signed this 9th day of March, 2017

CHRISTIAN B. LUGINBUHL

Christian Luginbuhl, Dark Sky Partners, LLC

APPENDIX A – DOCUMENTS REVIEWED

1) Canadian Environmental Assessment Act 2012

2) Guidelines for the Preparation of an Environmental Impact Statement, July 2015

3) The Halton Brief

4) The CN EIS (including the cover letter from CN dated December 7, 2015, the summary and the report); and, technical appendices:
    a) Appendix A (Final EIS Guidelines)
    b) Appendix B (Figures)
    c) Appendix C (Renderings)
    d) Appendix E.8 - Milton Logistics Hub Technical Data Report – Light
    e) Appendix G - Mitigation Measures and Commitments

5) CEAA Additional Information Requirements (March 15, 2016)

6) CN Response to CEAA on Information Requirements (May 18, 2016)

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Peer Review of Noise and Vibration Assessment
Canadian National Railway Company
Milton Logistics Hub Environmental Impact Statement

March 10, 2017

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EXECUTIVE SUMMARY

Novus Environmental Inc. ("Novus") was retained by the Regional Municipality of Halton, the City of Burlington, the Town of Halton Hills, the Town of Milton and the Town of Oakville (the "Halton Municipalities") to conduct a peer review of the Environmental Impact Statement prepared by Stantec in respect of the Canadian National Railway Company (CN) Milton Logistics Hub (the "EIS"). We focused on the sufficiency of the environmental noise and vibration impact assessments in terms of the technical validity of the information, methods, analysis, and conclusions regarding the identification and significance of any environmental effects, mitigation, and any proposed follow-up programs. This report presents our findings, recommendations, and requests for additional information.

Following our review of the EIS and associated technical appendices, we have concluded that the information provided by CN is not sufficient. In our opinion, some of the studies should be supplemented, or re-done. In many cases, the methods and analysis used are not consistent with CTA requirements, or the requirements of the Province of Ontario and the Municipality. For some of the other work, insufficient background information was provided to allow an assessment of the calculations and interpretations.

1.0 INTRODUCTION

1.1 PURPOSE OF REVIEW AND SCOPE OF REPORT

CN has proposed to construct and operate a new intermodal railway/ truck terminal in the Town of Milton, within the Regional Municipality of Halton, Ontario. The new proposed facility will handle 450,000 shipping containers at full operation, and will operate 24 hours per day, seven days a week.

There is potential for noise and vibration impacts on surrounding existing residences and sensitive land uses, due to both facility construction and operation. In addition, there are a number of areas which are zoned for future development which will include additional sensitive uses.

Noise and vibration assessments were conducted on behalf of CN by Stantec Consulting Ltd. ("Stantec"). The purpose of this review is examine the noise and vibration impact assessment work completed for the project, including the methodology, results, and conclusions, and outline any additional information which may be required for a complete assessment of the work done and the potential impacts.

As part of our review work, we have reviewed the documentation supplied by CN as part of their Environmental Impact Statement ("EIS") application. In addition, we have also conducted site visits to the area, reviewed municipal official plans, zoning maps, and plans of subdivision for the surroundings, examined detailed aerial photography, and reviewed numerous environmental noise and vibration guidelines.

1.2 EXPERT QUALIIFICATIONS

The peer review team brings a combined 35+ years of experience in evaluating environmental noise and vibration impacts from transportation sources, including road and rail facilities, and from industrial and commercial land uses.

R. L. Scott Penton, P.Eng.

Scott has been active in the fields of air quality, acoustics, noise, vibration and pedestrian wind since 1995. He has an undergraduate degree in Systems Design Engineering from the University of Waterloo, and has published numerous papers on environmental noise impact assessment. He has worked on hundreds of environmental impact assessments, covering everything from new subdivisions to major power plants, for projects in Canada and around the world, and is a respected specialist providing expert opinion evidence.

Marcus Li, P.Eng.

Marcus is a specialist in acoustics, noise and vibration. He has undergraduate degrees in Chemical and Biochemical Engineering – Environmental Option from the University of Western Ontario. Marcus has over 15 years of experience in the acoustics, noise, and vibration consulting field. He has worked on hundreds of projects related to manufacturing facilities, educational institutions, healthcare facilities, power plants, pits and quarries, landfills, asphalt plants, concrete plants, land-use planning, and transportation. In addition to acoustics, noise, and vibration assessments, he has experience in conducting peer reviews, audits, complaint investigations, and in providing expert opinion evidence.

1.3 BACKGROUND INFORMATION ON NOISE AND VIBRATION

Prior to outlining the specific technical points relating to the noise and vibration work, we wished to provide some background on the concepts and certain considerations particular to the proposed site. This will provide better context for our comments to follow.

1.3.1 Categories of Noise

Broadly speaking, for a railway terminal, there would be two categories of noise to consider: **transportation** noise and **stationary** noise.

Transportation noise mainly results from locomotive movement on the railway tracks and on the haul routes approaching the vicinity. The most significant transportation noise would occur when a train is passing along the railway. It is characterized by relatively high noise levels for a period of a few minutes, and quiet (no noise from the track) otherwise. In addition, the plans for the facility include an increase of truck traffic in the area of 800 trucks daily. Additional transportation noise will therefore be produced along public roadways carrying off site haul traffic.

Stationary industrial noise is characterized by relatively constant noise when the facility is in operation. The sources can be machinery such as exhaust fans, ventilation equipment, idling trucks, and vehicles moving within the boundaries of the facility. Mixed in with these constant noise sources are "impulsive" noises, which are noises with very high sound levels occurring over less than a second. Examples of such noises are dropping of bins/containers, rail car "knuckle thumps", etc. In addition, stationary industrial facilities often feature moving vehicles with back-up beepers, which can disturb nearby residences.

There is a fairly broad variety of types of noises that need to be considered. As well, different standards and guidelines generally apply to these different types of noise.

1.3.2 Operation Phases

In terms of the operations phase, noise and vibrations resulting from increased truck and train traffic and on-site daily operations must be considered. The noise and vibration projected for the operations phase are held to different standards than during the construction phase.

During the construction phases, there will be different equipment in the vicinity of the CN lands and on site than during operation. For the required construction and paving operations, heavy equipment will be in use such as rock trucks, gravel dump trucks, concrete delivery trucks, and drill rigs for pipeline placement. The noise and vibration estimates during the construction phase must be considered for the extent of their nuisance value to the area residents during hours of permitted construction activity. The thresholds for noise levels tend to be more relaxed during permitted construction activities than during regular operations.

1.3.3 Worst Case Scenario Approach

In environmental assessment for a proposed project, because the facility does not exist, it is necessary to estimate future effects using approaches such as projections based on current conditions, or modelling (which is the preferred approach). Because much can be unknown about the magnitude of actual effects that will result, the conventional approach is to use reasonable worst case scenarios in projections and modelling, so that the estimated effects will not be lower than what actually occurs.

For example, if on-site locomotive traffic and unloading/loading activity peaks during the daytime hours with four locomotives per hour during the daytime, but there is no traffic at night time, the worst case scenario approach would involve performing the noise modelling assuming the presence of four locomotives at all times. A noise parameter typically used to conduct such an assessment is the **L_{eq} (1 hr),** which is the averaged equivalent noise level over a 1 hour period.[1] When employing a worst case scenario approach, the L_{eq} (1 hr) is the noise level over the hour at which it is highest, and this is the parameter that should be predicted using noise modelling.

An alternative approach, which has been used in the EIS is to average out the locomotive traffic and other activities over a 24 hour period, and then use the resulting average for the noise modelling. This parameter is called **L_{dn}** which means refers to the noise level averaged over 24 hours of day and night. This is not necessarily a worst case scenario approach. In the above example, using the L_{dn} parameter would result in a lower predicted noise level that does not reflect actual noise levels during the daytime.

Similarly, when considering the projected increases in amount of noise due to the facility, this would be calculated by measuring ambient levels of noise, estimating the projected levels of noise that will result from the project, and then calculating the difference. If the ambient level is measured in a way that makes it appear artificially high, then the projected difference in noise levels due to the new facility will be smaller. If the assumptions in calculating the projected noise levels result in the predicted noise being lower, the difference will again be smaller. In both cases, what will result is a downplaying of the significance of the magnitude of the noise increase, and an underestimation of the actual effects. To use a worst case scenario approach, the assumptions used should be carefully considered to ensure that ambient levels are not overestimated, and projected noise levels are not underestimated.

1.3.4 Monitoring Locations and Points of Reception

To study projected effects of noise on the surrounding areas, it is necessary to choose monitoring locations where noise measurements will be taken. The monitoring locations should be chosen on the basis that the noise measurements will be representative of what would be perceived at "points of reception" (PORs). In EIS Appendices E.9 and E.10, a POR is defined as "a noise-sensitive receptor such as a residence, campground, daycare, school, church, or hospital". Impacts may be measured for every such POR in the area, or representative PORs may be chosen. If taking the latter approach, it is important that they be selected so that they are representative of a given area, and that they reflect worst case

[1] Leq(day) and Leq(night) are alternate parameters that may also be considered to assess impacts from some sources, under some guidelines. These reflect averaged noise levels over the day and night periods respectively.

scenarios for that given area.

The selection of monitoring locations and PORs is complicated in this case by the size and shape of the lands. The proposed intermodal facility is over 750 m wide and over 3000 m long, with significant noise sources located in numerous locations. As well, the local assessment area is 1,335 hectares in size. As a result, selection of monitoring locations to be representative of PORs is complex, and the measured data must be appropriately processed and manipulated to ensure that it is representative of the actual ambient sound levels perceived at a given POR. In our opinion, the selected PORs in the analysis do not necessarily represent worst-case impacts at all locations, nor can many of them be said to be representative of the noise perceived at the PORs. As well, in many cases, insufficient information was given to understand how the data was processed, or the conditions in which it was measured.

When considering whether mitigation measures such as noise barriers will be effective, the heights of the relevant PORs must be provided. This is because when comparing noise levels at ground level versus two-three stories above the ground, more noise is likely to be received at the higher POR because there is less likely to be less noise attenuation from any noise barriers located between the source and the POR. Conditions such as the height of PORs are therefore crucial to understanding the measurement results. However, as detailed in the report, receptor heights were not provided.

1.3.5 Noise Guidelines and Standards

There are several sets of guidelines, by-laws and standards which appear to be applicable to this project. CN focused its work on the following two documents for its assessment of both transportation and stationary noise.

- United States Department of Transportation, Federal Transit Administration: *Transit Noise and Vibration Impact Assessment Manual*, dated May 2006 ("**US FTA Manual**")
- Health Canada: *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (DRAFT)*, dated January 2011 ("**HC Draft Guidelines**")

However, while the above guidelines are relevant to assessing transportation-related noise, different guidelines are applicable to stationary noise. The following further standards are relevant to assessing stationary noise in this project.

1.3.5.1 Additional Stationary Noise Guidelines

1. Canadian Transportation Agency: *Railway Noise Measurement and Reporting Methodology,* dated 2011 ("**CTA 2011**"): This is said to apply to stationary source facilities, including intermodal terminals.[2] It requires more detailed measurements and parameters than the US FTA Manual and the HC Draft Guidelines.

2. Ontario Ministry of the Environment and Climate Change: *Environmental Noise Guideline – Stationary and Transportation Sources - Approval and Planning, Publication NPC-300*, dated August 2013 ("**NPC 300**"): In Appendix E10, sub-appendix C, CN states that NPC 300 did not appear applicable. However, in our opinion NPC-300 does appear applicable to assessing compliance for new or expanded stationary sources of noise,[3] and it accordingly sets out relevant criteria and assessment methodologies.

The NPC 300 guidelines require some of the same additional parameters mentioned in CTA 2011, and also specifically requires the assessment of impacts on a worst-case hour basis [L_{eq}(1hr)], rather than based on a 24 hour average [L_{dn}].

3. Town of Milton - Noise By-law: Milton has a comprehensive noise by-law which applies to all industrial and commercial land uses within the Town, and which appear applicable to the proposed facility. The by-law therefore serves to indicate what is considered to be reasonable noise impacts within the community. This by-law also requires that the standards for noise set out in the NPC 300 guidelines be met, and prohibits noise that exceeds the NPC 300 guidelines from construction equipment or loading and unloading of containers between specified times of day.[4]

4. The Railway Association of Canada/Federation of Canadian Municipalities: Guidelines for New Development in Proximity to Railway Operations, dated 2013 ("**RAC/FCM**"): The purpose of the document is "… to provide a comprehensive set of guidelines for use when developing on lands in proximity to railway operations." These guidelines were not referred to in the EIS, but also appear applicable to the project. They recommend measurements and analysis consistent with what has been set out in CTA 2011 and NPC-300.

1.3.5.2 Schedules of Equipment-Generated Noise Levels

In addition, in estimating the noise levels of specific equipment on the site, there are relevant schedules to some of the above guidelines which set out accepted levels of attributed noise, that

[2] CTA 2011, p. 25
[3] NPC 300, p. 1
[4] Milton Noise By-law, sections 4.1 and 4.3

can be used in calculations and modeling. For instance, Appendix A of the CTA 2011 document lists the Sound Power Level of a single idling diesel locomotive as 107 dBA (decibels, adjusted for human response). In many cases it was noted that CN used lower assigned values than the standard values.

2.0 ASSESSMENT OF EIS

In this section, we focus on the sufficiency of the technical information provided in the EIS on noise and vibration aspects. Where information is found to be insufficient, we suggest information requests so that the current EIS can be supplemented.

2.1 MUNICIPAL PLANNING ISSUES

Regarding the zoning of the lands close to the proposed site, table 6.1 of the EIS states that:

> *"Approved land use planning for the employment lands where the Project is located is compatible for development of the Terminal by CN. Surrounding lands were planned for residential growth north of Britannia Road with knowledge of the future planned rail related employment uses south of Britannia Road on the CN lands. Therefore, project effects to existing municipal and regional land use planning, including present and approved land uses are not assessed in the Socio-Economic Conditions VC."*

This statement is not supported. The various high-level land use planning studies which have been completed for the Regional Assessment Area (RAA) did not include the presence of a large rail logistics hub of this nature. These include the Milton Official Plan, the Milton Sherwood Survey Secondary Plan, the Milton Boyne Survey Secondary Plan, the Milton Bristol Survey Secondary Plan, and the Regional Official Plan.

Under the applicable Halton Region *Land Use Compatibility Guidelin*es, MOECC Guideline D-6 applies to any future development applications in the area of the proposed Milton Logistics Hub.

The D-series of guidelines were developed by the MOECC in 1995 as a means to assess recommended separation distances and other control measures for land use planning proposals in an effort to prevent or minimize 'adverse effects' from the encroachment of incompatible land uses where a facility either exists or is proposed. The guideline specifically addresses issues of odour, dust, noise and litter.

To minimize the potential to cause an adverse effect, areas of influence and recommended minimum setback distances were included within the guidelines. Guideline D-6 "Compatibility Between Industrial Facilities and Sensitive Land Uses" is specific to industrial uses in proximity to more sensitive land uses such as the proposed residential re-development on the subject lands. The proposed Milton Logistics Hub is considered to be a Class 3 Heavy Industry under these guidelines. No noise-sensitive land uses, including noise-sensitive commercial or institutional uses (e.g., residences, schools, daycares, hotels, motels, places of worship) are recommended to be located within 300 m of the property boundary of such a site. **Figure 1** provides an overlay of the proposed facility boundary, and the applicable 300 m Recommended Minimum Separation Distance and 1000 m Area of Influence from the Milton Logistics Hub overlaid on mapping showing active developments in the area. Sections of the Master Plan from the Milton Boyne Survey Secondary Plan are shown. Significant residential areas (residential, residential/office, and major node areas are located within 300 m of the proposed project. As shown on the figure, planning applications have already been filed for a number of residences within this 300 m distance. This is also shown in the Halton Brief, at Figure 5.

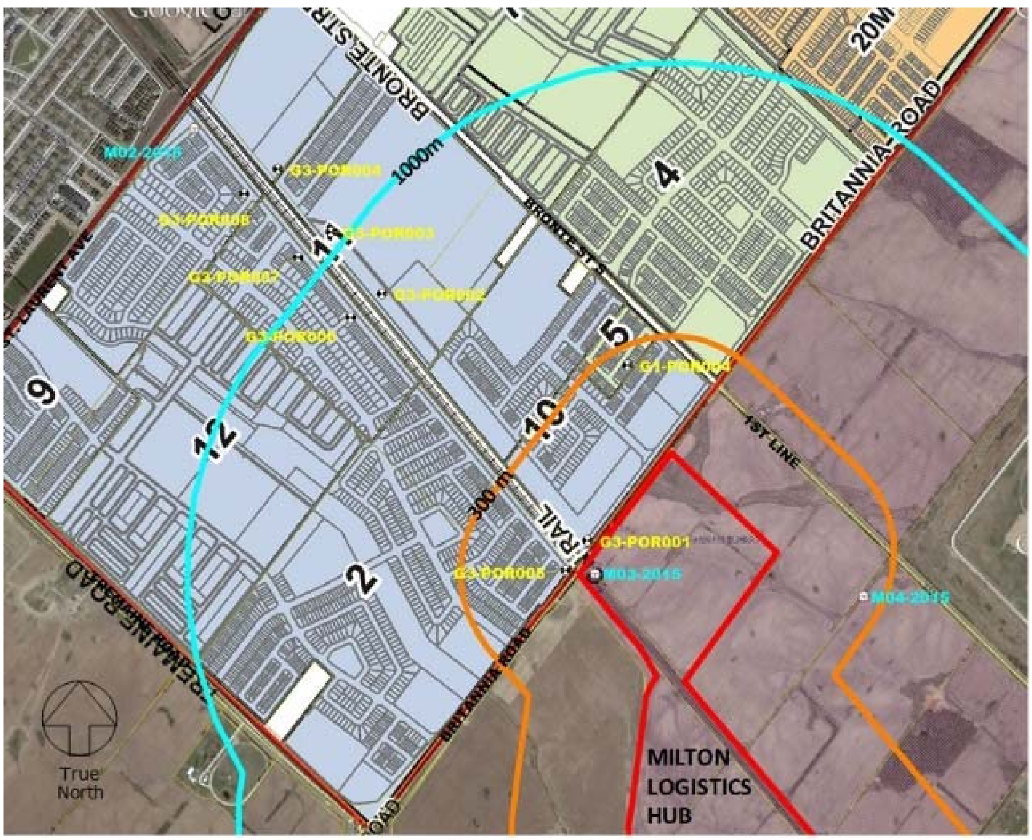

Figure 1: Overlay of Town of *Milton Boyne Survey Secondary Plan* Phase 3 – Draft Plan of Subdivision Status versus Intermodal Hub Proposal (1:15,000)

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Healthy Communities, and Noise on Residential Sensitive Land Uses EIS Guidelines 6.2.1, 6.3.4 and 6.3.5 Halton Brief, table D.7	EIS 6.4.1	**RNV1. Municipal and Regional Land Use Planning** An assessment of the effects of the CN Logistics Hub on the existing municipal and regional land use planning is required.	The EIS indicates that land use planning north of Britannia Road was done with knowledge of the rail related employment uses. This has not been properly supported. Further information is needed to understand this statement.

2.2 FIELD SURVEYS AND MEASUREMENTS

2.2.1 Monitoring Locations and POR Groupings

As mentioned earlier, it is important to select monitoring locations for measurement that will be representative of the surrounding areas, and this was challenging given the size and shape of the CN lands. However, CN only chose 10 monitoring locations, which do not appear to be representative of all respective PORs. Ideally, ambient sound levels at all PORS should have been estimated using road and rail traffic noise modelling, with the modelling results validated and/or calibrated using the ambient noise measurements.

The following figure graphically illustrates the relationship between the 10 monitoring locations (cyan labels) used in the EIS and the 38 modelled PORs (yellow labels) for which the data is intended to be representative. In general, the ambient monitoring locations are used to represent receptor groupings (refer to cyan outlines for grouped receptors) spanning distances of 1 km to 1.4 km. Two (2) receptors were found to use monitoring locations of ambient levels which were over 5 km away.

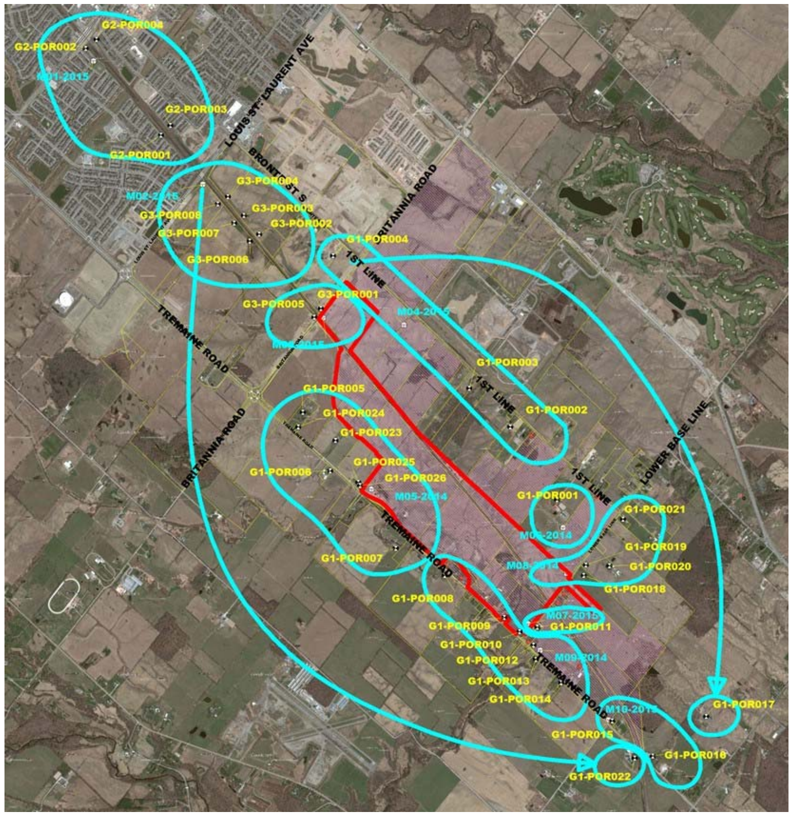

Figure 2: Groupings Of Ambient Monitoring Locations And The Points Of Reception They Are Intended To Represent (1:38,000)

In our opinion it is highly unlikely that the measurement locations are representative of the huge range of distances being covered. This is based on the different sound environments which would be present and the different distances from the primary sources of ambient noise (i.e. major and minor roadways and the railway main line). If existing background ambient sound levels are to be determined using measurements, rather than through road and rail traffic noise modelling, then additional measurements should be conducted.

The inadequacy of the monitoring locations and lack of representativeness for their corresponding PORs is an issue that impacts all of the calculations and predictions of noise and vibration levels – ambient levels, construction-related noise and vibration, transportation-related noise and vibration, and operational noise and vibration.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Healthy Communities, and Noise on Residential Sensitive Land Uses EIS Guidelines 6.2.1, 6.3.4 and 6.3.5 Halton Brief, table D.7	EIS 6.4.1	**RNV2. Monitoring Locations** In order to provide adequate data on the spatial variation of noise over the study area, measurements should be conducted at new locations, in addition to the previous 10 locations considered. Alternatively, or in conjunction with additional measurements, road and rail traffic noise modelling should be used.	The 10 monitoring locations are not considered to be representative of the distances covered by the receptor groupings. This is based on the different sound environments and varying distances from the ambient noise sources (i.e. roadways and railways). If the ambient measurement approach will be used instead of the preferred approach of road and rail traffic noise modelling, measurements at additional representative receptors should be taken.

2.2.2 Seasonal Effects (Insect Noise)

Baseline ambient noise measurements were completed in July 2014 and June 2015, as indicated in Sec 4.1.3 of EIS Appendix E.9. Given these are the summer months, contamination from the sounds of nature (e.g. insects, birds, etc.) are likely to have affected the measurements and resulted in higher than normal sound levels. By overestimating background sound levels, the EIS assessment could underestimate the potential impact of the proposed facility.

In our opinion, additional ambient noise measurements should be completed during the early spring or late fall months, when the sounds of nature will be at a minimum.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Background Ambient Noise Levels EIS Guidelines Section 6.1.1, 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV3. Seasonal Effects** Additional ambient baseline noise measurements are required during the spring and/or fall seasons, with minimal noise from birds/insects.	The sounds of nature during the summer months (e.g. insects, birds, etc.) are likely to affect the measurements and result in higher than normal ambient sound levels. This would result in overestimation of background sound levels, and in turn a potential underestimation of the potential impact of the proposed facility.

2.2.3 Weather Effects

Weather can have severe effects on long-term noise measurements. High winds create "pseudo-noise" at the microphone, even with a wind screen in place. High relative humidity can create shorts in the electrically charged microphones resulting in abnormally high readings. Rain can create additional noise, and fog can also affect measurement results by adding increased atmospheric absorption.

MOECC Publications NPC-102 and NPC-103 sets out limits on these parameters to ensure that only valid noise measurements are used in analyses. Further restrictions are placed by the equipment manufacturer's specifications. Following the above, and in accordance with general acoustical practices, ambient noise measurements should not be made when any one of the following conditions are present:

- Wind speeds at a height of 10m are higher than 20 km/h
- Relative humidity is in excess of 90% (or 95%, depending on the equipment specifications)
- Rain, fog or snow are present.
- Temperatures are lower than -10°C (lower temperatures can be measured using heaters and other specialty equipment) or above 40°C.

Therefore, in validating long-term noise measurements, these parameters need to be known. In addition, measurements should be taken on site, or in an area that is close enough to the site that it has the same climate.

Sub-appendix C of EIS Appendix E.9 provides the meteorological data used by Stantec in validating their measurement results. Based on our review, the data appears to consist of Environment Canada meteorological data for Burlington Piers. The Burlington Piers data is located more than 16.5 km from the project site, on the lakeshore, and in a completely different meteorological environment from the site, which will be dominated by lake effect winds.

In response to CEAA IR#14, Baseline Ambient Noise Levels, which raises many of the same issues we have listed above, CN provides additional meteorological data from Toronto Pearson Airport. However, this is still not suitable. Pearson Airport is located more than 27 km from the proposed site, again in a completely different meteorological environment from the site.

CN stated:

> "There were no extreme weather events of concern limiting the performance of the measurement system or artificially elevating the ambient sound level during the measurement periods. Conditions during data collection were considered appropriate by acoustical experts in accordance with the guidelines noted above."

However, a review of the Pearson data provided in the IR response (as Attachment IR14) indicates numerous periods of fog, rain, thunderstorms, high winds, and high humidity. Thus the Pearson data also does not support the conclusions of the IR response.

When adverse weather conditions are included in the background ambient assessment, the background ambient sound levels presented in the EIS and used in the analysis of impacts become artificially high. As a result, the potential impacts of the proposed facility are underestimated.

In the absence of any suitable existing meteorological stations, a portable station measuring the required parameters should have been used. Such stations are readily commercially available and are frequently used in noise measurements.

The meteorological data presented in the assessment is not sufficient to ensure that only valid data was used in the analysis. As with the case of seasonal effects, additional ambient background measurements are required.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Background Ambient Noise Levels EIS Guidelines Section 6.1.1, 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV4. Weather Effects** Local meteorological weather data is required to properly validate the ambient noise measurements completed. In the absence of existing local weather data, additional ambient baseline noise measurements are required with a local meteorological station.	Validation of long-term noise measurements requires additional meteorological data. Wind data alone is insufficient, as the inclusion of adverse weather conditions would result in artificially high ambient levels. This would result in an underestimation of facility impacts.

2.2.4 POR Distance to Roadways and Railway

A review of EIS Appendices E.9 and E.10 indicate that the unmodified ambient measurement results have been used to establish the baseline ambient levels for various groups of receptors.

Each noise monitor represents a unique location in terms of its distance from the railway corridor and distance from local roadways. As the distance to roadways and railways at the considered points of reception are different, the ambient measurement results need to be modified to account for this.

For example, the following figure shows monitoring location M05-2014 and the represented points of reception. Given the separation distance from the railway, noise contributions from trains are not anticipated to change significantly (0 to -2 dBA). However, changes in roadway noise levels are expected to be in the range of -6 dBA to +5 dBA, depending on a distance correction for absorptive ground.

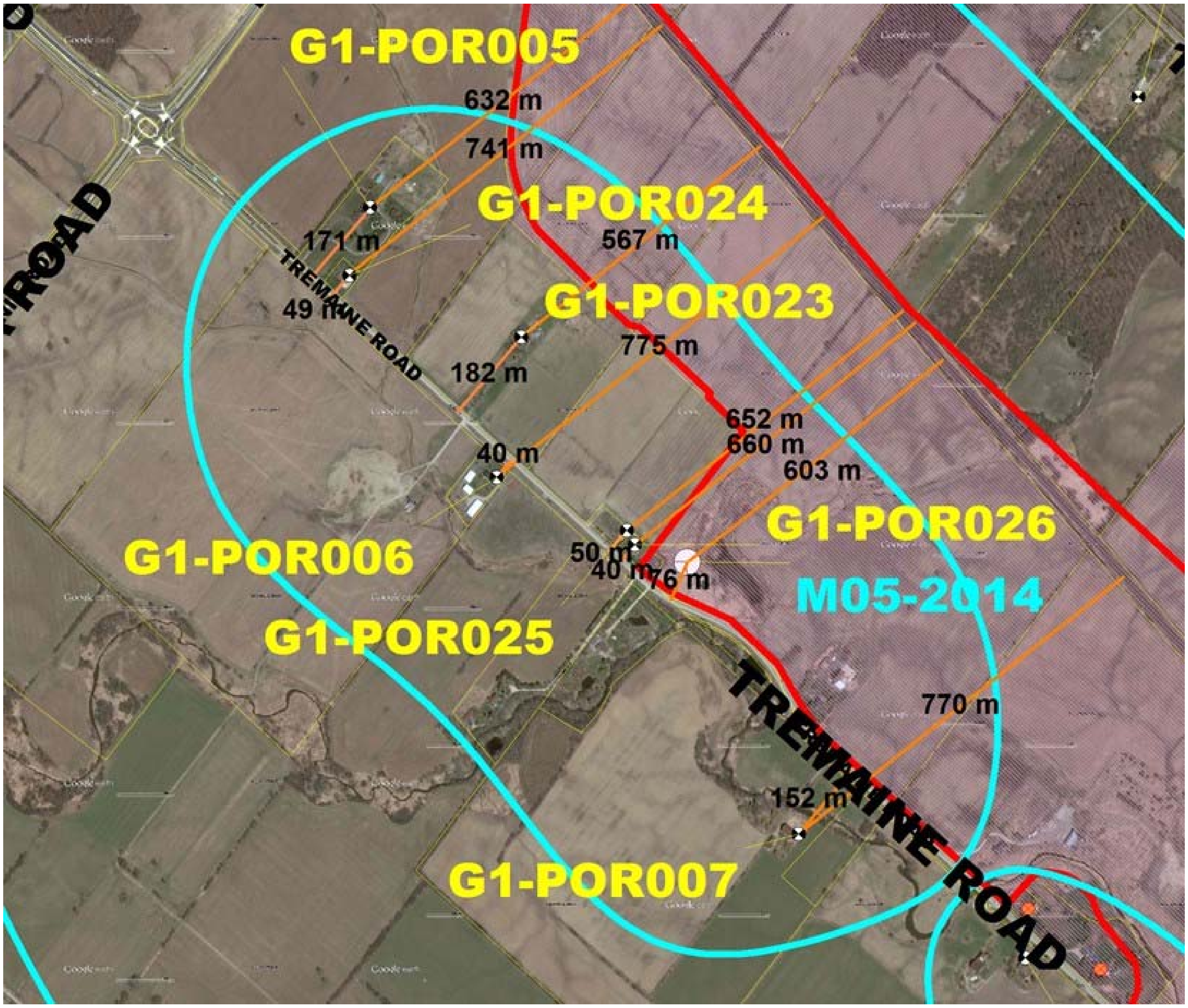

Figure 3: Example of Differences of Distances Between Significant Noise Sources and Points of Reception and Ambient Measurement Points

Based on the above, the guidelines used in the assessment may be higher or lower than the existing background ambient sound level used in the analysis. In our opinion, the background ambient sound levels used in the EIS assessment should be adjusted to account for these potentially significant effects.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Background Ambient Noise Levels EIS Guidelines Section 6.1.1, 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV5. Distance Effects for Roadways and Railways** Background sound levels need to be adjusted at the points of reception to account for the change in distance from the roadways and railways.	The varying distance of the receptors from the roadways and railways should be accounted for in determining ambient sound levels. Otherwise there is the significant potential for over- or under-estimation of background sound levels.

2.2.5 Effects of Self Screening

Different facades of a house experience different noise sources. For example, consider a house with a railway along the rear property line, and a roadway along the front property line. When evaluating sound levels at the rear side of the house, that side will have full exposure to the railway line, but the house itself provides screening of the roadway. Similarly, the front of the house will not experience noise from the railway, due to self-screening, but will have full exposure to noise from the roadway.

However, the microphones used in the EIS for ambient monitoring experience the entire environment with no shielding. From the example above, a microphone would see both the noise from the railway line and from the roadways. It can therefore effectively "over-measure" the actual background ambient sound level experienced by a given point of reception. This effect is illustrated in the following figure:

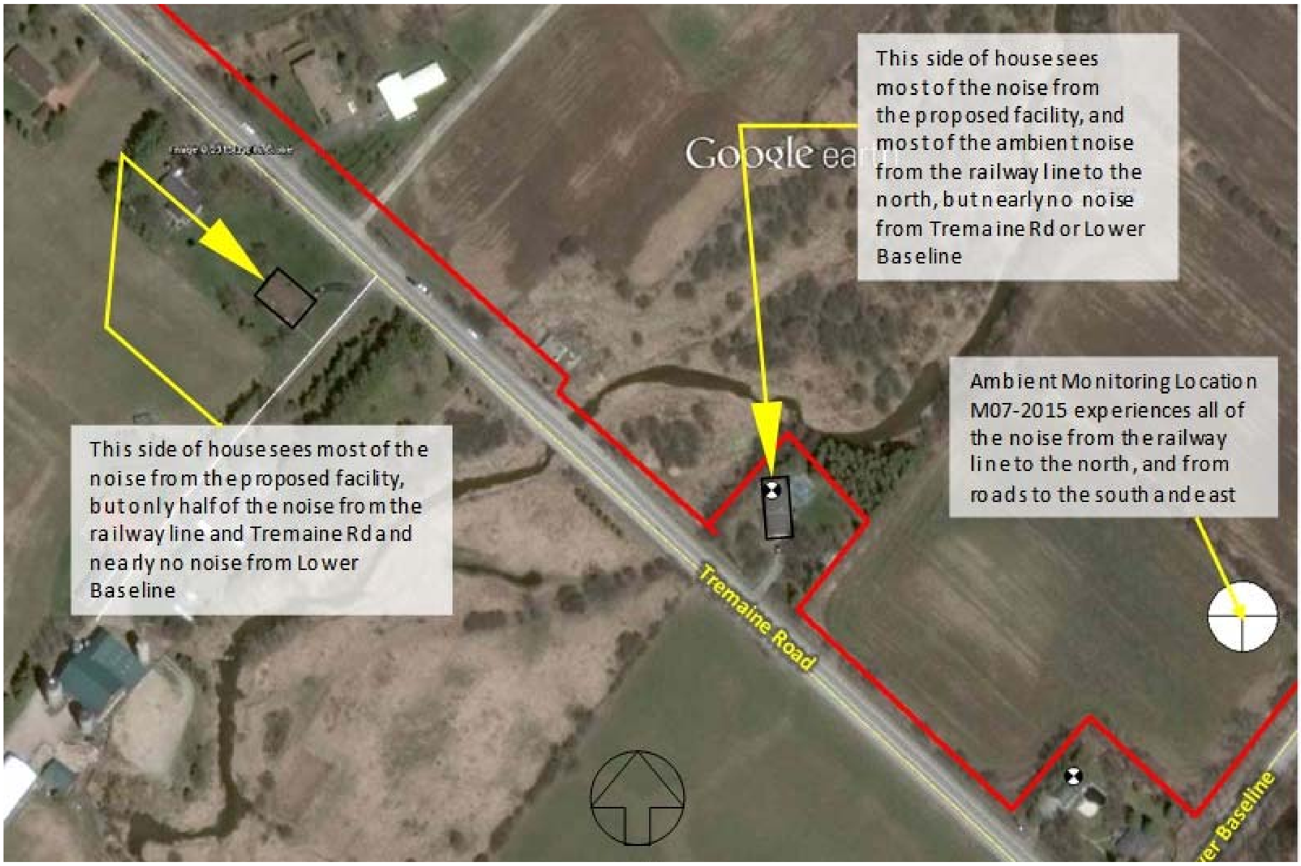

Figure 4: Example of Self-Screening Effects Which Result in Lower Ambient Sound Levels And Under-Predicted Noise Impacts

As a result, for many receptors, the existing ambient sound level used in the assessment is higher than what is actually experienced at the receptor. Due to the artificially inflated background noise levels, the noise impacts in EIS would be under-predicted.

In our opinion, the background ambient sound levels used in the EIS assessment at each point of reception should be adjusted to account for this effect.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Background Ambient Noise Levels EIS Guidelines Section 6.1.1, 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV6. Effects of Self Screening** Background ambient sound levels should be adjusted to account for the screening from the receptor building itself.	In the absence of self-screening from the receptor building, ambient levels are potentially higher than what is actually experienced. This would ultimately result in an under-prediction of noise impacts.

2.2.6 Rural Area Noise Adjustment

In assessing the potential for impacts following the HC Draft guidelines there are additional adjustments which must be used to account for rural environments.

From the measured ambient sound levels provided in Sub-Appendix D of EIS Appendix E.9, the existing and future approved residences surrounding the proposed facility are in Class 2 suburban and Class 3 rural areas, with the rural areas located south of Britannia Road. One-hour ambient Leq sound levels in this area routinely drop below 40 dBA at night, which is typical of a rural environment. Under the HC guidelines a +10 dB adjustment is applied to both the measured ambient and the predicted sound levels so that the potential annoyance of the project is correctly predicted. The EIS did not use this approach.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV7. Noise Assessment Criteria** In accordance with the HC Draft guidelines, please adjust all ambient sound levels by adding 10 decibels.	The HC Draft guidelines employed by CN require an adjustment of ambient sound levels recorded in rural areas by adding 10 decibels. This is required to prevent the under-prediction of facility impacts.

2.2.7 Selected Points of Reception

Thirty-eight (38) specific representative PORs were selected. However, based on our review, the “representative” receptors selected do not always represent worst-case impacts from the facility.

The were divided by CN into three groups: Group 1 related to PORs at existing residences, and Group 2 and 3 related to lands which are zoned for residential use but which do not currently have residences on them.

All of the comments below regarding the PORs apply to noise and vibration measurements and projections in respect of ambient levels, transportation, operations of the facility, and construction.

2.2.7.1 Group 1 Receptors – Existing Residences

Twenty-six (26) existing residences were identified as "Group 1" PORs in the EIS. These are intended to be representative of the existing residences, farm houses, etc., in the area.

a. "Participating Receptors" Excluded From The Analysis

Of note, "participating receptors" which are located on CN land (but not within the proposed site boundaries) are not included in the assessment. No rationale is provided as to why these residences should not be considered to be points of reception. Under MOECC guidelines, dwellings which are outside of the stationary source boundary are still considered to be noise-sensitive receptors, even if they are owned by the stationary source. CN owns several properties which are completely outside of the project boundary, and on which there are located existing residences. Examples are provided in the figure below (note: the figures are not exclusive, and additional such receptors exist).

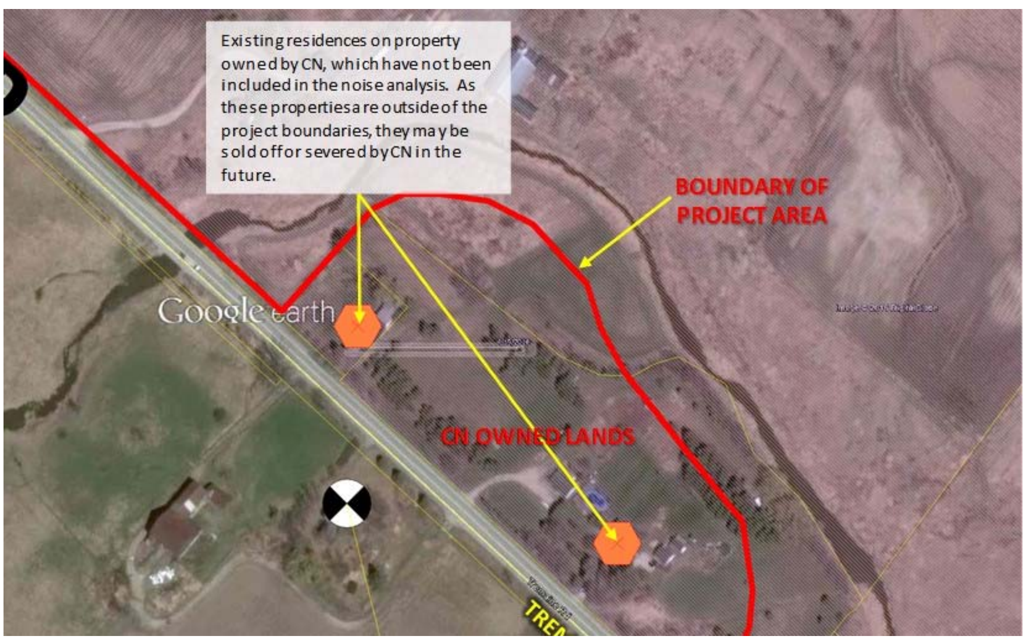

Figure 5: Example A of CN-Owned Points of Reception Which Should Have Been Included in the Analysis

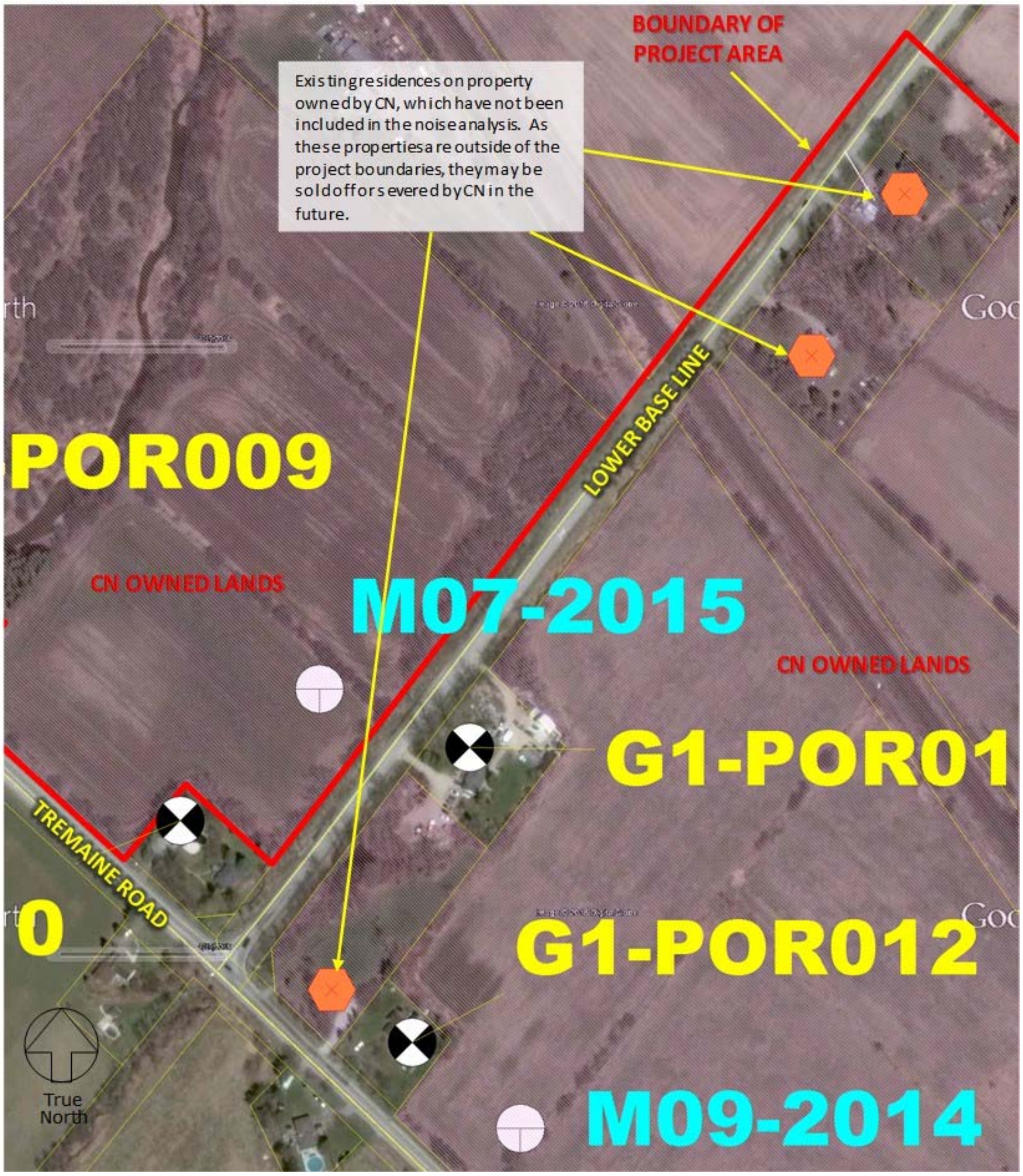

Figure 6: Example B of CN-Owned Points of Reception Which Should Have Been Included in the Analysis

Considering the above, it is our opinion that the distinction between "participating receptors" as defined in the EIS Appendices E.9 and E.10, for which no noise impact assessment has been completed, and the remainder of existing receptors is incorrect, and that all residential points of reception outside of the project boundaries should have been included in the analysis.

b. Non-Representative Points of Reception Used

In our opinion, the selected representative points of reception in the analysis do not necessarily represent worst-case impacts at all locations, especially since noise mitigation measures such as berms and noise walls are required.

An example is provided in the figure below. Two representative receptors are shown. These representative receptors are more than 600 m apart, and there are four non-participating residences located between them. Noise impacts in general, and especially the effects of terrain and noise barriers, are highly dependent on the geometries between the sources and the receiver. Given the extreme distance between the chosen receptors, it is likely that they are not representative of impacts at these intermediary locations.

To account for such effects, all existing noise-sensitive points of reception must be identified, and have noise prediction results provided. In our opinion, the same should be done in this situation, for all existing points of reception within the Local Assessment Area boundary of 1 km from the site. Using modern noise prediction software, adding the additional receptors would be a trivial exercise, and would prevent any potential issues.

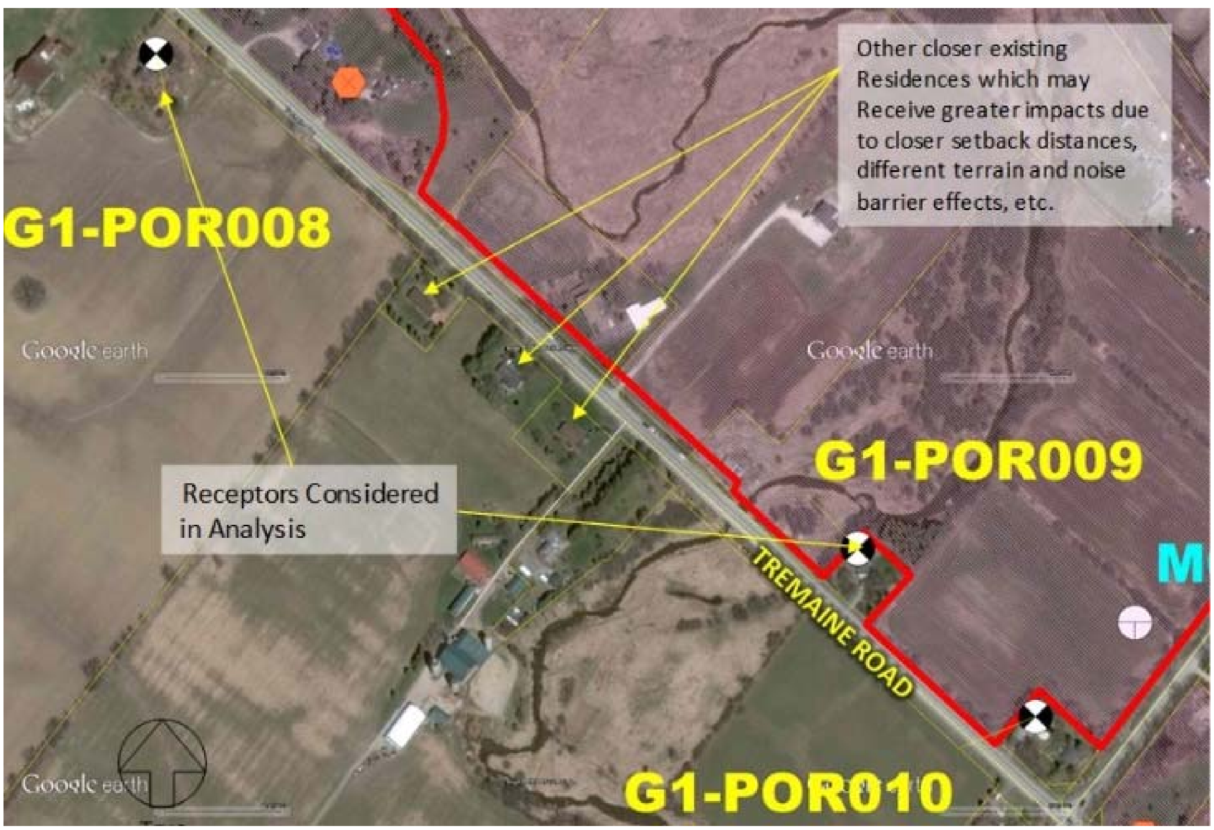

Figure 7: Example of Potentially Non-Representative Point of Reception Used in Analysis

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV8. Points of Reception – Residences on CN Lands** Please include additional PORs at existing residences located on CN-owned lands in the analysis.	Residences on CN lands are located closer to the noise sources at issue. By excluding these as points of reception, the resulting predicted noise impacts will not represent potential worst-case impacts from the proposed facility. These additional PORs at residences in CN lands are also important for the operational vibration measurements. As well, for the construction vibration assessments, there are two proposed grade saparations which will involve extended period of construction and therefore vibration. It will be particularly important to study existing residences located close to those grade separations.

c. Vacant Lot Receptors

There are a number of accessible, privately owned vacant lots (lots without a residence but for which the current zoning would allow for a residence to be constructed). Similarly, there are a number of CN-owned properties which are outside of the project boundary which are also vacant. Please see the following figure:

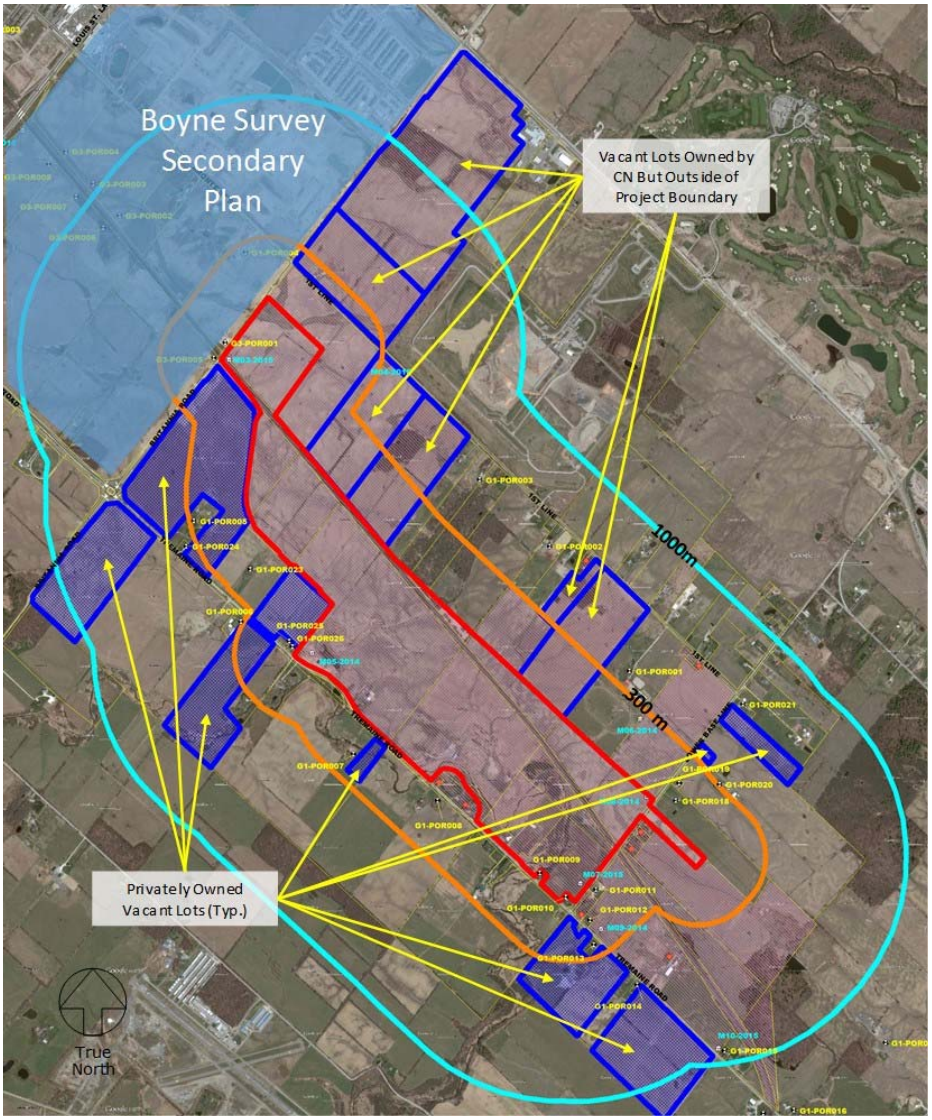

Figure 8: Vacant Lots Within Local Assessment Area

These properties are considered to be "noise sensitive zoned lots" under MOECC NPC-300 noise guidelines. When conducting noise impact assessments, the guidelines required that a point of reception be considered on these properties. The selected point of reception should be "consistent with the existing zoning by-law, the typical building pattern in the area and an appropriate or likely future use of the vacant lot. The location of the point of reception is the centre of this 1-hectare portion of the vacant lot, at a height of 4.5 metres above ground."

In our opinion, consistent with NPC-300 and good acoustical practice, points of reception should have been located on these vacant lots as part of the analysis.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV9. Points of Reception – Vacant Lots** Please include additional PORs at residentially-zoned vacant lots in the analysis.	The residentially-zoned vacant lots are potential sites for future residences. These should therefore be considered in the analysis as PORs.

2.2.7.2 Group 2 and Group 3 Receptors – Future Subdivision / Urban Developments

Group 2 and 3 receptors are located in the lands north of Britannia Road and east of Tremaine Road, which are currently undergoing intensive development. This area is known as the Boyne Survey Secondary Plan. All of the lands are currently zoned for residential uses.

a. Selected Points of Reception Locations

In terms of the Group 2 and Group 3 PORs, only 9 of them have been used to predict impacts in the approximate 190 hectares of new development within 1000 m of the proposed facility.

All of the ambient measurement points and the majority of the PORs considered (with the exception of G1-POR004) are located directly along the railway right-of-way. However, the interior of the developments, away from the rail line and major roadways, will experience potentially greater noise impacts, as ambient sound levels will be lower, and therefore, the stationary noise impact from the intermodal facility, which is compared against the ambient, will be higher.

In our opinion, additional representative points of reception should be considered in this area, and especially within 300m of the proposed facility, distributed within the area.

b. Points of Reception Heights

The height of the point of reception is a critical factor in determining potential noise impacts. Noise mitigation measures, such as berms or noise walls, are not as effective at screening upper storey windows as they are at protecting first floor areas or outdoor amenity areas, as demonstrated in the figure below. In addition, there are other acoustical effects, such as loss of ground attenuation (noise absorption by the ground), which generally results in higher sound levels at elevated points of reception.

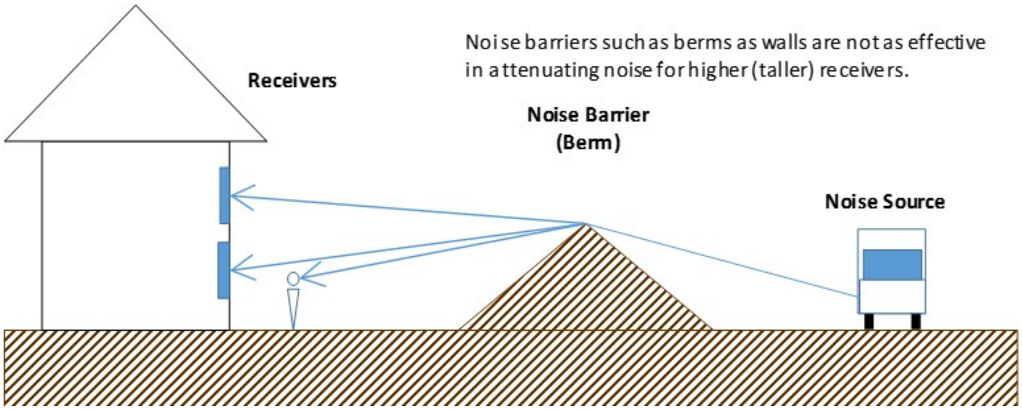

Figure 9: Effect of Receiver Height on Barrier Attenuation

EIS Appendix E.10 does not provide the receptor heights used in the analysis – therefore it is impossible to confirm whether appropriate receptor heights have been used, and if the proposed noise barriers will be adequate. This is a key issue for the Boyne Survey Secondary Plan lands, as higher intensity development is permitted in this area.

Different heights for PORs are appropriate depending on the heights of the residences approved for the land at issue. The following figure shows the Master Plan for the Boyne Survey Secondary Plan. The plan includes "Major Node" areas within 300 m of the proposed intermodal facility. Major node areas are mixed use (residential/ commercial) areas. Per the Town's urban use guidelines, these areas will have the highest densities within the community. These densities will be accommodated in taller, mixed-use buildings with retail at-grade and residential/office uses above.

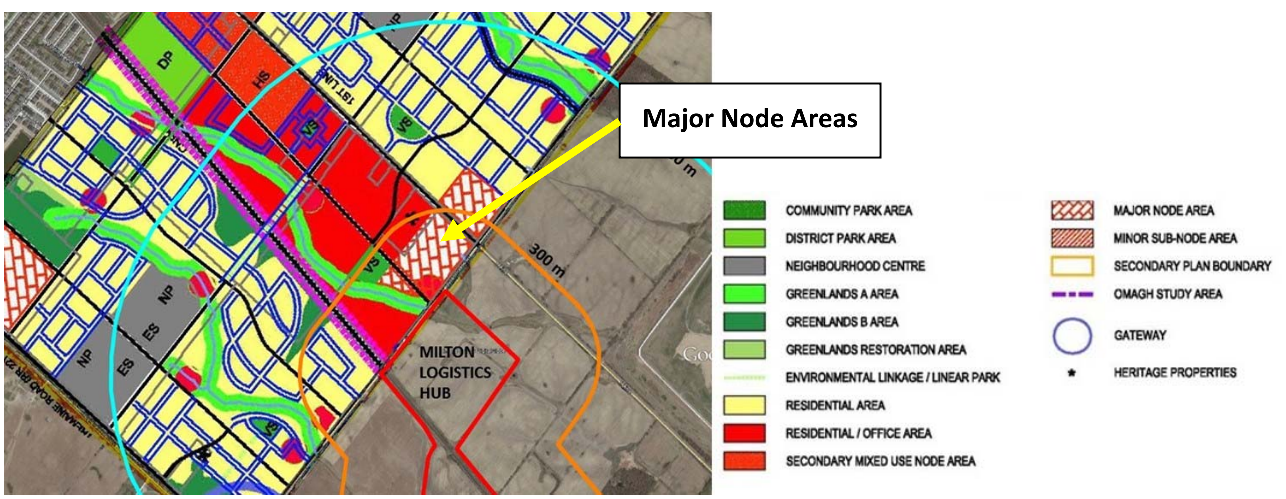

Figure 10: MOECC Guideline D-6 Setbacks From the Milton Logistics Hub Versus Town of *Milton Boyne Survey Secondary Plan* Master Plan for Future Development

Additional points of reception, modelled at heights representative of the maximum building heights allowed in the zoning in the area, should be included in the EIS analysis. As discussed previously, this is critical in understanding the effectiveness of noise barriers proposed as mitigation measures, such as berms and noise walls.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV10. Points of Reception – Group 2 and 3** Additional receptors should be included for the approved Town of Milton Boyne Secondary Plan area, particularly within 300 m of the proposed facility.	A designation of only nine PORS for the large area in consideration is representative of the entire area. Further PORs should therefore be considered, particularly within 300 m of the facility, which is the minimum required setback for such a facility according to MOECC Guideline D-6.
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV11. Heights of PORs** Receptor heights used in the analysis should be included for all PORs. For existing residences (group 1), worst-case second storey (4.5 m) or third-storey (7.5 m) bedroom window heights need to be assessed, as applicable. For zoned-for-future-use receptors in Major Node areas in the Town of Milton Boyne Secondary Plan (groups 2 and 3), a minimum receptor height of three storeys (7.5 m) should be examined.	The receptor heights for PORs must reflect residential heights approved for the relevant areas. Noise reception is highly dependent on receptor height, particularly when mitigation measures are proposed.

2.3 PREDICTED OPERATIONAL NOISE AND VIBRATION IMPACTS

2.3.1 Noise Assessment Criteria

As mentioned in the background section, although CN applied two sets of guidelines (the US FTA Manual and the HC Draft 2011 guidelines), there are other sources of guidance that also appear applicable, to stationary source facilities including intermodal facilities, such as the **CTA 2011** guidelines, the **NPC-300** guidelines, the **Milton Noise By-Law,** and the **RAC/FCM** guidelines**.** In general, these guidelines require higher standards for the noise assessments, and in our experience, would result in calculation of greater predicted impacts in terms of noise generation by the new facility.

These four additional guidelines would require the provision of four parameters[5] that were not included in the EIS:

(1) Predictions of hourly sound levels from the facility [**L_{eq} (1 hour)**].
(2) Assessment of specific impulsive sound levels.
(3) Assessment of the tonality of noise sources.
(4) Comparisons of predicted facility hourly **L_{eq} (1 hour)** noise versus the ambient sound levels.

In addition, the NPC-300 and RAC/FCM guidelines require the calculation of impacts based on the worst case hourly sound level **L_{eq} (1 hour)**. The RAC/FCM guidelines also require that the impulsive sound levels be analyzed in a specific manner, using a Logarithmic Mean Impulse Sound Level **L_{LM}**.

The assessment of operational noise impacts needs to be separated into two components: (1) an assessment of the railway noise from the main line as well as of the increased truck traffic along the haul routes; and (2) an assessment of the stationary noise from the intermodal facility.

The stationary noise assessment should look at "predictable worst-case impacts" during the daytime and night-time period, by comparing predicted non-impulsive L_{eq} (1hr) and impulsive L_{LM} sound levels from the facility, predicted at off-site points of reception, versus the applicable guideline limits.

While CN does provide hourly measured L_{eq} sound levels in Sub-Appendix D of EIS Appendix E.9, however the data is not tabulated, and the ranges of measured L_{eq} (1 hr) sound levels for daytime (7am to 11pm) and night-time (11pm to 7am) periods is not provided. This information is required in order to meet the CTA 2011 requirements, and to determine the applicable area classification and daytime and night-time guideline limits in accordance with NPC-300.

From the measured ambient sound levels provided in Sub-Appendix D of EIS Appendix E.9, the existing and future approved residences surrounding the proposed facility are in Class 2 suburban and Class 3 rural areas. Similarly, the hourly L_{eq} due to the facility is not plotted and/or compared to ambient levels in the main assessment in EIS Appendix E.10.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV12. Separation of Transportation and Stationary Noise** The assessment of operational noise impacts needs to be separated into two components: an assessment of the twinning of the main line/increase in railway traffic and truck traffic on the haul routes; and an assessment of the intermodal facility. The assessment of the main line twinning can be performed against HC and FTA noise guidelines, as well as considering change from existing conditions, in a manner similar to that conducted in EIS Volume E.10. An assessment of changes in L_{eq} Day and L_{eq} Night sound levels must also be provided.	Transportation and Stationary assessments are typically separated and assessed against different criteria. The Transportation noise (i.e., twinning of the railway track/increase of railway traffic volume) needs to be assessed separately from the Facility's Stationary noise.

Continued…

[5] CTA 2011, Methodology section

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV13. Noise Assessment Guidelines for Stationary Noise** a) An update to the EIS should include a consideration of: • CTA requirements for Intermodal Facilities, • NPC-300 for stationary sources, • the Town of Milton Noise By-law, and • the RAC/FCM Proximity Guidelines b) The updated EIS should include: • Predictions of hourly sound levels from stationary noise sources (L_{eq} (1 hr)) • The worst-case hourly Leq sound levels from stationary noise sources (Continuous Noise) • An assessment of the tonality of noise sources • An assessment of Impulsive sound levels, using Logarithmic Mean Impulse Sound Level for the analysis • Comparison of predicted sound levels versus guidelines based on prevailing ambient background sound levels	The FTA and HC guidelines adopted in the assessment do not meet the requirements of the Canadian Transportation Agency (CTA) and appear to under-predict the potential for noise impacts. In addition, it appears that the NPC-300 guidelines, Town of Milton Noise By-law and RAC/FCM Proximity Guidelines are applicable and therefore should have been considered in the assessment.

2.3.2 Adjustments for Impulsive and Tonal Railway Noises

Rail yard operations including intermodal terminal operations include a number of impulsive noise sources such as knuckle thumps (noise from rail car couplers during starting or stopping) as well as noise from trains passing over switches, cross overs and other special track work features.

In its analysis of impulsive noise levels, CN made an adjustment of +5 dB to the predictions. This is too low. In accordance with CTA 2011 and ISO 1996-1, rail noise impulses are a "highly impulsive" source, and a +12 dB adjustment is recommended.

Another source of impulsive noise will be compressors. Compressed air is understood to be available on the work pads, and will be housed within a metal clad compressor building, located near the administrative building and maintenance garage (per Section 3.3.2 of the Main EIS). As a compressor is typically considered to be a significant noise source, an assessment of the compressor noise is required. Alternatively, a justification is required to confirm insignificance of the noise source at the surrounding noise sensitive receptors.

Train shunting is another example of an impulsive noise source. CTA 2011 lists the impulse sound power level of train shunting as 111 dB. However, the EIS uses 103 dB in its modeling. This should be explained.

A common source of complaint with respect to operations such as this is back-up alarms. There is no consideration of back-up alarms in the EIS other than the statement "*Back-up alarms were not considered separately in this assessment. Due to their intended use (safety warning), environmental noise effects of backup alarms are generally exempt from assessment*."

The EIS should discuss the equipment for which back up alarms will be utilized and indicate means as to how their offsite audibility can be mitigated. Sometimes operations can be staged to minimize reverse operations, for example, and there are alternate technologies available. Mitigation measures should be included in Appendix G (Mitigation).

As well, under MOECC NPC-104 noise guidelines, a +5 dB adjustment for tonal noise should be applied. Trains travelling over turns produce a noise known as "wheel squeal", which is a highly tonal noise. Appendix E.10 of the EIS states that "moderate wheel squeal" was considered in the analysis. However, wheel squeal is not listed as one of the sources in Table 4.5 of the EIS, which documents the noise sources considered in the analysis. Therefore, it is impossible to confirm what a "moderate" level of wheel squeal means, or if it was included in the analysis.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV14. Impulsive Noise** Please adjust all projected impulsive sound levels for railway noises by adding 12 decibels.	The CTA and ISO 1996-1 guidelines require an adjustment of projected sound levels for rail noises to be adjusted by adding 12 decibels. This is required to prevent the under-prediction of facility impacts.
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV15. Noise from Compressors** Please include noise from compressors in the analysis of operational noise. If CN is taking the position that compressor noise will not be significant, please provide the rationale.	Additional information on sound power noise emission levels used in the analysis must be provided to confirm noise modelling was completed appropriately.
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV16. Train Shunting** Please explain why lower-than-typical noise emissions levels were used in the analysis for train shunting (103 dB instead of 111 dB).	Additional information on sound power noise emission levels used in the analysis must be provided to confirm noise modelling was completed appropriately.
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV17. Back Up Beepers** Please provide a discussion on the effect of backup beepers and their effect on potential noise disturbance.	Additional information on sound power noise emission levels used in the analysis must be provided to confirm noise modelling was completed appropriately.
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.9	**RNV18. Wheel Squeal** Please provide additional information on how wheel squeal was included in the analysis (i.e. what does “moderate wheel squeal” mean?) and identify whether the appropriate tonal penalty of +5 dB was also included.	Additional information on sound power noise emission levels used in the analysis must be provided to confirm noise modelling was completed appropriately.

2.3.3 Assumptions for Other Stationary Noise Levels

In its noise modelling, CN listed a number of Terminal and Mainline Noise Source Sound Power Levels listed in Table 4.5 of EIS Appendix E.10. However, these appear lower than those typically used in similar assessments. For instance, for idling single and double locomotives, the CTA 2011 document lists the Sound Power Level of a single idling diesel locomotive as 107 dBA. However, the EIS lists it as 94 dBA.

As well, certain noise sources were modelled as multiple units in operation. Idling locomotive noise is currently modelled as a total of three (3) units, in a more central location of the site, which would tend to diminish the noise impact at the PORs. It is not clear in our review of the main EIS or Appendix E.10 of the EIS how this number or location of locomotives was determined. Typical railway data provided by CN for use in land-use planning assessments generally states that freight trains consist of up to four locomotives and 140 cars.

In our opinion, the typical and worst-case locations of the locomotives is expected to be near the ends of the work pads, closest to the residential receptors (see the figure below).

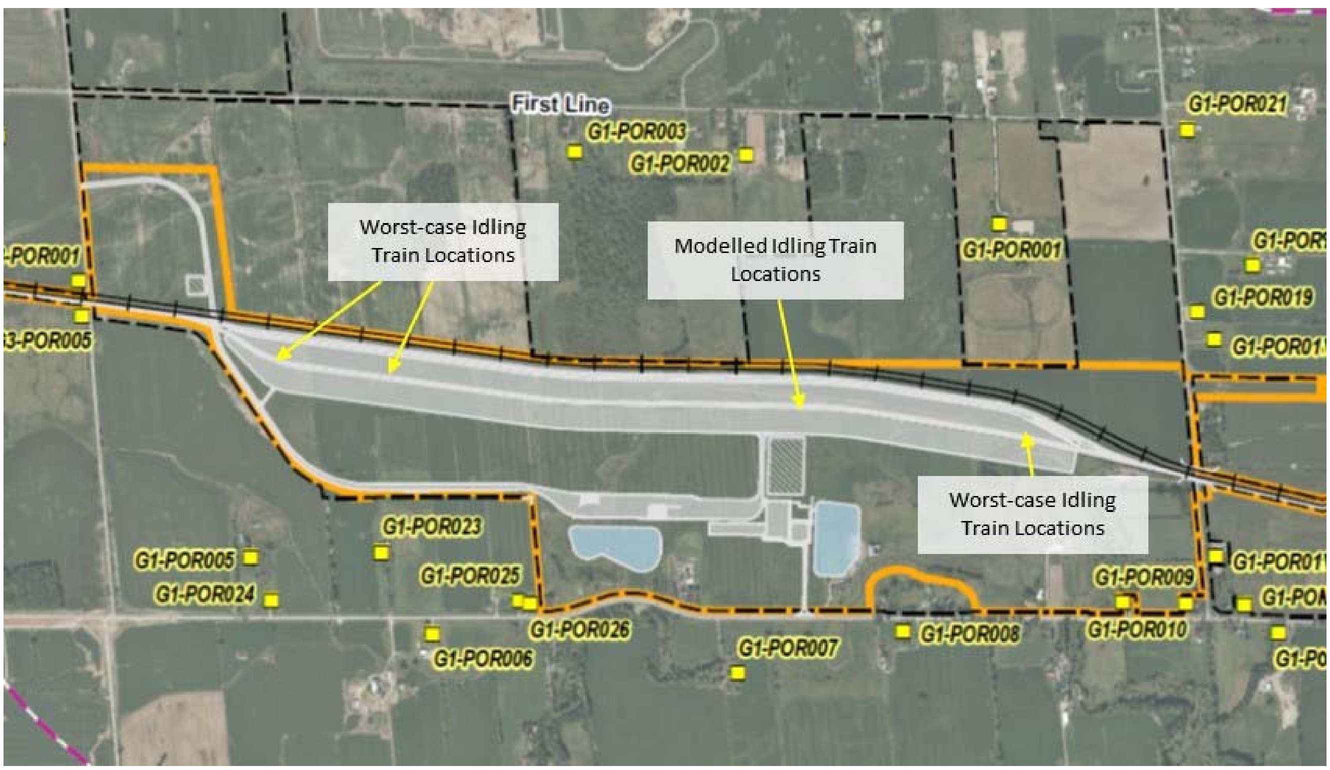

Figure 11: Anticipated Worst-Case Idling Locomotive Locations

In addition, the potential for two (2) trains to be on site at the same time due to the twinning of the main line is considered to be a possible worst-case condition, in which up to eight (8) idling locomotives would be expected.

A justification for the number of locomotives and location of locomotive is required to confirm the worst-case operational noise has been considered.

In addition, in regard to the noise impact of idling trucks, a sound power level of 107 dBA was provided for an idling truck noise source in Table 4-6 of the EIS App E.10. It is not clear how the idling truck noise was modelled for the 140 queued trucks (section 3.4.2.1, main EIS), and if the sound power level or modelling inputs are considered appropriate. Additional information is required to confirm this source has been assessed properly.

As well, a total of 80 reefers (refrigerated trucks or containers) have the potential to be used within the terminal (Table 1.1, AppE.10 of the EIS), which includes both International and Domestic Reefers. A sound power level of 104 dBA and 106 dBA were provided in Table 4-6 of the EIS App E.10 for Domestic and International Reefers, respectively, which is considered appropriate. Based on a review of Figure 4 of App E.10 of the EIS, each of the Domestic and International Reefers are modelled as single point sources. It is not clear how the number of reefers was modelled for each set of sources, and if the sound power level or modelling inputs are considered appropriate. Additional information is required to confirm these sources have not been underestimated.

Similarly, the use of Engine Brakes (also known as Jake Brakes) for deceleration of trucks is a common source of complaint with regard to truck traffic, both on site and on public roadways. The use of Engine Brakes was not considered in the EIS. The EIS should explain how and why Jake Brakes are typically utilized and indicate means as to how their offsite audibility can be mitigated, through controlling road grades and intersections and driver training for example. Mitigation measures should be included in Appendix G.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV19. Idling locomotives** Please explain why lower-than-typical sound power noise emission levels were used in the analysis for several significant sources, such as idling locomotives. As well, please explain why the number and location of idling locomotives used in the analysis does not appear to be consistent with a predictable worst-case impact assessment. For example, in the information provided for land-use planning assessments, CN typically specifies that trains contain 4 locomotives rather than 3.	Additional information on sound power noise emission levels used in the analysis must be provided to confirm noise modelling was completed appropriately.
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV20. Trucks and Reefers** The EIS is unclear on how the numbers of idling trucks and refrigeration units were modelled. Please provide additional information.	Additional information on sound power noise emission levels used in the analysis must be provided to confirm noise modelling was completed appropriately.
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV21. Engine Brakes** Please provide a discussion on the effect of engine brakes and their effect on potential noise disturbance, as well as proposing mitigation measures to reduce their impact.	Additional information on sound power noise emission levels used in the analysis must be provided to confirm noise modelling was completed appropriately.

2.3.4 Modelling Parameters

The EIS relies on noise modelling to predict future noise levels. However, relatively little information was provided to assess whether the modelling has been sufficiently performed or has considered all relevant parameters. In particular, there are a number of key parameters which have not been discussed in the EIS, which have the potential to significantly affect predicted off-site sound levels.

a. Terrain

Terrain can affect the predictions of noise. Natural terrain features such as berms and barriers or in-cuts can provide acoustical screening. The effectiveness of designed noise mitigation measures such as berms and barriers are significantly affected by the base elevations of the sources, receptors and mitigation measures.

The Cadna/A noise modelling package can use digital terrain data to account for these effects; however, from the EIS documents, it is uncertain if terrain data was included in the analysis.

b. Ground Absorption

Acoustically absorptive terrains, such as grass and fields, and acoustically reflective terrain, such as pavement, hard packed soil and gravel, and water, can affect off-site noise levels. Appendix E.10 of the EIS notes that a combination of absorptive and reflective ground was used. However, the specific values of ground absorption used ("G" values) are not provided, nor is a map provided showing the locations of either reflective or absorptive areas considered in the analysis.

c. Meteorological Conditions

Temperature and Relative Humidity affect the atmospheric absorption of sound, which can affect off-site predicted sound levels. Typically, predictable worst-case values of 10°C and 70% R.H. are used. These are representative of average Ontario conditions, and also provide worst-case predictions. The values used in the EIS noise analysis were not provided.

d. Reflections

Reflections off of vertical surfaces such as buildings can increase off-site sound levels. Typically, an "order of reflection" of at least 1 is used in noise assessments, (accounting for primary reflections off of vertical surfaces, but not retro-reflections between nearby walls). The values used in the EIS noise analysis were not provided.

e. Model Calibration

Section 4.3.1 of EIS Appendix E.10 mentions that the operational noise model was "calibrated using on-site measurements". It is uncertain as to what this means, since the facility is not currently in existence. The specific adjustments that were made to the noise model to "calibrate" it are not provided.

f. Ontario-Specific Modelling Adjustments for Noise Barriers

In order to provide a predictable worst-case noise assessment, noise modelling assessments conducted in Ontario for MOECC review use specific adjustments to the algorithms set out in the international standard ISO 9013-2 to adjust barrier effects, including "No negative path length distance" and "No subtraction of negative ground attenuation". The EIS does not state if these adjustments are used.

2.3.5 Additional Modelling Data

The EIS should also be updated to provide the following additional data, which is also necessary to understand how the calculations and analyses were performed.

- The Cadna/A computer noise models used in the assessments
- The overall and 1/1-octave sound power data used in the analysis for each of the modelled source locations shown in EIS Appendix E.10
- Copies of the calibration certificates for all measurement equipment used for ambient background noise and vibration measurements.
- For the measurements of equipment which were conducted at the Montreal Hub, copies of the raw measurement data, calibration certificates, and all sound pressure/intensity to sound power calculations.
- Detailed descriptions of the assessment scenarios assumed in the analyses (i.e., which sources have been combined with others versus assessed separately; the number of vehicles which have been assumed, etc.)

2.3.6 Insignificant Noise Sources

In general, sources considered to be insignificant contributors to the operations or construction activities should be mentioned and listed separately. By doing so, this will confirm all noise sources for the project were considered, and no sources were inadvertently omitted.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV22. Modelling parameters** Please provide specific modelling information and parameters that have not been provided in the EIS: terrain effects, ground absorption, reflections, meteorological conditions (temperature and relative humidity), and noise barrier settings.	This information is needed so that the noise modelling can be assessed.
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV23. Further information and documentation on noise modelling** Please provide information on the “model calibration” which is referenced in EIS Appendix E.10. Explain how were the modelling predictions were adjusted, as well as providing the documentation set out below. a) Please provide the resulting updated Cadna/A computer noise models used in the assessments b) Please provide the overall and 1/1-octave sound power data used in the analysis for each of the modelled source locations shown in EIS Appendix E.10. c) Please provide copies of the calibration certificates for all measurement equipment used for ambient background noise and vibration measurements. d) For the measurements of equipment which were conducted at the Montreal Hub, please provide copies of the raw measurement data, calibration certificates, and all sound pressure/intensity to sound power calculations.	Additional information on sound power noise emission levels used in the analysis must be provided to confirm noise modelling was completed appropriately

Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV24. Noise Sources Deemed Insignificant** A list of insignificant sources should be included.	This is needed so that the sufficiency of the noise modelling can be considered.

2.3.7 Assessment of Haul Route Noise Impacts

Increased truck traffic on public roadways is often a source of public concern related to safety and increased noise. Offsite truck traffic is not considered in the EIS.

However, it is common practice in Ontario to consider the amount of additional noise produced along public roadways carrying off site haul traffic as well as other factors in the selection of the haul routes. Since 800 trucks daily are proposed to be associated with the facility, there is a potential for an environmental change near the haul routes and the attendant potential for a significant adverse environmental effect.

An example of how this matter can be addressed is contained in the Ontario *Noise Guidelines for Landfill Sites*, October 1998. That Guideline requires a detailed quantitative assessment of noise impact on individual receptors along alternative haul routes and they number of affected receptors along the alternative haul routes. It also states that the Municipality and affected residents must be clearly informed of any potential noise impact.

A quantitative analysis as per the Ontario *Noise Guidelines for Landfill Sites* should be conducted, the significance of any sound level increases due to off-site haul traffic assessed and used to inform the selection of the haul route.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV25. Haul Route Noise Assessment** An assessment of potential impacts from off-site haul routes should be undertaken. The MOECC *Noise Guidelines for Landfill Sites*, which deal with off-site haul routes, may be used as being representative of what is generally considered to be acceptable.	Addition of the 800 facility trucks daily has the potential to increase noise levels along the off-site haul routes for the Facility. An assessment of environmental change is required.

2.3.8 Operational Vibration Assessment Criteria

The vibration effects assessment work was provided in EIS Appendix E.18. The vibration effects due to the change in track configuration (i.e., the mainline track twinning) has been assessed in EIS Appendix E.18 by assessing:

1) The change in vibration levels from existing conditions, and
2) The overall vibration level, compared against ISO 2631-2 and US Federal Transit Administration (FTA) criteria.

For new residential developments located adjacent to railway lines, CN has its own vibration guideline, which recommends that an overall vibration level of 0.14 mm/s RMS, measured between 4 Hz and 200 Hz, be met. While the guideline value is essentially the same as the ISO 2631-2 and (correct) FTA limits, its existence should be acknowledged in the EIS.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Vibration Impacts EIS Guidelines Section 6.3.1, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.18	**RNV26. Operational Vibration Criteria** Include reference to CN's guidelines for new residential and commercial developments adjacent to railway operations.	In assessing operational vibration impacts, the EIS Appendix E.18 has adopted U.S. Federal Transit Administration (FTA) and ISO 2631-2 guidelines. CN's own guidelines for vibration impacts on new residential and commercial developments should also be discussed.

2.3.9 Operational Vibration Impact Assessment

The entire assessment of potential operational vibration impacts is based on the measurement of four train pass-bys, each measured at a different location. Vibration propagation through the soil is highly dependent on the type of soil (clays, gravels, rock, etc.) which can vary tremendously by location. Given that the project extends for more than 7 km along the main line, it is highly unlikely that vibration propagation will be the same at the northern-most existing receptors, as they are at the closest measurement location, 3.6 km away.

Additional vibration measurements should be conducted, especially at the north end of the project near existing residences and within the Boyne Subdivision area, where the majority of new approved residential development will be built.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Vibration Impacts EIS Guidelines Section 6.3.1, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.18	**RNV27. Operational Vibration Impact Assessment** Conduct additional vibration measurements to establish existing conditions along the railway corridor. The focus should be receptors at the north end of the project near existing residences, and within the Boyne Subdivision area	Vibration propagation through soil is highly dependent on the type of soil. Given the size of the site, the four different measurement locations are not expected to be representative of the entire site.

2.3.10 Mitigation Measures – Operational Noise and Vibration

Section 5.1.2 of EIS Appendix E.10 and portions of Appendix G outline the recommended mitigation measures for the project. The focus of the operational noise mitigation is on physical mitigation measures in the form of noise berms to be installed both at the proposed intermodal terminal, and off-site by future developers.

The EIS then discussed “administrative” noise mitigation measures such as traffic speed reductions and training to avoid excessive impulsive events. While such measures can sometimes be used to reduce the intensity of noise, they are reliant on on-going training and their effectiveness in reducing noise levels is difficult to quantify.

In the mitigated results scenario supplied in Section 5.1.3 of EIS Appendix E.10, it not known what adjustments were used to account for these “administrative” measures, versus reductions due to physical measures such as noise barriers.

Given the numerous insufficiencies in the operational noise analysis discussed above, it is our opinion that the noise mitigation measures outlined in the EIS documents are unlikely to be sufficient to ensure that all applicable noise guidelines are met. As a result, the effectiveness of mitigation measures should be reconsidered after the requested re-analysis is completed.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Operational Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV28. Operational Noise Mitigation Measures** A re-assessment of noise mitigation measures is required, following a re-analysis of the operational noise	As the operational noise impact assessment was considered to have numerous insufficiencies, the effectiveness of the noise mitigation measures could not be determined.

2.4 CONSTRUCTION NOISE AND VIBRATION IMPACTS

2.4.1 Noise Assessment Criteria

The construction noise criteria applied in the EIS includes the FTA Guidelines and Health Canada Guidelines, as indicated in Section 4 of EIS Appendix E.10. In the EIS, Construction noise impacts were assessed based on the L_{dn} sound levels, and a comparison to the baseline ambient levels. In our opinion, this was inappropriate.

2.4.1.1 Application of L_{dn} Metrics to Construction Noise Impact Assessments

As indicated in Section 4.3.2 of EIS Appendix E.10, the majority of construction activity will occur between 7 am and 7 pm (Phase 1 and Phase 2) with some work extended to 9 pm. During Phase 3, only paving operations are understood to potentially occur during all periods of the day.

Given that the majority of construction activity occurs during the daytime period, a predicted L_{dn} sound level will result in reduced noise levels when averaged against the periods of inactivity. Therefore, in our opinion, an assessment of construction activity impacts based on L_{dn} sound levels and criteria (FTA and Health Canada) is considered inappropriate and a separate assessment for daytime and night-time impacts should be performed. This would better reflect realistic scenarios.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Construction Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV29. Application of L_{dn} metrics in Construction Noise Assessment** An update to the assessment is should be provided, based on separate daytime and night-time impacts (L_{eq} Day and L_{eq} Night values).	CN applies the FTA criteria for facilities and transitways, as well as the HC Draft Guidelines to assess constuction noise using L_{dn} sound levels. Assessment of construction noise impacts using the L_{dn} criteria is considered inappropriate, given the construction activities are typically during daytime hours only. This would result in an under-estimation of actual impacts.

2.4.1.2 Additional Criteria Which Should Be Considered – Construction, Town of Milton Noise By-Law

As discussed in **Section 2.2.1.3**, the proposed project lies within the local jurisdiction of the Town of Milton. A discussion of any restrictions on construction activities due to the Town of Milton Noise By-law, should be completed. This includes restrictions on allowable times for construction activities.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV30. Town of Milton Noise By-law** A discussion of any restrictions on construction activities due to the Town of Milton Noise By-law, should be completed.	The Town of Milton Noise By-Law appears applicable, as the proposed project is located within this jurisdiction.

2.4.1.3 Additional Criteria Which Should Be Considered – Construction, MOECC NPC-115

The MOECC stipulates limits on noise emissions from individual items of equipment, rather than for overall construction noise. During construction, if noise complaints occur, sound emission levels for the various types of construction equipment used should be checked to ensure the specified limits in MOECC Publication NPC-115 – “Construction Equipment” are met. A discussion of the proposed construction activities, relative to the NPC-115, should be completed.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Construction Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV31. MOECC NPC-115 Noise Guidelines** A discussion of whether the planned construction equipment meets the standards set out in NPC-115 should be included, as well as a commitment to measure construction equipment noise emission levels should noise complaints occur.	The MOECC NPC-115 guideline appears to be applicable to the proposed project, and should be considered in the assessment.

2.4.2 Adjustments for Impulsive Noises During Construction

Appropriate adjustments for impulsive noise from construction activities were not applied. In particular, impulsive events such as tail gate slams from gravel trucks were not included in the analysis. Such noises are high-energy impulsive sources, which would require a +12 dB adjustment in accordance with HC’s guidance and ISO 1996-1. As such, the potential annoyance of construction has been under-predicted.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Construction Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV32. Adjustments for Impulsive noises during construction** The application of adjustments for impulsive noises during construction should be performed. In particular, high energy impulsive noises such as tailgate slams should be included in the modelling. Per ISO 1996-1, appropriate adjustments for high-energy impulsive noise impacts should be included (+12 dB).	Adjustments in the modelling for impulsive events help to reduce the likelihood that potential noise effects will be underestimated.

2.4.3 Lower-Than-Typical Sound Emissions for Noise Sources

A number of Construction Noise Source Sound Power Levels listed in Table 4.7 of EIS Appendix E.10, are lower than those typically used in similar assessments based on our experience. These include:

- Rock Truck sound power level of 101 dBA is considered to be lower than expected. A Sound Power Level in the range of 120 dBA is anticipated for a Rock Truck pass-by.
- Concrete Delivery sound power level of 101 dBA is considered to be lower than expected, when compared to standard levels pneumatic cement powder unloading. In addition, this source is typically tonal, in which there is no indication of a penalty added in the analysis. A sound power level of 111 dBA (116 dBA including tonal penalty) is anticipated, based on our experience.
- Auger/Drill Rig is currently assumed to be representative of the Horizontal Directional Drill (HDD) rig used during the pipeline replacement in the EIS. An overall sound power level of 121 dBA for the HDD Entry Pad is anticipated based on historical Novus measurements, which is higher than the 114 dBA sound power level in the AppE.10 of the EIS. The Entry Pad sound level includes the HDD rig, dewatering equipment, vacuum truck, and excavator.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Construction Noise Impacts nstruction Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV33. Construction Noise Modelling Noise Emissions** The sound power noise emission level of several noise sources were identified as being lower than those typically used. This includes, but are not limited to Rock Trucks, Pneumatic Delivery of Cement Powder, and HDD operations. The Construction Noise Assessment should be updated with more typical sound levels for these sources.	Additional information on sound power noise emission levels used in the analysis must be provided to confirm noise modelling was completed appropriately.

2.4.4 Source Type in Noise Modelling

The noise modelling methods used for construction noise impact assessment are not clear. Based on the information provided in EIS Appendix E.10 and a review of Figure 5, Sub-Appendix B, all construction activities appear to be modelled as a combined area noise source spread over the entire site. The exception is the Cement Plant, which has been included as a single point source.

This approach is generally inappropriate. Given the large size of the site, it is unlikely that equipment will be active over the entire site on any given day. Work would be concentrated in particular areas which would change on a day to day basis as the construction activities proceed. In addition, certain activities would be localized and should be assessed individually. For example, noise impacts from the Britannia Road Grade Separation over the CN Mainline would be underestimated, if the construction equipment were dispersed over the entire facility.

In assessing construction noise impacts, several scenarios therefore need to be considered, as the construction activity moves around the site, to establish predictable worst-case levels at all receptors. Only operational noise results are shown in Appendix E.10. Noise impact contours for each phase of construction should be included in subsequent versions of the noise report.

Based on our review, insufficient information has been provided in the EIS to confirm whether the construction noise impacts were assessed appropriately.

2.4.5 Construction of Grade Separations

Two (2) grade separations are identified in Section 3.4.1.4 of the main EIS. A new overpass across the CN track for truck access and a new underpass to allow for Lower Baseline roadway traffic to pass under the existing mainline. As this construction activity is fixed and a component of both Phase 1 and Phase 2 of construction, this activity should be included as a distinct noise source / assessment scenario in the construction assessment.

This is of particular relevance, given the close proximity of residential homes near the Lower Baseline crossing (please see **Figure 19**).

2.4.6 Pipeline Relocation and Horizontal Directional Drilling

As indicated in the Main EIS (Section 3.3.15) Horizontal Directional Drilling will be used to relocate the existing pipeline. As this is a fixed construction operation, with the potential to remain at a single location for several months, this operation should be included with the construction noise assessment as a distinct noise source or sources.

The Entry Pad is considered to be the most significant noise source, and would include the Horizontal Directional Drill Rig, excavator, generator, dewatering rig and vacuum truck. The Exit Pad would not be as significant, as only an excavator or backhoe would typically idle for the majority of the time.

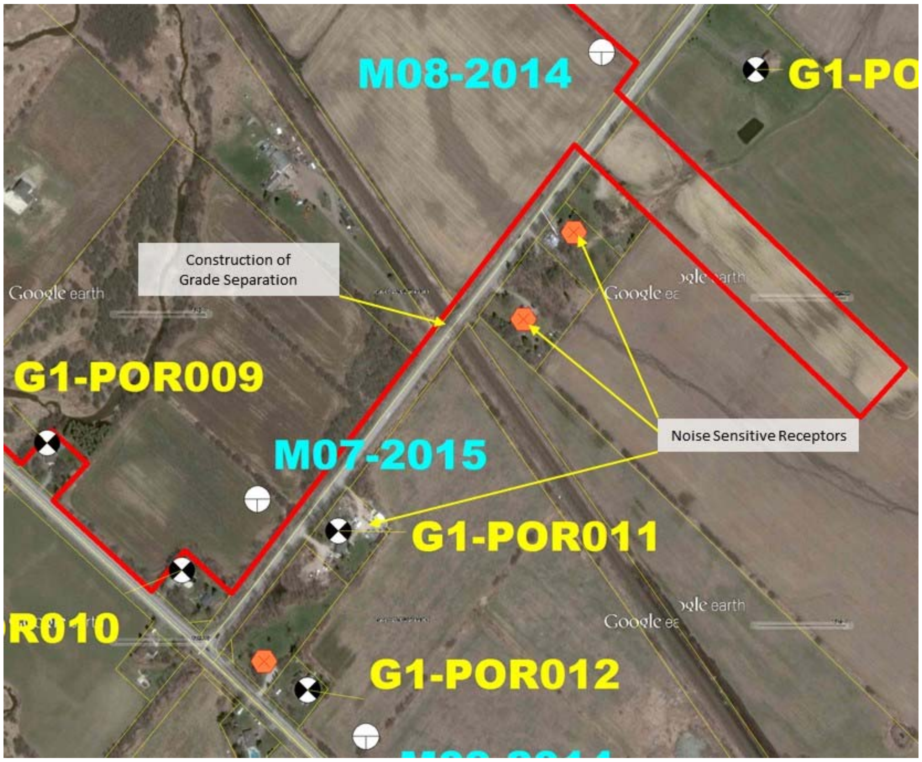

Figure 12: Relative location of Lower Baseline Grade Separation Construction Activity to Surrounding Noise Sensitive Receptors

2.4.6.1 Tailgate Slams During Construction

Gravel deliveries are anticipated to be completed using typical dump trucks, in which unloading of material would include tailgate slams. Given the high sound power level of a tailgate slam (approx. 130 dBAI), this source is considered to be significant during the unloading of material. In addition, Table 1.2 of Appendix E.10 identifies up to 20 trucks could be in use simultaneously, which has the potential to be a frequent occurrence for tailgate slams. In our opinion, tailgate slam noise should be included with the Construction Noise Study, and assessed as an impulsive noise source.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Construction Noise Impacts EIS Guidelines Section 6.2.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV34. Construction Noise Modelling - Noise Source Locations** For the majority of sources, the construction noise assessment appears to be model the sources as a single large area source spread over the entire site, with the Cement Plant as a the only fixed point source. The construction noise impacts should be updated with localized concentrations of noise sources to reflect the progression of major construction activities, and to provide a predictable worst-case assessment at off-site receptors.	It is not appropriate to treat construction noise as evenly spread out over the entire site. It is unlikely that any equipment during construction will be active over the entire site on nay given day. Instead, construction work tends to be focused on particular locations on the site. Therefore, adjustments should be done for the modelling to reflect this. Spreading out the noise over a large surface area will underestimate the impact.
		RNV35. Construction Noise Modelling – Fixed Construction Sites Construction activities considered to be fixed for extended periods of time should be assessed as a distinct set of noise sources. This includes the two (2) grade separations, and the pipeline relocation.	Such activities should be treated as distinct noise sources from the general construction activities, as they are focused on a particular spot in the site for extended periods of time.
		RNV36. Construction Noise Modelling - Tailgate Slams Tailgate slams are anticipated impulsive noise sources during gravel deliveries, and any other on-site activities with truck unloading. The Construction assessment is required to include tailgate slams, since continuous activity from trucks is anticipated during all phases of construction.	Tailgate slams have a high sound power level, frequent occurrence, and will occur over the majority of the site during construction.

2.4.7 Construction Vibration Assessment

The Construction vibration effects assessment work is contained in EIS Appendix E.18. There are several issues with the sufficiency of assessment. These issues are discussed in detail below. In summary:

1) Construction Vibration Criteria: Additional vibration criteria related to potential damage should also be assessed. The potential for damage would extend to structures other than residences. In addition, vibration effects on fish should also be examined.

2) Points of Reception: Not all existing residences have been included in the assessment. The assessment should be extended to examine existing residences located on CN-owned lands.

4) Damage to Structures: The construction vibration assessment should be extended to consider the potential for damage impacts to structures other than residences. In addition, vibration effects on fish should also be examined.

2.4.7.1 Additional Construction Vibration Criteria Which Should Be Considered – OPSS 120

The EIS Appendix E.18 only considers potential annoyance impacts on off-site residences on non-CN owned properties. It does not set limits for or consider vibration impacts on off-site structures, such as roadways, utilities, etc., which may be affected by project construction. Vibration damage limits in terms of PPV vibration levels should have also been considered.

Ontario Provincial Standard Specification OPSS 120 sets out general vibration limits for the use of explosives, to avoid damage to structures. Although blasting is not anticipated at this facility, the possibility of its use still remains. In addition, the limits can also be used to assess the probability of damage from other construction activity. We recommend that OPSS 120 or other damage based construction vibration criteria be included in the EIS construction vibration assessment.

2.4.7.2 Additional Construction Vibration Criteria Which Should Be Considered - DFO

The Canadian Department of Fisheries and Oceans (DFO) has published *Guidelines for the Use of Explosives In Or Near Canadian Fisheries Waters*. These guidelines provide appropriate limits for vibration to avoid damage to sensitive fish habitat. Again, while blasting is not anticipated at this facility, the limits can also be used to assess the probability of damage from other construction activity. We recommend that the DFO criteria or other fish-based construction vibration criteria be included in the EIS construction vibration assessment.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Construction Vibration Impacts EIS Guidelines Section 6.2.1, 6.3.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.18	**RNV37. Construction Vibration Criteria** The construction vibration assessment should be extended to also consider the potential for damage to structures, including structures other than residences, and fish and fish habitat. Ontario OPSS 120 or other damage-based criteria should be considered. In addition, the Department of Fisheries and Oceans (DFO) *Guidelines for the Use of Explosives In Or Near Canadian Fisheries Waters* could be considered.	In assessing operational vibration impacts, the EIS Appendix E.18 has adopted U.S. Federal Transit Administration (FTA) guidelines for annoyance at residential receptors. Additional guidelines and assessments for structural damage should be included, as well as damage to fish and fish habitat

2.4.7.3 Construction Vibration Impact Assessment

The construction vibration study should be extended to consider potential vibration impacts on all existing residences, including those located on CN-owned property. This is especially a concern for residences located near the two proposed grade separations, where construction will be located nearby for extended periods of time.

The construction vibration assessment should be extended to also consider the potential for damage to structures, including structures other than residences.

The potential for vibration impacts on fish habitat should also be considered.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Construction Vibration Impacts EIS Guidelines Section 6.2.1, 6.3.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.18	**RNV38. Construction Vibration Impact Assessment** Provide an updated assessment of the potential construction vibration impacts of the proposed intermodal facility. In conducting the re-assessment, the following issues must be addressed: a) The construction vibration study should be extended to consider potential vibration impacts on all existing residences, including those located on CN-owned property. This is especially a concern for residences located near the two proposed grade separations, where construction will be located nearby for extended periods of time. b) The construction vibration assessment should be extended to also consider the potential for damage to structures, including structures other than residences such as pipelines and other utilities. c) The potential for vibration impacts on fish habitat should also be considered.	In assessing operational vibration impacts, the EIS Appendix E.18 has adopted U.S. Federal Transit Administration (FTA) guidelines for annoyance at residential receptors. Additional guidelines and assessments for structural damage should be included, as well as damage to fish and fish habitat0-

2.4.8 Mitigation Measures – Construction Noise and Vibration

Given the insufficient data and analyses discussed above, the appropriateness of Construction noise mitigation measures (maximum allowable sound levels and berming in Fig 5 of App E.10) cannot be determined. Following an update of the construction noise modelling, additional comments regarding the requirements and types of noise mitigation will be provided.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Construction Noise Impacts EIS Guidelines Section 6.2.1, 6.3.1, 6.3.4, 6.3.5 Halton Brief, table D.7	Main EIS Appendix E.10	**RNV39. Construction Mitigation** Re-assess the construction noise mitigation, following a re-assessment of the construction noise modelling.	A review of the construction noise mitigation could not be completed, given insufficient information was provided.

2.5 IMPACTS ON HUMAN HEALTH

It is unclear if CN has considered noise exposure to be relevant to human health. This seems contrary to the EIS Guidelines. In Section 6.3.4 and 6.3.5, they indicate that noise exposure is a key component of human health. This is consistent with Health Canada's guidance documents on noise effects (HC, 2011). Health Canada considers annoyance with noise to be a health effect, as well as other health effects such as noise-induced hearing loss and sleep disturbance.

However, in section 6.4.1 of the EIS, which deals with the predicted changes to the atmospheric environment (including noise), only air quality is listed as relevant to human health. The "Basis for Inclusion as a VC (Valued Component)" column states that:

> *"No other exposure pathways (i.e., drinking water quality and noise exposure) of concern are applicable to the evaluation of human health."*

As such, even though a noise assessment has been completed, it is uncertain that if results of the noise assessment are used in any way to address potential impacts on the Valued Components.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Healthy Communities, and Noise on Residential Sensitive Land Uses EIS Guidelines 6.3.4 and 6.3.5 Halton Brief, table D.7	EIS 6.4.1	**NV40. Noise as a VC in Human Health Assessment** Provide an explanation as to why noise has been excluded as an exposure pathway in terms of health effects. Alternatively, update the human health risk assessment to incorporate noise exposure.	The EIS Guidelines require that any Human Health Risk Assessments consider the impact of noise exposure as an exposure pathway. However, it appears that only air quality has been considered as relevant to human health. The relevant rationale should be provided.

3.0 CONCLUSIONS

Based on our review of the EIS documentation, the information provided by CN is not sufficient to ensure that significant noise and vibration impacts will not result from the construction and operation of the proposed intermodal facility. The methods and analysis used are not consistent with CTA requirements, or the requirements of the Province of Ontario and the Municipality. In our expert opinion, the analysis under-predicts the potential for noise impacts, and therefore the proposed mitigation measures are unlikely to be sufficient.

4.0 REFERENCES AND DOCUMENTS REVIEWED

Canadian Environmental Assessment Agency (“CEAA”), “Guidelines for the Preparation of an Environmental Impact Statement, pursuant to the Canadian Environmental Assessment Act, 2012, Milton Logistics Hub Project, Canadian National Railway Company”, dated July 2015.

CEAA Supplemental Information Request #1, “Requirements for Additional Information for Canadian National Railway Company for the Milton Logistics Hub Project Environmental Assessment”, dated March 15, 2016.

Canadian Transportation Agency (“CTA”) *Guidelines for the Resolution of Complaints Concerning Railway Noise and Vibration*, dated October 2008.
https://www.otc-cta.gc.ca/eng/rail-complaints

Canadian Transportation *Railway Noise Measurement and Reporting Methodology*, dated August 2011.
https://www.otc-cta.gc.ca/eng/railway_noise_measurement

Department of Fisheries and Oceans (DFO) *Guidelines for the Use of Explosives In Or Near Canadian Fisheries Waters*, dated 1998.
http://www.dfo-mpo.gc.ca/Library/232046.pdf

Halton Municipalities, "Brief to the Project Review Panel: *Role of Halton Planning Framework within CEAA Panel Review of the CN Milton Logistics Hub Project*", dated June 2016.

Halton Region, *Halton Region Official Plan.*
www.halton.ca/planning_sustainability/plans_strategies_studies/haltons_regional_official_plan/

Halton Regional Official Plan Guidelines – *Noise Abatement Guidelines.*
http://www.halton.ca/common/pages/UserFile.aspx?fileId=121111

Halton Regional Official Plan Guidelines – *Land Use Compatibility Guidelines.*
http://www.halton.ca/common/pages/UserFile.aspx?fileId=121105

Health Canada ("HC"), *Useful Information for Environmental Assessments*, dated 2010.
http://publications.gc.ca/collections/collection_2015/sc-hc/H128-1-10-599-eng.pdf

Health Canada ("HC"), *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (DRAFT*), dated January 2011.
http://www.gov.mb.ca/sd/eal/archive/2012/summaries/5471_appendix2.pdf

International Standard ISO 1996-1: *Acoustics, Description, measurement and Assessment of environmental noise- Part 1: Basic quantities and assessment procedures*, dated August 2003 (Note: a new version was released March 2016).
http://www.iso.org/iso/catalogue_detail.htm?csnumber=59765

International Standard ISO 1996-2: *Acoustics, Description, measurement and Assessment of environmental noise- Part 2: Determination of environmental noise levels*, dated March 2007.
http://www.iso.org/iso/catalogue_detail.htm?csnumber=41860

Ontario Ministry of the Environment and Climate Change ("MOECC") Publication NPC-300: *Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning*, dated August 2013.
https://www.ontario.ca/page/environmental-noise-guideline-stationary-and-transportation-sources-approval-and-planning

Ontario Ministry of the Environment and Climate Change Publication NPC-233: *Information to be Submitted for Approval of Stationary Sources of Sound*, dated October 1995.
https://www.ontario.ca/page/information-be-submitted-approval-stationary-sources-sound-npc-233

Ontario Ministry of the Environment and Climate Change - Various guidelines and procedure publications published by the MOECC under the *Model Municipal Noise Control By-law*, dated August 1978, including:

- Publication NPC-101 – Technical Definitions,
- Publication NPC-102 – Instrumentation,
- Publication NPC-103 – Procedures (for measurements),
- Publication NPC-104 – Sound Level Adjustments,
- Publication NPC-115 – Construction Equipment,

https://archive.org/details/modelmunicipalno00ontauoft

Ontario Ministry of the Environment and Climate Change Guideline D-6 – *Compatibility Between Industrial Facilities & Sensitive Land Uses*, dated July 1995.
https://www.ontario.ca/page/environmental-land-use-planning-guides

Ontario Ministry of the Environment and Climate Change *Noise Guidelines for Landfill Sites*, dated October 1998.
https://www.scribd.com/document/338609097/09-5-MOE-1998-Draft-Noise-Guidelines-for-Landfill-Sites-for-Haul-Route-Analysis

Town of Milton Bylaw No. 133-2012, "A By-Law To Prohibit And Regulate Noise Within The Town Of Milton".
http://www.milton.ca/MeetingDocuments/Council/bylaws2012/133-2012%20Noise%20Control%20By-law%20and%20Repeal%20By-law%2016-84.pdf
Rail Association of Canada ("RAC") / Federation of Canadian Municipalities ("FCM") *Guidelines for New Development in Proximity to Railway Operations*, dated May 2013.
http://www.proximityissues.ca/asset/image/reference/guidelines/2013_05_29_Guidelines_NewDevelopment_E.pdf

Stantec Consulting Ltd., "Milton Logistics Hub, Environmental Impact Statement" (the "Main EIS Report"), dated December 7, 2015, including:

- Main EIS Appendix B – Figures.
- Main EIS Appendix C – Renderings.
- Main EIS Appendix E.9 – Technical Data Report, Baseline Ambient Noise Study.
- Main EIS Appendix E.10 – Technical Data Report, Noise Effects Assessment.
- Main EIS Appendix E.18 – Technical Data Report, Vibration Effects Assessment.
- Main EIS Appendix G – Mitigation Measures and Commitments.

Stantec Consulting Ltd., "CN Response to the Canadian Environmental Assessment Agency (CEAA) Information Request 1 Received – March 15, 2016", dated May 18, 2016.
United States Department of Transportation – Federal Transit Administration ("FTA") *Transit Noise and Vibration Impact Assessment Manual*, dated May 2006.

CN MILTON LOGISTICS HUB

REVIEW OF CN ENVIRONMENTAL IMPACT STATEMENT – AIR QUALITY

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Provided to: Region of Halton

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March 2017

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CN MILTON LOGISTICS HUB

REVIEW OF CN ENVIRONMENTAL IMPACT STATEMENT – AIR QUALITY

EXECUTIVE SUMMARY

I have been asked by the Regional Municipality of Halton, the City of Burlington, the Town of Halton Hills, the Town of Milton and the Town of Oakville ("Halton Municipalities") to provide a technical review, on matters of air quality, of the Environmental Impact Statement prepared by CN for the proposed Milton Logistics Hub. I focused on the sufficiency of the CN air quality and GHG reports, as well as relevant responses to the CEAA information requests current to the date of this report.

I reviewed the technical validity of the information, the methods and analysis used, and the conclusions regarding the significance of any environmental effects, proposed mitigation measures, and plans for related follow-up programs. In addition, the CN Air Quality (AQ) assessment has been done in response to CEAA requirements and therefore is subject to those requirements. Therefore, I also included a conformance check to the CEAA EIS Guidelines in my review.

My review of the CN AQ assessment is based on the on-site operations scenarios presented by CN as well as the off-site traffic levels assumed by CN in their various reports. Should any of these facets alter or increase in the future, it would nullify the results of this assessment and require a reassessment. In my review, I concentrated on the future operating scenario (I have numerous comments on CN's assessment for construction-related pollution; however to simplify my review, I have not included those comments in this review).

Most of my comments in this review are related to the methodology used and thus fall under section "Review of Methodology". In order to present the results of my review of the methodology, I have presented them in the approximate order one would normally conduct an AQ assessment. In each of those sections, it is requested that CN provide additional information to support the AQ assessment work.

CN did not assess all activities for all sources of air emissions nor did they assess all chemicals of potential concern from all relevant activities. The emission data provided was unclear, and did not seem to provide maximal emission estimates. The dispersion modelling could not be adequately reviewed due to the lack of information. The resultant AQ levels were either missing or could have been significantly underestimated. As a result, the health impact expert did not have complete information in order to conduct an appropriate health assessment. In summary, I believe that the air quality assessment component of the Main EIS, submitted by CN, is not currently sufficient to conduct a full review by the panel.

Overall I request a new evaluation, considering the numerous and various issues described in this report, as well as all accompanying model files for my review. I request that all revised information provided by CN be consolidated into a single AQ assessment report (with accompanying information). Upon provision of such information, and upon further review, I may have further questions.

CN MILTON LOGISTICS HUB

REVIEW OF CN ENVIRONMENTAL IMPACT STATEMENT – AIR QUALITY

QUALIFICATIONS

Airzone One Ltd., a consulting company located in Mississauga, Ontario, specializes in air quality services. It has offered environmental services since 1979, including air permitting and emissions reporting, ambient monitoring and modelling for the purpose of Environmental Assessments and Land Use Compatibility studies (for example), and laboratory analysis with CALA certification for air monitoring methods in relation to particulate matter and VOCs (Volatile Organic Compounds). Airzone also analyzes PAHs (polycyclic aromatic hydrocarbons) including B(a)P (benzo(a)pyrene). I am a Senior Air Quality Modeller for Airzone.

My position at Airzone entails conducting air quality assessments using dispersion modelling for environmental assessments (in Canada and internationally), land use compatibility assessments, permitting purposes and also for general air assessments. I have been in this position since 1999. As part of my experience, I have been involved in reviewing and providing commentary on the regulatory air permitting system in Ontario.

I have a B.Sc. (Honours) in Geology from Imperial College (London) and a Ph.D in Physical Geography from the University of Hull (UK) where my thesis was on modelling airborne particle dispersion. I spent four years conducting postdoctoral research at the University of Guelph and as a Natural Sciences and Engineering Research Council of Canada Visiting Fellow to a Canadian Government Laboratory spent with Environment Canada. During this time I focused my research on modelling particle dispersion in the air. I have several academic publications on the topic of airborne particles, and have taught Air Quality courses at Conestoga and Sheridan Colleges.

I have been retained as an air pollution dispersion modelling expert in approximately a half-dozen litigation (mainly land re-zoning) disputes, which have involved peer-reviews. I have assisted the Town of Oakville develop their Health Protection and Air Quality Bylaw, specifically aimed at assessing stationary facility emissions of fine particulate matter (“PM2.5”).

CN MILTON LOGISTICS HUB

REVIEW OF CN ENVIRONMENTAL IMPACT STATEMENT – AIR QUALITY

1. INTRODUCTION

1.1 Purpose of Review

I have been asked by the Halton Municipalities to provide technical review, on matters of air quality, of the assessment conducted by CN for the proposed Milton Logistics Hub ("Hub").

I reviewed the technical validity of the information, the methods and analysis used, and the conclusions regarding the significance of any environmental effects, proposed mitigation measures, and plans for related follow-up programs. In addition, the CN Air Quality Technical Data Report in Appendix E1 ("App. E1") and assessment has been done in response to CEAA requirements and therefore is subject to those requirements. Therefore, I also include a conformance check to the CEAA EIS Guidelines in my review.

My review of the CN App. E1 is based on the on-site operations scenarios presented by CN as well as the off-site traffic levels cited as induced by the project. Should any of these facets alter or increase in the future, it would obviate the results of this AQ assessment and require a re-assessment.

For Acronyms and Abbreviations, as well as a Glossary of Terms, see Appendix A.

1.2 Scope of Review

CN has provided 5 separate assessments related to AQ, all of which I reviewed; see Appendix B for full reference and shorthand used throughout:

1. CN's Report on Greenhouse Gases (June 17, 2016) (GHG report),

2. The main air quality technical data report (App. E1: Appendix E.1 - Milton Logistics Hub Technical Data Report - Air Quality),

3. The Traffic Impact Memo (Appendix C4 of the App. E1),

4. The CN response to CEAA information requests including AQ and Human Health Risk Assessments (HHRA) of "participating receptors" (Att. IR12 CN response May 18), and,

5. The CN response to CEAA information requests including a cumulative AQ assessment of "project, project traffic and public traffic" (Att. IR13-2 CN response Sept 30).

The App. E1 contains most of the available information about the assumptions made and is the primary focus of my review. It contained a cumulative AQ assessment of the project on-site emissions alone combined with air quality baseline data (but did not include emissions from project-related traffic off-site).

The Traffic Memo (Appendix C4) described an AQ assessment of off-site traffic and its sole impacts on AQ but it was not incorporated with the App. E1 assessment nor were its results passed along to the Health Impact Expert. I assumed that the Traffic Memo study has been superseded by the CN response (Sept 30 IR13-2), which included a cumulative AQ assessment of the project components emissions on-site and off-site and included traffic (project-related as well as baseline public traffic). Very little information was included on how this new AQ assessment was completed.

REVIEW OF CN ENVIRONMENTAL IMPACT STATEMENT – AIR QUALITY

The CN response (May 18) included AQ and HHRA assessments of "participating receptors", those that had not been examined in the App. E1 and the results were passed along to the Health Impact Expert.

In my review, I concentrated on the future operating scenario, once the Hub is fully implemented. To simplify my review report, I have not included my review of the AQ assessment of construction-related emissions. Emissions due to accidents were not reviewed as this was assumed to be a part of the "risk assessment". I also note that I have not cross-referenced the input data used in the App. E1 (such as the Review of Terminal-Generated Truck Traffic report) to check if the Hub operating conditions or traffic input data used are reasonable and correspond with data used in other parts of the EIS.

In order to present the results of my review, I provide my comments under headings, following the approximate order one would normally conduct an AQ assessment, as listed below.

- 2.1.1 Identification of project activities (on-site and off-site) that are sources of air emissions
- 2.1.2 Identification of all Chemicals of Potential Concern (CoPCs) from all relevant activities
- 2.1.3 Maximal emissions for each CoPC
- 2.1.4 Modelling the dispersion of each CoPC from on-site/off-site project sources
- 2.1.5 Baseline air quality levels, accounting for local spatial/temporal hotspots
- 2.1.6 Combination of project air quality impacts with existing and future baseline levels
- 2.1.7 Required provision of exposure data to a Health Impact Expert
- 2.1.8 Mitigation proposals

2. CN EIS AND TECHNICAL APPENDICES – REVIEW AND INFORMATION REQUESTS

2.0 Introduction to Air Quality Assessment of CN's proposed Milton Logistics Hub

CN's proposed Milton Logistics Hub ("Hub") includes the introduction of additional locomotives on-site, diesel-fuelled trucks and other vehicles on-site and on surrounding public roads. This will introduce new air emission sources into the surrounding community. Emissions, largely from vehicle-related exhaust fumes and road dust, will be emitted from the proposed project components and carried towards sensitive receptors in the surrounding community by winds. In terms of potential effects on human beings, these emitted contaminants will be present in the air (as a direct human inhalation risk).

Multiple contaminants can be emitted from diesel exhaust and road dust including particulate matter and its various size fractions and species, oxides of nitrogen (NO_x), carbon monoxide, sulphur dioxide (SO_2), and a wide variety of organic compounds (commonly known as "VOCs") and polycyclic aromatic hydrocarbons ("PAHs").

Throughout this report, I will discuss dust emissions in terms of "particulate matter". In regards to the dust emissions, dust particles vary in size and composition. The total amount of dust in the air is known as Total Suspended Particles ("TSP"). The size fractions of dust particles can vary from very fine particles, less than 2.5 micrometres (µm) in aerodynamic diameter, through to particles greater than 44 µm in diameter. Dust particles smaller than 10 µm in aerodynamic diameter are known as "PM10." The finer dusts (especially those smaller than 2.5 µm in aerodynamic diameter, termed "PM2.5") are known to cause health effects.

Air quality impact assessments must, at the very least, address the worst-case impacts on AQ, which lead to the biggest increases in AQ levels above the pre-existing background level. An AQ assessment of worst-case impacts is required because it answers the basic question "what are the worst effects of this project on my community?" For air contaminants, this is done by considering maximum emissions and worst-case atmospheric dispersion conditions together under maximal production or activity levels so that maximal impacts on AQ levels can be considered and assessed. It is important that the maximum emission rates that could happen, or will be allowed to happen, are assessed; these limits could be set by (i) the facility (management limits), with appropriate over-sight (e.g., CN claims it will not exceed 800 road trucks per day through the Hub), or, (ii) may be limited by the machinery or processes in the facility itself (production/mechanical limits; e.g., certain diesel engines may be limited to a maximum RPM (revolutions per minute) and therefore exhaust emission rate).

One way to determine airborne pollutant levels, resulting from emissions from project sources, would be to measure the levels of all substances emitted to the surrounding community. However, actual measurements are not available for proposed projects, as they have not been constructed nor have they begun operating yet. Instead, to assess air quality risk we rely on predicted changes in air quality, using air quality computer models, to assess estimated changes in air pollution levels. In fact, to assess the levels of an air contaminant surrounding a set of facilities, due to emissions from those facilities, most jurisdictions require the use of quantitative computer models that predict the dispersion of contaminants from a discharge point (or points) to a receptor in the surrounding community ("dispersion models").

In its simplest form, a dispersion model requires input on (1) the sources of pollution, including the emission rate, (2) meteorological data such as wind speed and turbulence, and, (3) topography. The model then simulates, mathematically, the pollutant's transport and diffusion through the air. The model output is an air pollutant concentration over a particular assessment time period (say 1 or 24 hours) at one or more specific receptor locations in the surrounding community. Dispersion modelling is the only way to estimate air quality levels from a proposed facility not yet built.

In dispersion modelling, worst-case emissions are then combined with a range of meteorological conditions (simulated by modelling with long, such as five years, meteorological data sets) to ensure that worst-case emissions are reasonably combined with worst-case meteorological conditions and so to provide worst-case impacts on AQ in the surrounding community.

Many facilities will run their operations differently according to the time of day or year. In general, the operational scenario assessed for the subject sources should be that which causes the highest off-site increases in AQ. It is the responsibility of the proponent to assess all likely operating scenarios and find the one(s) that cause the highest off-site impacts on a contaminant-by-contaminant basis. It is also the responsibility of the proponent to demonstrate that it has tested all scenarios and found the worst-case operating scenario, which must then be used in the AQ assessment.

I use the term "conservative" throughout this report. Due, in part, to the lack of site-specific information when estimating emissions, it is normal practice that such calculations be conducted in a "conservative" manner. The term "conservative" refers to a methodology that ensures that emissions and air quality levels are not underestimated and applies to all levels of decision-making where assumptions must be made. For example, to estimate dust emissions from future roads it is necessary to know the level of dustiness on that road; however, that information will not be known because the road does not currently exist to allow site-specific measurements. Therefore, the level of dustiness must be estimated; it is required that the estimate be made (in light of lack of specific data) conservatively. In this example, we must ensure that the level of road dustiness used in our calculations is as high as it could reasonably be to ensure we do not underestimate road dust emissions under any future circumstance.

2.1 Topics of information requests

2.1.1 Identification of project activities (on-site and off-site) that are sources of air emissions

With most projects that are subject to environmental assessments, there are generally numerous actual and potential sources of air contaminant emissions. In order to correctly identify all emission sources it is important that detailed information on processes (that will lead to air emissions) are provided. Provision of such detailed information is required to allow review and confirmation that all emissions sources have been properly accounted for. It is important that all sources be identified because even weak sources of air emissions, when situated close to points of reception in the surrounding community, can have a significant impact on air quality at those receptors. Based on the information available to us, I have found the following insufficiencies in this category. Note that this list could change as more information is provided.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 176 App. C2 CN response Sept 30 pdf pg 51-94, App. E1 pg 54 Sect. 6.5	**AQ1. Paved roads for off-site project related trucks and on-site non-road vehicles** Include an AQ assessment of paved road dust emissions on public roads that will incorporate project-related traffic off-site and on-site non-road vehicles.	The AQ assessment of paved road dust emissions was not conducted for off-site project-related trucks or non-road mobile equipment on-site. A paved road dust emissions assessment was completed for project-related truck movements within the property line (App. E1 pdf pg 176 App. C2) but did not appear to be completed for off-site project-related and non-project related vehicles (CN response Sept 30 pdf pg 51-94, App. E1 pg 54 Sect. 6.5). Also, only tailpipe emissions were determined for non-road mobile equipment on-site and not paved road dust emissions on-site. These are sources of dust emissions that are related to the project that were not considered. The project will add extra vehicles to the public roads and the quantity of road dust emitted from that source should be determined. Also, if on-site truck road dust was assessed, then road dust from non-road mobile equipment on-site should also be assessed.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			All sources from all relevant activities need to be included in the AQ assessment in order to arrive at valid predictions regarding AQ.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 48 Sect. 6.2.1 CN response Sept 30 pdf pg 51-94	**AQ2. Locomotive travel off-site** Include locomotive travel off-site in the AQ assessment or provide quantitative justification for how off-site travel was determined to be negligible.	Locomotive travel off-site was not assessed. The Air Emissions Sources and Emissions Inventory (App. E1 pg 48 Sect. 6.2.1) states "*emissions from locomotive travel off-site are not the subject of this study*". It is unclear why locomotive travel off-site was not included in the AQ assessment given that Hub-related off-site truck emissions were assessed (in CN response Sept 30 pdf pg 51-94). All sources from all relevant activities need to be included in the AQ assessment in order to arrive at valid predictions regarding AQ.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	Main EIS pg 5-6 Sect. 1.2.2 App. E1	**AQ3. Locomotive refuelling and refuelling facilities** Include locomotive refuelling operations and fuel storage tank emissions in the AQ assessment or provide quantitative justification for how these sources were determined to be negligible.	Locomotive refuelling and refuelling facilities were not assessed. This is an example of a project activity described (Main EIS pg 5-6 Sect. 1.2.2) whose air emissions are not described in the App. E1. There is no mention in the App. E1 of locomotive refuelling operations and associated potential emissions. Likewise, no emissions from fuel storage tanks appear to be assessed. All sources from all relevant activities need to be included in the AQ assessment in order to arrive at valid predictions regarding AQ.

2.1.2 Identification of all Chemicals of Potential Concern from all relevant activities

Once sources have been identified, the next stage is to identify the contaminants being emitted. It is important that all contaminants that could be emitted be included in the AQ assessment. In my opinion, the list of contaminants considered by CN was overly narrow and missed several important contaminants, which could have a significant impact on AQ, as detailed below.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines pg 19 Sect. 6.1.1 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	HC review pdf pg 3 App. E1 pdf pg 165-166 App. C1, pdf pg 169-175 App. C2, pdf pg 177-182 App. C2, pdf pg 185-200 App. C3	**AQ4. Diesel Particulate Matter (DPM) not assessed** A quantitative AQ assessment of airborne DPM levels is required for all diesel exhausts.	DPM is a crucial contaminant to quantify. As articulated by Health Canada in its Conformity Review of the Milton Logistics Hub Environmental Impact Statement dated February 15, 2016, "*DPM are typically fine to ultra-fine in particle size, and thus considered a highly respirable toxic air contaminant associated with cancer and adverse health problems such as respiratory illnesses and increased risk of heart disease*." The EIS Guidelines also identified DPM as a Chemical of Potential Concern that should be considered. However, this was not done in any of the work described by CN relating to diesel sources.
Air Quality EIS Guidelines pg 19 Sect. 6.1.1 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg ii Executive Summary App. E1 pg 15 Sect. 3.4	**AQ5. Ozone and ammonia not assessed** Please provide quantitative justification for not including O_3 (ozone) and NH_3 (ammonia) in the AQ assessment, including evidence of negligibility.	CN did not provide a quantitative AQ assessment of O_3 or NH_3. These contaminants were specifically requested in the EIS Guidelines and therefore should be part of the AQ assessment.
Air Quality EIS Guidelines pg 23 Sect. 6.1.10 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	EIS Guidelines pg 23 Sect. 6.1.10 App. E1	**AQ6. Secondary particulate matter not assessed** Please provide an AQ assessment of secondary PM that could form from gaseous precursors emitted from the project.	The EIS Guidelines Human Environment section (EIS Guidelines pg 23 Sect. 6.1.10) describes "Health" and footnotes the following: "*The proponent should refer to Health Canada's Useful Information for Environmental Assessment in order to include the appropriate basic information relevant to human health.*" (HC 2010). An excerpt from that document (pg 5) is as follows: "*1. Air Quality Effects* *In an assessment of potential changes in air quality, it is advisable to consider local, regional, and where appropriate,*

Topic	**Reference to CN EIS and Information Responses**	**Requested Information**	**Rationale**
			long-range impacts on air quality during all phases of the project. It is advisable to also consider the following: *An inventory of all potential contaminants and emissions from the proposed project (including) . . . <u>secondary particulate matter [secondary PM])</u> . . .”* (my underlining) The underlined part was not addressed in the App. E1. There was also no consideration of secondary PM that can be formed as a result of a series of chemical/physical reactions involving precursor organic or inorganic gases (the project emits precursors VOCs, NO_x and SO_x). Secondary particulate matter contributes to the PM2.5 concentrations and thus a complete AQ assessment will need to include this particulate matter formation pathway.
Air Quality EIS Guidelines pg 19 Sect. 6.1.1 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 165-166 App. C1, pdf pg 169-175 App. C2, pdf pg 177-182 App. C2, pdf pg 185-200 App. C3 App. E1 pg 14 Sect. 3.4	**AQ7. Polycyclic aromatic hydrocarbons (PAHs) other than Benzo(a)pyrene not addressed** Please provide an AQ assessment of all PAHs emitted from the site.	Polycyclic aromatic hydrocarbons (PAHs) are a group of more than 100 different chemicals that are released from burning coal, oil, gasoline, trash, tobacco, wood, or other organic substances such as charcoal-broiled meat. Internal combustion engines fuelled by diesel release numerous types of PAHs. In terms of PAHs, only B(a)P was assessed from diesel exhaust emissions from the Hub. This is far fewer than the typical number of PAHs that are considered necessary for assessment in an environmental review. For example, the US EPA AP-42 Chap. 3.3 provides emission factors for 16 PAH species. The Chemicals of Potential Concern Section (App. E1 pg 14 Sect. 3.4) refers to MOECC guidance (MOECC 2012), which states that while it is suitable for B(a)P to be used as a surrogate, if an individual PAH has a

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			standard, it must be assessed separately. The EIS Guidelines (Sect. 6.1.1) further references the CEPA list of toxic substances through its connection to HC 2010. That list includes PAHs in general, and not just B(a)P. It should also be noted that the EIS Guidelines do not specify that only B(a)P should be measured. Rather, it lists "*polycyclic aromatic hydrocarbons (PAHs)*". All possible contaminants from the sources of the project should therefore be assessed, including PAHs other than B(a)P.
Air Quality EIS Guidelines pg 19 Sect. 6.1.1 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 165-166 App. C1, pdf pg 169-175 App. C2, pdf pg 177-182 App. C2, pdf pg 185-200 App. C3	**AQ8. Volatile Organic Compounds and other hydrocarbons not addressed** Please provide an AQ assessment of toluene, xylene and propylene, as well as any other VOCs and hydrocarbons that could be emitted from the project.	Volatile Organic Compounds (VOCs) are a sub-set of hydrocarbons that participate in atmospheric photochemical reactions. Hydrocarbons are a more general class of compounds that do not necessarily participate in atmospheric photochemical reactions; they can, however, cause human inhalation concerns. There are numerous different types of hydrocarbons and VOCs emitted from engine exhausts. For mobile equipment, App. E1 only mentioned a limited number of VOCs for diesel-fired sources. However, toluene, xylenes and propylene are also emitted from all of the diesel engines assessed but were excluded from the assessment. The On-Road Vehicle Emissions in Future Facility section in the Appendix (App. E1 pdf pg 175 App. C2) outlines the contaminants considered for project operations for on-road vehicles driving within the property line. CN used a modelling tool provided by the US EPA called the MOVES model, to determine vehicular emissions. The MOVES model provides output for many organic species that may be emitted from vehicles, but only a few of those were selected by CN. See Figure 1 (in Appendix C of this report) for a list of those contaminants.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			Also, line-haul locomotives emit more hydrocarbon contaminants than what was accounted for. In the Rail Locomotive Emissions in Future Facility section in the Appendix (App. E1 pdf pg 171-172 App. C2), the sum total of emissions from the six selected VOCs is only approximately 10% of the Tier 2 hydrocarbon total emissions for line-haul locomotives (US EPA 2016), therefore 90% of these emissions remain unaccounted for. The CEPA list of toxic substances, referenced in the EIS Guidelines through HC 2010 as explained previously, includes any VOCs participating in photochemical reactions, as well as hydrocarbons. The EIS Guidelines also states that study is required for "*volatile organic compounds (VOCs)*" generally. This suggests that all possible contaminants in this category should be assessed. The information should also be made available to the HHRA.
Air Quality EIS Guidelines pg 19 Sect. 6.1.1 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 176 App. C2	**AQ9. Composition of vehicle-related road dust** Please provide a full AQ assessment including speciation of road dust.	There was no consideration of the composition of the vehicle-related road dust. Fugitive road dusts vary by composition as well as by size fraction. If the road surface material contains quartz (a form of crystalline silica common in rocks and soils), then the dust raised from that road may contribute an additional inhalation hazard, since crystalline silica has known health effects if inhaled. A comprehensive AQ assessment should include consideration of all species of fugitive dusts. The Traffic Emissions from the Paved Road in Future Facility section in the Appendix (App. E1 pdf pg 176 App. C2) shows that only the size fractions PM, PM10 and PM2.5 were assessed. There is no mention of speciated road dust, and no justification provided about why this was not done.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			Speciated road dust should be considered as there may be health effects.

2.1.3 Maximal emissions for each Chemical of Potential Concern

The next step is to quantify the emission rates for each contaminant from each source.

As described earlier, it can be difficult to estimate emission rates when a proponent does not have site- and project-specific input data for various aspects of emissions estimates. Therefore, the routine practise is to make assumptions or utilize surrogate data in place. However, the manner in which those substitute data are chosen is critical. A conservative assumption (or choice) for substitute data is necessary; it is an assumption that does not lead to a potential underestimate of the true emissions.

In the case of the CN AQ and GHG study, I have found a number of instances of "average" calculation inputs or assumptions used rather than either "worst-case/upper-limit" values or "conservative" assumptions. Very limited justification was provided for many assumptions used. Using "average" activity levels as the basis for emissions calculations is generally insufficient for a worst-case, conservatively-based AQ impact assessment.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 67 Table 7.2 App. E1 pdf pg 175 App. C2 Main EIS pg 4 Sect. 1.2.1 Main EIS pg 61 Sect. 3.4.2.1	**AQ10. Truck idling and travel** Please provide evidence and justification that 20 trucks idling will be the maximum amount given that the site can accommodate a queue of 140 trucks. Also, please describe and rationalize the assumptions made for categorizing certain emission sources as attributable to truck idling, versus those attributable to truck travel (App. E1 pg 67 Table 7.2 for sources labelled OR1 through OR4).	The number of trucks allowed to queue on-site (140) is higher than the number of trucks assumed to idle in the AQ assessment (20), and therefore the idling assumption does not appear conservative. It is also unclear which emission sources account for idling and which emission sources account for truck travel. Assessing the required worst-case scenario ensures that the actual AQ impacts will not be underestimated by the predictions.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 161 App. C App. E1 pdf pg 176 App. C2 CN response Sept 30 pdf pg 52 Att. IR13-2 Main EIS pdf pg 15	**AQ11. Daily truck traffic** Please explain the rationale behind the maximum number of trucks per day being set at 800, rather than 1233. If 1233 is the correct maximum, please provide a revised AQ assessment in respect of this parameter.	Appendix C (App. E1 pdf pg 161 App. C) describes the "*maximum number of trucks per day for shipping containers in or out of the facility*" as 1233. However, the on-site vehicular emissions calculations assume a maximum of 800 trucks per day (App. E1 pdf pg 176 App. C2). This number is repeated in CN's later response to CEAA IR13-2, dated Sept 30, 2016. It is not clear why the maximum value of 1233 trucks/day was not used and instead 800 trucks/day was assumed. This is important because assessing the worst-case scenario ensures that the actual AQ impacts will not be underestimated by the predictions.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 8, Sect.2.4 App. E1 pdf pg 161 App. C GHG report pg 7 Sect. 2.4	**AQ12. Daily locomotive traffic** Please advise what the daily maximum number of trains will be in the Hub, including deadhead runs, and use this figure for modelling purposes in the emissions analysis.	The Operation Activities section (App. E1 pg 8, Sect.2.4) describes that the average rail traffic consists of 26 freight trains, and this figure is used in the emissions calculations. However, the daily upper limit of train traffic, which appears to be 30 trains per day, should be used in calculations in order to take the required conservative approach. Also, it is not clear if the above discussions of train traffic include deadhead runs, which are non-revenue-generating train trips. Deadhead runs will also generate emissions and should also be considered in the analysis.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 78 Sect. 7.4.1.4 App. E1 pdf pg 173 App. C2 App. E1 pdf pg 177 App. C2 App. E1 pdf pg 169 and 171, App. C2	**AQ13. Particulate matter size fraction assumptions** Please provide a re-assessment with the conservative scenario, which was implied in Sect. 7.4.1.4, that 100% of Particulate Matter (PM) is PM2.5. Alternatively, provide PM2.5 test emissions data to justify the assumptions made. If re-assessment is not completed, please provide justification that the emission factors for Stationary	In the Non-road mobile equipment calculation assumptions, (App. E1 pdf pg 173 App. C2) a footnote to the Table with the title "*Emission Calculations – Criteria Contaminants*" states "*For PM emissions from the tailpipe of the equipment, based on US EPA AP-42 Appendix B.2 Generalized Particle Size Distributions for gasoline and diesel fuel combustion engines, PM10 = 96% PM; PM2.5 = 90% PM.*" However, these generalized particle size distributions are <u>average</u> values (and apply to

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
		Internal Combustion Engines running on Gasoline or Diesel Fuel (US EPA AP-42 Appendix B.2) are applicable to non-road mobile equipment and locomotives.	Stationary Internal Combustion Engines running on Gasoline or Diesel Fuel, US EPA AP-42 Appendix B.2). Maximum values for PM10 and PM2.5 in that reference are equal to 99%. Therefore, it would be conservative to assume that 100% of PM consists of PM2.5. The PM10/PM2.5 fractions used were based on averages rather than upper limits o Same comment for stationary equipment (App. E1 pdf pg 177 App. C2) o Same comment for locomotives (App. E1 pdf pg 169 and 171, App. C2) The Air Quality Predictions and Discussion subsection (App. E1 pg 78 Sect. 7.4.1.4) with the title Particulate Matter (PM, PM10 and PM2.5) states: "*Note that it was conservatively assumed that the PM emissions from the fossil fuel combustions in the equipment engines are equal to PM10 and PM2.5*." This would have been conservative but the calculations were not done in accordance with the above statement. In multiple places in the App. E1, CN provides the footnote to tables in Appendix C2 and C3, outlining that "*PM10 = 96% PM; PM2.5 = 90% PM*", as just described. Note also that those size distributions apply to Stationary Internal Combustion Engines running on Gasoline or Diesel Fuel (US EPA AP-42 Appendix B.2) and not necessarily non-road mobile equipment or locomotives (as was assumed in the App. E1). Therefore, it is unclear whether it is appropriate to use these size distribution assumptions for non-road mobile equipment and locomotives in this case.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			Assessing emissions conservatively ensures that the actual AQ impacts will not be underestimated by the predictions.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 175 App. C2 App. E1 pdf pg 162 App. C	**AQ14. Vehicular speed assumptions** Please explain how the average speed assumption used in the calculations provides the maximal emissions of the various contaminants, compared to other possible speeds used on-site.	The On-site vehicular emissions calculation assumptions (App. E1 pdf pg 175 App. C2) state that the vehicle speed assumed was "10 mi/h" for on-site truck traffic. However, this appears to be an average speed, based on comments made in Appendix C (App. E1 pdf pg 162 App. C) that sets the average speed at 15 km/h, which converts to 9.32 mi/h. Similarly, the speeds for other mobile sources in the speed consideration table in Appendix C (i.e. trains passing by, trains, hostlers and reach stackers) appear to be average speeds. Vehicular speeds that cause maximum emissions should be used in the calculations, so that the actual AQ impacts will not be underestimated by the predictions.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 162 App. C GHG report App. A pg 4 GHG report App. A pg 5-6	**AQ15. Operating load assumptions** Please provide rationale that the assumptions made for operating load for all project equipment are maximal or conservative.	For Non-road mobile equipment, Stationary Equipment, Locomotive and On-road Equipment calculations, CN used the "*Average Operating Load On-site*" (my underlining) (App. E1 pdf pg 162 App. C; GHG report App. A pg 4 GHG emissions from Direct Project Sources; GHG report App. A pg 5-6 GHG emissions from Direct Project Sources). Using an average means that the predictions may not consider the worst-case scenario. Assumption of worst-case scenarios ensures that the actual AQ impacts will not be underestimated by the predictions.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy	App. E1 pg 89 Sect. 7.7 App. E1 pdf pg 161 App. C GHG report App. A pg 5-6	**AQ16. Manufacturer specifications, in particular fuel usage values, power rating and type of equipment** Please provide necessary documentation relating to manufacturer specifications of the actual equipment to be used, or	The Uncertainties of Prediction section (App. E1 pg 89 Sect. 7.7) states "*Equipment specifications, power rating, fuel usage rate and average loading percentage during their operation at the Terminal were not available for some on-road and non-road sources and these data were estimated or assumed based on similar types of equipment*." However, no manufacturer specifications of any sort,

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Communities – Air Quality	GHG Report App. A pg 10 App. E1 pdf pg 165 App. C1, pdf pg 169 App C2, pdf pg 171 App C2	similar equipment to be used, so that assumptions made throughout the emission estimate calculations can be verified. Please provide manufacturer data or specifications, quantitative justification of the selected assumptions, and/or sample calculations, if needed, in respect of the values chosen for fuel usage, power rating and type of equipment with tier ratings.	whether for actual equipment to be used or "similar" types of equipment, were provided to confirm values used. In particular, the table entitled "*Non-road and stationary equipment*" (App. E1 pdf pg 161 App. C) lists a number of different assumptions, but with no justification provided. For instance, numbers are listed in the "*fuel usage rate*" column, and the only explanation are provided for them are in the "*notes*" column, which indicates the fuel usage data was "*obtained from the equipment specs data, if data available; otherwise, fuel consumption data is estimated based on data from similar equipment*", neither of which were provided and therefore, I cannot review these assumptions. Similarly, the fuel usage values provided in the GHG report (App. A pg 5-6 GHG emissions from direct project sources) are not backed up by manufacturer data or specifications. In addition, the numbers listed as "*power rating*" are not backed up by manufacturer data or specifications (App. E1 pdf pg 161 App. C, pdf pg 165 App. C1, pdf pg 169 App C2, pdf pg 171 App C2, and GHG Report App. A pg 10). As well, in the column "*type of equipment*" (App. E1 pdf pg 161 App. C), the tier ratings for various pieces of equipment are listed. No manufacturer specifications are provided to verify the tier rating assumptions. The tier ratings are important as they are used in the emission calculations. Without justification, there is no evidence of where the assumption originated. In order to assess whether the calculations take into account worst-case scenarios, justification is required, and explanations and documentation for assumptions are needed.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 176 App. C2	**AQ17. Silt Loading assumption** Please use an appropriate conservative silt loading value or provide justification for the ubiquitous silt loading assumption used to project the "dustiness" of the Hub roads.	A common method to predict dust emissions from paved roads is to use the emission factor from the US EPA AP-42 (Chap. 13.2.1). An important input variable for the emission factor calculation is the silt level of the future road. Silt is comprised of dust particles on the road surface that are less than 75 µm in diameter. Essentially, silt levels indicate the "dustiness" of the road. With higher silt levels, the equations predict higher dust emissions. For CN, the silt loading assumption (App. E1 pdf pg 176 App. C2) in the On-site Paved Road dust emissions calculations included "*ubiquitous silt loading default values*" for the average daily traffic (ADT) category of 500-5000. However, the "*Ubiquitous silt loading*" assumptions from the US EPA AP-42 Chap. 13.2.1 (pg 8-9) are designed for public roads, not facility roads. Facility roads are usually dustier than public roads. Therefore, CN should use a silt loading assumption that corresponds to facility roads so that worst-case scenarios are used in the predictions.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 161 App. C App. E1 pdf pg 171-172 GHG report App. A pg 4	**AQ18. Locomotive operation and idling** Please provide evidence that the trains will idle for a maximum of 5 hours, and provide the basis for locomotive operational times on-site. Please also describe if there are emissions during the remaining 5 hours the trains are on-site. Outline how train movement is accounted for and if it was not considered, include consideration of train movement in the AQ assessment.	The Production and Equipment Data Input Tables (App. E1 pdf pg 161 App. C) list operational details for the locomotives, including train operational times and idling times. The duration of train stay on-site is said to be 10 hours, and the idling time is said to be 5 hours, but no explanation or rationale is provided for these durations. As well, only emissions while the locomotives are idling appear to be used in the AQ calculations (App. E1 pdf pg 171-172). However, emissions would also be released while the trains are moving, so this should be taken into account. The same two issues are seen in the corresponding entries in the GHG emissions table (GHG report App. A pg 4).

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			Without justification for these figures and assumptions, there is no evidence of where they came from and whether they make sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 169-170 App. C2 and pdf pg 162 App. C	**AQ19. Locomotive speeds** Please advise which realizable speed results in maximal emissions while the bypass locomotives remain in the project area, and use these findings in the AQ assessment.	For the locomotive emissions (App. E1 pdf pg 169-170 App. C2 and pdf pg 162 App. C), CN has defined a project area and attempted to quantify air emissions from within that area, including emissions from locomotives moving through the area but not stopping at the hub (“bypass” locomotives). To calculate diesel exhaust emissions from those bypass locomotives, while in the project area, CN has assumed a certain travel speed. From that speed, given the length of track within the project area, CN calculates the residence time the locomotive remains in the project area and thus contributes to on-site project emissions. Therefore, the faster the locomotive moves, the less time it spends in the project area, and so the less time it emits air contaminants while within the area. However, at the same time, the faster the locomotive travels the higher the emission rate of air contaminants as the engine operates at a higher rate. Therefore, there are two opposing factors to consider; the higher emission rate at higher speeds, but the decrease in residence time at higher speed. This analysis has not been done. This analysis is required because there will be a worst-case speed that maximizes emissions. Assessment using this worst-case speed ensures that maximal air quality impacts are not underestimated from these calculations.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 165 App. C1	**AQ20. Diesel engine sulphur dioxide (SO_2) calculations** Please provide specifications for specific diesel engines that will be used on-site, in particular in terms of "diesel engine efficiency". Also, please provide a sample calculation for SO_2 in terms of grams per brake-horsepower hour (g/bhp-h).	The emission calculations for locomotives (App. E1 pdf pg 165 App. C1) include an estimate of the emissions of SO_2. Calculation of the emissions of SO_2 includes an estimate of diesel engine efficiency. However, CN provides only a generic diesel engine efficiency without justification that this applies to locomotives relevant to this project. Sample calculations for locomotive SO_2 emissions were also not provided. This information is needed so that it can be determined whether a worst-case scenario was used for this aspect of the AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	GHG report App. A pg 7 and pg 10	**AQ21. Moderate control assumption for diesel trucks** Please explain the meaning of the "moderate control" assumption for on-road diesel trucks used in the GHG assessment, and provide a rationale for why this equates to a worst-case scenario.	The GHG report (GHG report App. A pg 7 GHG emissions from direct project sources; pg 10 GHG emissions from future operation with project) states emission factors for on-road diesel trucks were assumed to have "*moderate control*". No justification was provided for this assumption, nor was a definition provided for "*moderate control*". Without justification, there is no evidence of where the assumption came from and whether it makes sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 174 App. C2 App. E1 pdf pg 178 App. C2	**AQ22. Compressed Natural Gas (CNG)-fired shunter and Powerpack genset assumptions** Please provide a reference for the CNG-fired shunter emission factor value or justify the use of gasoline and diesel industrial engine emission factors for a CNG-fired source. Please also provide sample calculations for the emission rates for the CNG-fired shunter and the powerpack genset (Cummins QSB7) for a sample VOC.	There will be two kinds of Shunters that will be used at the facility, one of which is fuelled by compressed natural gas (CNG) (App. E1 pdf pg 174 App. C2) (as well as other non-road mobile equipment). Also, there will be a Powerpack Genset (App. E1 pdf pg 178 App. C2) used at the facility (as well as other stationary equipment). In calculating emissions from these machines, CN referred to emission factors set out in a standard reference, EPA AP-42 Chap. 33. However, this chapter provides factors for gasoline and diesel-powered engines. These may not be valid for CNG-powered engines, like the CNG-

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			fired shunter. As well, there are discrepancies between the numbers used by CN in its calculations, and the actual published numbers in the EPA reference for both of the CNG-fired shunter and the powerpack genset, as well as the diesel-fired shunter. As well, sample calculations of the VOC assessments were not provided in order to allow review of the work and whether it is premised on a worst-case scenario.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 175 App. C2	**AQ23. Climate normals** Please provide justification and explanation for the assumptions made about climate normals, including a description of what normals were used and how those assumptions lead to worst-case emissions.	"Climate Normals" are long-term averages of climatological variables such as temperature or precipitation. These were used in modelling on-site truck emissions (App. E1 pdf pg 175 App. C2). However, in assessing AQ impacts, it is necessary to consider worst-case scenarios. CN may need to employ an alternate variable that leads to a worst-case emissions scenario.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 48, Sect. 6.2.2 App. E1 pdf pg 171 App. C2	**AQ24. Tier 2/3 emission standards for locomotives** Please provide justification for the types of trains assumed and the engine type, and please explain the rationale for the assumption that all of the locomotives will achieve at least Tier 2 or 3 emissions status.	In the Future Operation section for Locomotives servicing Milton Logistics Hub On-Site (App. E1 pg 48, Sect. 6.2.2), it states for locomotives that "*Tier 2/3 emission standards are used*." Tiered emission standards for locomotives are set by the US EPA, and go from a scale of 0-4. The types of trains, the engine type, and the basis for the assumption that the locomotives will achieve at least Tier 2 or 3 emissions status is not described in App. E1. Without justification, there is no evidence of where the assumption came from and whether it makes sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1	GHG report App. A pg 5	**AQ25. Operating time in GHG report** Please provide explanation and rationale for the operating time	In the assumptions for the GHG emissions from project sources (GHG report App. A pg 5), an operating time of 20 hours was assumed for all non-road equipment on-site. However, in the Project Operation section

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 65-66 Sect. 7.2.2	assumption of 20 hours per day for non-road equipment on-site.	(App. E1 pg 65-66 Sect. 7.2.2), it states non-road equipment will operate 24 hours per day. No rationale or justification was provided for the 20 hour assumption. This is required so that it can be determined whether use of the assumption makes sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 8, Sect. 2.4 GHG report pg 7 Sect. 2.4	**AQ26. Future projections of train traffic** Please provide future projections of the anticipated number of trains or provide rationale that 28 trains will be the maximum number of trains that will ever pass through the PDA. Please include discussion of whether these are design limitations or if future on-site expansions could allow for greater throughputs.	The Operation Activities section (App. E1 pg 8, Sect. 2.4) assumes 26 trains travelling through the corridor daily, and an additional two trains being added due to project. This assumption is then incorporated in the emission calculations. However, there is no indication that this will be a maximum upper limit in terms of train traffic for the foreseeable future. Future projections are necessary to assess the AQ emissions projected for the future and to help plan follow-up and monitoring for this project.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 176 App. C2 App. E1 pdf pg 161 App. C CN response Sept 30 pdf pg 51 GHG report pg 2 Sect. 1.1.1	**AQ27. Future projections of truck traffic** Please provide future projections of the anticipated number of trucks, or if 800 will be the maximum number that will ever pass through the PDA in the future, please provide a rationale. Please discuss if these are design limitations or if future on-site expansions could allow for greater throughputs.	The On-site vehicular emissions calculations (in App. E1 pdf pg 176 App. C2, and App. E1 pdf pg 161 App. C) state that the maximum daily traffic will be 800 trucks per day. This upper limit is also assumed when discussing future projections in 2021 and 2031, as set out in CN's further response dated September 30, 2016. However, there is no indication that this is the actual maximum upper limit in terms of truck traffic for the foreseeable future. Future projections are necessary to assess the AQ emissions projected for the future and to help plan follow-up and monitoring for this project.
Air Quality EIS Guidelines 6.2.1	GHG report pg 7 Sect. 2.4	**AQ28. GHG emissions – assumption for daily number of trains** Please provide justification that the daily assumption of 28 trains, with 4 of those stopping at the Hub, is	GHG emissions are estimated on an annual basis, and are based in part on emissions calculated from the predicted train traffic. CN predicted that a daily average of 28 trains would pass through the Hub, with 4 of those trains stopping. However, it is unclear if the

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Halton Brief, Table D.7 Healthy Communities – Air Quality		applicable for use in the yearly GHG emissions calculations. If so, please explain why this is the maximum worst-case number of trains.	daily assumptions are applicable for the calculations of the annual GHG emissions, and if a worst-case scenario would result. This should be clarified by showing the calculations and rationale that the daily assumption of 28 trains with 4 stopping at the Hub leads to maximum annual GHG emissions.

2.1.4 Modelling dispersion from on-site/off-site project sources

In dispersion modelling for AQ impact assessments, worst-case emissions are combined with a range of meteorological conditions to ensure that worst-case emissions are reasonably combined with worst-case meteorological conditions to provide potential worst-case impacts on AQ in the surrounding region.

In the case of CN, they used a US EPA dispersion model to predict changes in air quality due to on-site (i.e. Hub operations) and off-site sources (i.e. CN Hub-related trucks on local roads). In order to review this work, it is necessary to check the proponent's assumptions and calculations, and be able to replicate their AQ assessment results. This requires access to the model input and output files. I have reviewed their use of this dispersion model (as was described in the App. E1 report and associated documents) and have found the below insufficiencies in this category.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	CN response Sept 30 pdf pg 51-94 App. E1 pg 85-86 and pdf pg 227 CN response May 18 pdf pg 87-110	**AQ29. Model input/output files** Please provide the following explanations and data: - clarifications concerning whether the assumptions, data used and methods were the same in the CN response (Sept 30) as the original App. E1 report, or if there were differences. - a table of source characteristics used in the dispersion modelling,	In the revised AQ assessment submitted by CN in response to CEAA information requests (CN response Sept 30 pdf pg 51-94), very little information was provided about the assumptions considered. Table 1 in the revised AQ assessment (CN response Sept 30 pdf pg 94) indicated maximum predicted ground-level air concentrations due to the CN project alone and CN traffic alone, but the numbers indicated do not match what was previously shown in the App. E1 (App. E1 pg 85-86 and pdf pg 227, respectively).

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
		including rationale for source characteristics. - details of the traffic data inputs to the MOVES model used for the latest iteration (assuming MOVES was used, that was not indicated in CN response Sept 30, but MOVES was used in the App. E1). - provide the MOVES model input and output files used in this, or an updated and consolidated AQ assessment. - the AERMOD model files used in the most recent, or an updated and consolidated, AQ assessment (i.e. Lakes GUI backup files). As well, please consolidate all revised aspects of the App. E1 into an updated, single App. E1 (including the "participating receptors" assessment set out in CN response dated May 18, 2016, at pdf pg 87-110).	Therefore, seemingly different assumptions were made in this Sept 30 AQ assessment; these different assumptions should be provided to allow independent review. Without the input and output model files for all scenarios, I cannot confirm if the modelling was conducted appropriately. I need to be able to replicate the findings to confirm their validity. Additional details about assumptions and what was used as model inputs is important to ensure an appropriate review can be conducted.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 131 Figure 5a	**AQ30. Locations of mobile sources** Please provide mapping of the locational envelope of all possible locations where all on-site mobile sources can emit contaminants from.	Source characteristics (in this case, locations) assumed in the model for mobile source locations were not justified/explained. Mobile sources such as on-site locomotives, reachers and stackers and on-road trucks can be located in many areas on the property including relatively close to the off-site sensitive receptors. As those sources get closer to off-site sensitive receptors, impacts on the AQ at those receptors can increase (App. E1 pdf pg 131 Figure 5a). Information on the limit of all potential source locations is required so that it can be confirmed that the worst-case locations for mobile sources have been included in the modelling.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 59 Table 6.2 App. E1 pdf pg 131 Figure 5a	**AQ31. On-site road traffic (source: OR4)** Provide explanation of whether OR4 was intended to be a line or a volume source, as an error in the referencing appears to have occurred. Please ensure consistency between the table and figure. Source characteristics should be provided, as well as revised tables/figures/modelling as needed.	The Source Summary – Project Operation Table (App. E1 pg 59 Table 6.2) lists the source ID OR4 (on-site road traffic) as being a line source (called link 4). However, the figure with the title "*Location of Terminal Sources – Operations*" (App. E1 pdf pg 131 Figure 5a) shows the source OR4 as a volume source. See Figure 2 (in Appendix C of this report) for this comparison. In the model, CN assumed the location of entrance idling is a volume source in the model, not a line source. It is not clear whether it was supposed to be modelled as a line source as indicated in Table 6.2. Without source characteristics clearly indicated, there is no evidence the assumptions are reasonable and whether they make sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	Main EIS pg 4 Sect. 1.2.1 App. E1 pg 66 Sect. 7.2.2	**AQ32. Modelled truck and locomotive idling and movements** Please provide maps and figures that reflect the operations and configurations of idling trucks along the 1.7 km distance, as well as the queuing area of 140 trucks and truck movement areas. Please provide maps and figures that reflect the operations and configurations of locomotive movement and idling. Please indicate how the mapping provides information to allow modelling of the worst-case operating scenario for truck traffic and idling, as well as locomotive operations.	The EIS Project Components section (EIS pg 4 Sect. 1.2.1) describes a 1.7 km private entrance road designated queuing area to accommodate up to 140 trucks within the Hub. However, the layout is not sufficiently described in App. E1 so that the location of idling trucks and moving trucks can be understood. Similarly, insufficient information is provided for locomotive idling and movements (App. E1 pg 66 Sect. 7.2.2). A worst-case operating scenario for trucks and locomotives involves considering idling locations that are as close as possible to property boundaries and sensitive receptors. Without the input and output model files for all scenarios, it cannot be confirmed whether the modelling was conducted appropriately. Without source characteristics clearly indicated that

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			coincide with actual operating scenarios, there is no evidence the assumptions are reasonable and whether they make sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 63-64 Sect. 7.1.1	**AQ33. Representativeness of meteorological data** Please provide rationale that this data set is representative of the project location.	The Meteorological Data section (App. E1 pg 63-64 Sect. 7.1.1) states: "*A five-year regional meteorological dataset available from the MOECC for the Halton-Peel area was used in the modelling assessment. These data are pre-processed by the MOECC for the LAA. Project site-specific meteorological data are not available from the MOECC.*" The statement "*These data are pre-processed by the MOECC for the LAA.*" is misleading. The MOECC did not pre-process this data specifically for the LAA. Everyone completing ECA applications (i.e. for permits for the MOECC) in Halton Region, Peel Region, Greater Toronto Area, York Region and Durham Region use the same default meteorological data set unless instructed to use alternates. It is not known when CN began to consider this project - they possibly could have begun site specific meteorological measurements at that time, therefore maximizing available site-specific data that could have been used for this AQ assessment. Justification is required for the use of this dataset as without justification, there is insufficient evidence that the meteorological data set used is fully representative of this site and whether it makes sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1	App. E1 pg 64 Table 7.1 CN response Sept 30 pdf	**AQ34. Meteorological data from 1996-2000** Please re-evaluate all relevant model runs and emission	The Meteorological Station Table (App. E1 pg 64 Table 7.1), states that an old meteorological data set was used (1996-2000). The CN response Sept 30 (CN response Sept 30 pdf pg 54 Att. IR13-2)

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Halton Brief, Table D.7 Healthy Communities – Air Quality	pg 54 Att. IR13-2 App. E1 pg 64 Sect. 7.1.1 CN response May 18 pdf pg 87-110 Att. IR12 CN response Sept 30 pdf pg 51-94 Att. IR13-2 App. E1 pdf pg 175 App. C2 CN response Sept 30 pdf pg 51-94 Att. IR13-2 App. E1 pg 49 Sect 6.2.4, pg 50 Sect. 6.3 ECCC review (pg 2)	estimates using a newer (preferably site-specific or proven equivalent) meteorological data set.	mentions a newer meteorological data set "*(2010-2015) from the nearest met station*" but it is not clear this newer meteorological data set was included in the updated modelling nor is it clear which meteorological station was considered the "*nearest*". If the 1996-2000 meteorology data set is the data set used in the AERMOD simulations (App. E1 pg 64 Sect. 7.1.1; CN response May 18 pdf pg 87-110 Att. IR12; CN response Sept 30 pdf pg 51-94 Att. IR13-2) and the MOVES model (App. E1 pdf pg 175 App. C2; CN response Sept 30 pdf pg 51-94 Att. IR13-2), as well as assumptions made in the emissions calculations (App. E1 pg 49 Sect 6.2.4, pg 50 Sect. 6.3), a newer available data set should have been used, a point that the ECCC review (pg 2) also brought up. A 1996-2000 data set is outdated for a project that will exist into the foreseeable future. The most accurate, up-to-date, data set available should be used.
Air Quality EIS Guidelines pg 29 Sect. 6.6.2 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 71 Sect. 7.3	**AQ35. Anomalous meteorological data** Please re-evaluate using the "anomalous" meteorological data that was previously removed or justify otherwise.	In the Air Quality Predictions and Discussion – Existing CN Operations Alone section (App. E1 pg 71 Sect. 7.3) describes that the "*meteorological anomalies*" were removed for the "*predicted off-site concentrations*" (i.e. receptor grid). Meteorological "anomalies" still occur (as they exist in the dataset), however, and therefore still may contribute to impacts on the surrounding environment. There is no rationale provided for why removal of "anomalous" meteorological data was appropriate for this assessment. Removal of this data will not provide maximum impact from the project. The EIS Guidelines (pg 29) specifically required that

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			CN's work take into account severe and extreme weather conditions. Therefore, meteorological anomalies should be returned to the dataset and the analysis re-done or justification for otherwise is required.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 64 Sect. 7.1.3	**AQ36. Topographical data** Please provide the source of this data and rationale for use of this topographical data in the modelling.	The Topographic Data section (App. E1 pg 64 Sect. 7.1.3) states: "*The terrain of the subject area is also incorporated into the modelling input. Terrain data was acquired and evaluated using AERMOD's terrain processor (AERMAP) for use in the dispersion modelling.*" The source of the terrain data was not provided. This information is required in order to confirm whether the modelling was conducted appropriately.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 175 App. C2 App. E1 pdf pg 211 App. C4	**AQ37. Variable emissions** Please re-assess with variable emissions for all applicable emission scenarios for all relevant project sources including locomotive and truck traffic. Alternatively, the worst-case emissions scenario (for example, 124 trucks/hour at all times of day) should be applied in the modelling and justification provided.	Variable emissions should have been used but were not. If peak activities coincide with poor dispersion conditions (i.e., dawn/dusk), this should be accounted for as maximal air contaminants emissions may then coincide with poor dispersion conditions and result in worst-case AQ impacts in the local community. As an example, the On-Road Vehicle Emissions in Future Facility emission estimates table with the title "*key input data to MOVES*" (App. E1 pdf pg 175 App. C2) states that 84 trucks/hour were "*conservatively used based on the traffic data for peak AM hour*". However, the Traffic Memo (App. E1 pdf pg 211 App. C4) provides the number of trucks every hour of a 24 hour period, projected to 2017 and 2022. The Traffic Memo also states there will be 124 trucks per hour at 13:00. This hourly variable data set was available for CN to use in their AQ assessment.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			Also, it is not clear how the use of 84 trucks per hour is a conservative assumption given that Appendix C4 of App. E1 indicates the worst-case hour will have 124 trucks on-site. Justification is required for assumptions used. In the modelling, CN did not vary emissions temporally. This is important for longer term averages (i.e. 24 hour averages or longer). Also, there are hourly air quality criteria (as opposed to 24 hour air quality criteria) for some contaminants, e.g. NO_2, which requires that the maximal operational hour should have been chosen for AQ assessment of those short-term contaminants.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 65 Sect. 7.1.5	**AQ38. Ozone limiting method (OLM) for nitrogen dioxide (NO_2)** Please provide rationale for the use of the Tier 3 OLM approach as opposed to the more conservative methods of Tier 1 or Tier 2.	In the Modelling Assessment Approach section for NO to NO_2 conversions (App. E1 pg 65 Sect. 7.1.5), it is stated: "*A standard methodology for determining ambient NO_2 concentrations based on maximum NO_x concentrations predicted by a dispersion model is the Ozone Limiting Method (OLM). The OLM assumes that some NO_2 is emitted directly from the exhaust and that additional NO_2 is formed in the atmosphere by the direct mole for mole oxidation of NO by O_3 in the presence of organic radicals and sunlight. The OLM method is also referred to as the US EPA Tier 3 approach to the NO to NO_2 conversion.*" The Tier 1 (or Tier 2) approach of assuming full conversion of NO_x to NO_2 would be conservative. Tier 1 is the default approach, which assumes that all NO_x is converted to NO_2. In contrast, Tier 3 considers atmospheric conditions and a lower conversion rate. It is therefore less conservative than Tier 1. CN refers to the Tier 3 approach as "*standard methodology*". However, the

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			Tier 3 approach is not a default option in AERMOD, and requires pre-approval from regulatory authorities for its use. Without justification, there is no evidence that this Tier 3 approach is appropriate and whether it is appropriate for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	CN response Sept 30 pdf pg 54 Att. IR13-2 App. E1 pg 24-25 Table 5.5 CN response Sept 30 pdf pg 92 figure IR13-1 CN response Sept 30 pdf pg 94 Table 1	**AQ39. Receptors** Please provide an updated and consolidated AQ assessment report combining all assessments. Provide clear tables and figures identifying all, non-gridded, receptors used in the dispersion modelling. Identify if the chosen receptors included predicted future receptor locations, such as areas already zoned for sensitive receptors including residential areas. Identify all currently zoned, as-of-right, receptors (special or otherwise) in the AQ assessment even if they do not presently exist. Please add rationale for inclusion and (where appropriate) exclusion of receptors chosen.	The CN response to CEAA (CN response Sept 30 pdf pg 54 Att. IR13-2) indicates "*a total of 58 special receptors*" and references the App. E1 report for the location of the receptors (App. E1 pg 24-25 Table 5.5). However, there are only 40 receptors listed in Table 5.5. However, Figure IR13-1 (CN response Sept 30 pdf pg 92) shows more than 110 receptors. It is unclear whether all receptors in the figure were used in this evaluation, and whether different receptors for each scenario shown in Table 1 (CN response Sept 30 pdf pg 94) were used. It is also not clear which of those receptors are current residential homes or areas zoned for residential in the future. Without the appropriate input options provided in the AQ assessment, it cannot be confirmed whether the modelling was conducted appropriately.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 68 Table 7.4 App. E1 pg 57 Table 6.2	**AQ40. Emission rates in model input table and source summary tables** Please confirm the emission rates that were used in the model are correct.	Tabulated emission rates do not match between the modelling input table and the source summary table. In the AERMOD Modelling Input – Emission Data for Identical Volume Sources Table (App. E1 pg 68 Table 7.4), the model inputs listed for the overall emissions of benzene and 1,3-butadiene, for non-road equipment do not match the values listed in the Source Summary Table for Project Operation (App. E1 pg 57 Table 6.2). This suggests the wrong emission rates were used in the model.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			The estimated emission rates need to be used in the model. Errors need to be corrected.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 227 App. C4 CN response Sept 30 pdf pg 94	**AQ41. Traffic assessments** Please describe the difference between the two AQ assessments done in the traffic memos. It currently appears that the assumptions were the same but the outcome was very different.	Two traffic impact assessments were done: one in the original EIS, and another in response to an information request. However, the results are very different in each, in particular for the assessments of B(a)P: - the original traffic memo said that B(a)P related to "CN Traffic" was 111% of the Air Quality Criteria for the 24 hour AQ assessment, and 138% of the Air Quality Criteria for the annual AQ assessment, and therefore was in excess (App. E1 pdf pg 227 App. C4). - the second traffic assessment done as part of the September 30 response stated the corresponding numbers for B(a)P as 40% and 60% (CN response Sept 30 pdf pg 94). Differences between these two AQ assessments and how they were each conducted should be explained.

2.1.5 Baseline air quality levels, accounting for local spatial/temporal hotspots

Baseline (or "background") levels of air pollutants are not the same at all locations. For example, closer to a non-subject source (i.e. sources of similar contaminants as the project but located off-site and not a part of the project), background levels will be higher as they will be affected by emissions of CoPCs from that non-subject source.

A specific example would be consideration of major roadways in the area, for example along Britannia Road or along Highway 25. These roadways will emit PM2.5 (for example) due to automobile exhaust and road dust and therefore airborne levels will be higher close to these locations. Roadways will also be emission sources of oxides of nitrogen (NO_x). Therefore, locations closer to off-site roadways will also experience higher background levels of NO_x. Thus, significant concentration gradients may exist close to these non-subject sources; if these "hotspots" coincide with areas of significant impact from the subject source, then relatively high levels of air quality degradation may occur in those locations.

Other non-subject sources also emitting the same CoPCs as the project include agricultural fields (dust), municipal waste disposal sites (dusts and VOCs) and other transportation facilities (e.g., Burlington airpark). Some potential non-subject sources that could have been assessed have been identified and are shown in Figure 3 (in Appendix C of this report). These sources already exist in the community.

Equally, baseline levels may not remain constant over time. Again using the example of major roadways, baseline levels for PM2.5 and NO_x near roadways are usually higher during rush-hour periods than during low-traffic periods. Also, dust levels close to existing agricultural fields will be higher during crop plowing or harvesting times; ammonia levels may also be higher during periods of manure application.

It is important that the proponent properly account for these spatial and temporal variations to ensure that cumulative levels (i.e. subject source emissions added to existing and future predictable baseline) of AQ are not underestimated. Conservative screening methods, such as the use of a constant, maximal (over space and time) baseline level could be permissible as long as it can be shown that the proposed baseline level will not underestimate actual levels at any particular place or time for each contaminant.

If more accurate estimates of background are required, the proponent can conduct measurements in the area surrounding the project, for example, at nearby residences. As with gathering site-specific meteorological measurements, the proponent should allow sufficient time to collect a statistically significant data set of pre-existing background levels at appropriate receptors.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 45-46 Sect. 5.3.2.7 App. E1 pdf pg 241 App. C5 App. E1 pg 95 Sect 9.0 CN response May 18 pg 13-14, IR11	**AQ42. Project Site Air Monitoring Program Purpose** Please clarify the technical goals of the monitoring program.	CN provided a brief description of the Project Site Air Monitoring Program (App. E1 pg 45-46 Sect. 5.3.2.7) and some Preliminary Ambient Monitoring data (App. E1 pdf pg 241 App. C5). The Conclusions (App. E1 pg 95 Sect 9.0) state "*<u>CN has established a site-specific air monitoring station to confirm the existing background air quality for the site</u>. The station was initially brought on line during the months of July to August 2015, with further changes as systems were revised October 2015. Preliminary raw data from the monitoring cannot yet be considered representative . . . <u>A sensitivity analysis comparing the site specific air station dataset and the published background dataset can be completed when sufficient site data is available.</u> This is expected to be nominally one year from the time of first obtaining valid data*" (my underlining). CN

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			implied they would use this monitoring data as part of the determination of baseline AQ levels. CEAA asked for additional information about this monitoring campaign (CN response May 18 pg 13-14, IR11-Baseline Air Quality). However, CN responded (pg 14 Sect. IR11) with: "*The supplemental collection of ambient air quality data described in EIS Section 9.4.1 (pages 333 to 334) <u>is not part of the baseline data collection program in support of the EIS</u>. This data collection program, which is currently underway, <u>is part of the proposed follow-up monitoring program</u>.*" (my underlining). The final statement above would seem to contradict their original stated intentions in App. E1. The purposes of their measurement program should be clarified as the purposes dictate the sampling design; whether it be to collect data representative of baseline AQ at sensitive receptors, or, fenceline (or similar) monitoring as part of the post-implementation monitoring program.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 45 Sect. 5.3.2.7 App. E1 pdf pg 233-260 App. C5 App. E1 pg 13 Sect. 3.4	**AQ43. Project Site Air Monitoring Program technical issues** Clarification of the purpose of CN's monitoring program is needed. In addition, please provide the sampling location(s), information on the sampling methods and calibration procedures, and a quality controlled data set. Please also ensure the study includes measurement of all CoPCs (and with appropriate detection limits) or justify otherwise.	There are technical issues with the Project Site Air Monitoring Program sampling techniques. For example, does the location of the monitoring site fit the purposes of the monitoring program? It is claimed that the location is "*within the local assessment area (LAA)*" (App. E1 pg 45 Sect. 5.3.2.7) but this is a large area. There was no information provided on exact sampling location(s) or how this monitoring data is related to the proposed project location. Given that the location or locations of the monitoring have not been provided, it is not known if those measurements are placed in an area suitable for its purpose.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			There was also no information provided on sampling methods and calibration procedures. For instance, the Preliminary Ambient Monitoring raw data (App. E1 pdf pg 233 App. C5) showed all 3 non-continuous NH_3 samples in the App. E1 as "*non-detect measurements*". CN should have used instrumentation with a better detection limit, as is available with other methods outside of those used in the App. E1; it seems an inappropriate method was used. As well, only selected VOCs were considered (App. E1 pdf pg 234-237), even though additional CoPCs were identified (App. E1 pg 13 Sect. 3.4). For instance, there was no analysis provided of acrolein, acetaldehyde, and formaldehyde, which are defined as CoPCs for this study. Data had not been quality controlled. There were negative concentrations and missing data. For example, the PM10 concentrations were approximately two times higher than the TSP concentrations for 2015-07-11. This is indicative of a significant problem, as PM10 is a size fraction of TSP and therefore PM10 should never exceed TSP at the same location and time. Clarity is required as to the purposes of their measurement program so that its design can be assessed. Independent of this, it appears that different instrumentation should be used due to the indications that the quality of the data collected so far is poor.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7	App. E1 pg 25-26 Sect. 5.3 App. E1 pdf pg 127 Figure 3	**AQ44. Influence of local non-subject sources on the baseline** Please provide an assessment of local emissions that may be experienced by receptors that will also be impacted by the CN	CN relied on existing data from the National Air Pollution Surveillance (NAPS) program of measurements obtained at specific localities in Southern Ontario as its assumed baseline AQ in the LAA (App. E1 pg 25-26 Sect. 5.3).

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Healthy Communities – Air Quality		site, and that may not have been reflected in the data from the National Air Pollution Surveillance Program (NAPS). Alternatively, please provide evidence that the NAPS stations represent a conservative estimate of baseline AQ at all sensitive receptors for all CoPCs.	However, the influence of specific non-subject sources in the LAA was generally not included. By using NAPS data alone, the baseline will reflect the area that the NAPS sites are located in and not necessarily reflect all of the sources interacting in the surrounding region of the PDA, which will be different. Further, NAPS stations are all located in developed/urban areas, while the project location is in a semi-rural region. Periodic agricultural sources of dust and other contaminants would not be represented in the NAPS data used, for example. Figure 4 (in Appendix C of this report) shows the selected NAPS stations and their proximity to the CN PDA (the NAPS stations are also shown in App. E1 pdf pg 127 Figure 3) . CN has not considered site-specific, non-subject local sources, such as waste treatment facilities in the area. Some potential non-subject sources that could have been assessed have been identified and are shown in Figure 3 (in Appendix C of this report). These sources may have similar contaminants as the project. These local, non-subject, sources could influence the local air quality and were not likely captured by the chosen NAPS sites, and therefore could result in underestimated AQ levels for some contaminants.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy	App. E1 pg 44 Sect. 5.3.2.6	**AQ45. NAPS baseline 90^{th} percentile** Please recalculate the baselines by using the 100^{th} percentile or justify otherwise.	In the Summary of Background Levels of CoPCs section (App. E1 pg 44 Sect. 5.3.2.6), CN used a baseline of the 90^{th} percentile for ambient monitoring data, stating that the 90^{th} percentile assumption is conservative. However, the 90^{th} percentile is not conservative, 100^{th} percentile is conservative, as it would result in the

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Communities – Air Quality			maximum value for each CoPC being considered.
Air Quality EIS Guidelines pg 8 Sect. 4.2 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	EIS Guidelines pg 8 Sect. 4.2 App. E1 pg 25-46 Sect. 5.3	**AQ46. Baseline statistics and margins of error** Please provide margin of error and statistical information in regards to the baseline data.	The EIS Guidelines at section 4.2, page 8 requires that calculations of margins of error and other relevant statistical information be provided for baseline data. However, none has been provided in regard to the AQ baseline data used by CN in App. E1.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 85 Table 7.13, pg 86 Table 7.14 CN response Sept 30 pdf pg 94 Table 1	**AQ47. Baseline air quality levels for PM, acrolein, acetaldehyde, and formaldehyde** Please provide background concentrations for PM, acrolein, acetaldehyde and formaldehyde, either estimated or measured. Re-evaluate all relevant cumulative AQ assessments by taking these into account. If the background concentration of acrolein, acetaldehyde and formaldehyde have been set at zero, please provide justification for the assumptions.	There appears to be some errors with setting the baseline air quality levels for the contaminants PM, acrolein, acetaldehyde, formaldehyde, and in some cases it appears that they were set at zero. In the case of PM, no baseline was provided for this category. However, baseline concentrations were provided for subsets of this category, for PM2.5 and PM10 (e.g. App. E1 pg 85 Table 7.13). This means that the baseline for PM must be at least at the level for the baselines for PM2.5 or PM10, but this point should be clarified. This is an important point as this oversight has resulted in an underestimation of the cumulative maximum receptor concentration for PM, which is shown to be a smaller number than for PM10 alone (e.g. Table 7.13). In the case of acrolein, acetaldehyde, and formaldehyde, CN stated in the Cumulative Effects Assessment at App. E1 pg 85 Table 7.13, pg 86 Table 7.14 and in the response to CEAA information requests (CN response Sept 30 pdf pg 94 Table 1) that there were no background measurements or estimates

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			for PM or for these contaminants. However, this is unclear because the calculations of the "cumulative" concentrations for some contaminants was larger than the "project alone", meaning that there must have been some background level assumed for these, but which background level was assumed is unknown (e.g. Table 7.13 for acrolein). If baseline levels for these CoPCs are not estimated, then cumulative air quality levels at receptors will be underestimated.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	CN response Sept 30 pdf pg 51-94 App. E1 pg 36 Graph 5.14	**AQ48. Baseline future projections** Please provide a complete prediction of future changes in baseline concentrations of Chemicals of Potential Concern (CoPCs), to be used in the projected future AQ assessments.	CN seemed to have taken into account future traffic predictions (CN response Sept 30 pdf pg 51-94) but that may not be the only source of future increases or changes in emissions of all CoPCs from non-subject sources. This is of concern because, for example, it can be seen that some parameters, such as PM2.5, shows an increasing trend from 2009-2013 as seen in App. E1 pg 36 Graph 5.14 (also replicated as Figure 5 in Appendix C of this report). Future baseline projections should be conducted so that all foreseeable future effects can be assessed (for example, in 5, 10 or 20 years).

2.1.6 Combination of project air quality impacts with existing and future baseline levels

As pollutants from the proposed CN-related sources (both on and off the fixed site) disperse through the air, they will add to pre-existing levels of those same pollutants (which are present at so-called "background" or "baseline" levels) that have been emitted from other pre-existing and future predictable non-subject sources. For example, since PM2.5 is emitted from diesel exhaust from locomotives, on-site mobile equipment (e.g. reachers, stackers, etc.) and trucks (both on- and off-site), PM2.5 is considered a CoPC for this study. However, airborne PM2.5 is also present in the area before the project is constructed and operating due to emissions from many surrounding activities, such as from public roads, agricultural operations as well as from other industrial facilities, etc. Future planned and predictable changes in these non-subject sources may also increase future emissions of PM2.5 and other CoPCs. For example, much of the land surrounding the proposed CN facility is already zoned residential and, once houses are built there, there will be increases in air emissions from residential heating furnaces and family vehicles.

In previous sections of this review report, I have provided descriptions of insufficiencies in the CN AQ assessment; these are all precursors to the final, cumulative AQ impact assessment, discussed here. Therefore, all previous issues found have an additive bearing on the final results, including the facts that not all sources were assessed, not all CoPCs were assessed, maximal emissions were not determined, the methods used in the dispersion modelling are unclear, and issues exist with the manner in which the baseline concentrations were determined (or in some cases, not determined). Given all of these preliminary issues, it is somewhat premature to discuss the resultant cumulative AQ levels predicted by CN; however, I have a few specific issues in this category in addition to those previously mentioned.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	CN response Sept 30 pg 11-12 IR13, and pdf pg 51-94 Att. IR 13-2 App. E1 pdf pg 203-229 App. C4	**AQ49. Project emissions combined with off-site project-related traffic** In order to provide adequate information to allow full review and assessment of the final consolidated AQ assessment (as requested earlier), please include a map indicating all components of the AQ assessment.	In a further response to IR-13 dated September 30 (pg 11-12 and pdf pg 51-94, attachment IR 13-2), a cumulative assessment was provided combining baseline and project emissions and incorporating project-related truck traffic and future public traffic, presumably replacing the Traffic Memo provided in the initial EIS (App. E1 pdf pg 203-229 App. C4). Further basic information such as a map (with either satellite imagery or roads indicated) indicating all components of the revised AQ assessment, including all 166 road segments in the AQ assessment, the location of the project itself, the future developments, the outline of the RAA used in this AQ assessment, receptors considered in this cumulative AQ assessment and any other components in the AQ assessment will be needed in order to fully understand and assess this work. Maps indicating all aspects considered in the study are required for conducting an appropriate review and correlating to model inputs (which have also been separately requested).
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7	CN response Sept 30 pdf pg 94 Table 1 App. E1 pg 85 Table 7.13	**AQ50. Cumulative AQ levels** Please provide corrected AQ assessments at appropriate receptors for acetaldehyde, in particular, as well as the other	A "cumulative effects assessment" includes the combination of the project emissions and background levels. However, there appears to be problems with the numbers provided by CN, as for several CoPCs, the value attributed to project emissions is higher than the cumulative value.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Healthy Communities – Air Quality	App. E1 pg 86 Table 7.14	contaminants as needed, if additional inconsistencies are found. Please provide justification for any assumptions, and re-evaluate all relevant cumulative AQ assessments accordingly.	For instance, the cumulative contribution (project+traffic+background) for acetaldehyde in CN response Sept 30 pdf pg 94 Table 1 was 0.0754 $\mu g/m^3$ (for 0.5 hour time period, year 2021), yet the impacts calculated for the corresponding project + project traffic effects was 0.422 $\mu g/m^3$ (with no background included). The project alone had 0.0952 $\mu g/m^3$ concentration, which is greater than the cumulative assessment concentration. A similar discrepancy occurred for the year 2031 assessment. This suggests issues with methodology, which may extend to all contaminants considered. Similar issues are seen with the data for formaldehyde (App. E1 pg 85 Table 7.13) and acrolein (App. E1 pg 86 Table 7.14). All numbers should be checked and any illogical results such as the above should be explained.

2.1.7 Required provision of exposure data to a Health Impact Expert

The EIS Guidelines refers the proponent to a Health Canada 2010 document "*Useful Information for Environmental Assessment in order to include the appropriate basic information relevant to human health.*" (HC 2010). This document states that AQ predictions should be connected to a discussion of the potential effects on human health.

In environmental assessments, a health impact expert frequently provides an opinion in the form of an HHRA based upon the community-level exposure to CoPCs estimated by dispersion modelling, as described above. This is especially the case when existing air quality criteria values (e.g., for PM2.5) may not be fully protective of human health.

It does not appear that CN has submitted a complete AQ assessment to the HHRA. For example, there were several contaminants that were never assessed by CN and therefore could not have been subsequently reviewed in terms of HHRA. In this section I point out additional insufficiencies relevant to this topic.

For the purposes of my report, I defer to the Halton Municipalities' Health Impact Expert to opine on the sufficiency of CN's HHRA (App. E7) in regard to PM2.5 exposures, as well as other contaminants that may be relevant.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 14 Sect. 3.4	**AQ51. Diesel Particulate Matter information for Human Health Risk Assessment** Please complete an assessment of Diesel Particulate Matter for all diesel exhausts (baseline, project, construction and on-road traffic), to be passed along to the Human Health Risk Assessment.	CN states in its Chemicals of Potential Concern section (App. E1 pg 14 Sect. 3.4) that any analysis of Diesel Particulate Matter (DPM) was addressed in the same category as other fine particulate matter. However, some analysis of the effects of DPM could be lost or obscured if it is addressed in the broader category of fine particulate matter. DPM should have been treated as a separate species, and forwarded to the HHRA.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	CN response Sept 30 pg 11-12 IR 13 and pdf pg 51-94 Att. IR13-2 App. E1 pg 82-86, Sect. 7.6 App. E7 pg 17 Table 7 App. E1 pdf pg 203-229 App. C4 CN response Sept 30 2016 IR13 and IR 13-2	**AQ52. Off-site traffic exposure data to be included in Human Health Risk Assessment** Once the cumulative assessment is re-evaluated, including all sources and CoPCs and emission rate estimates that were not completed appropriately before, the full assessment needs to be passed along to a HHRA.	The cumulative AQ assessment that included off-site traffic exposure data (CN response to information request Sept 30 pg 11-12 IR 13 and pdf pg 51-94 Att. IR13-2) appeared to not be supplied to HHRA (App. E7). It appears that the HHRA only evaluated an earlier cumulative AQ assessment from the original EIS (at App. E1 pg 82-86, Sect. 7.6) that did not include off-site traffic data (App. E7 pg 17 Table 7). The same applies to the Traffic Impact Memo (App. E1 pdf pg 203-229 App. C4), which was presumably superseded by CN's response to CEAA Sept 30 2016 IR13 and IR 13-2. It does not appear to have been forwarded for HHRA. The HHRA cannot be completed appropriately unless all relevant sources, CoPCs and emission rates are included in the full cumulative AQ assessment, including project emissions (on- and off-site) and future traffic projections, as well as future predictions of the baseline concentrations in the area.

2.1.8 Mitigation proposals

Normally once the HHRA is conducted, and identifies unacceptable adverse effects, the proponent is required to reduce emissions by various means of mitigation. These means of mitigation should be quantifiable and verifiable. In other words, for example, watering roads to reduce dust emissions should include evidence of the effectiveness and the quantitative level of effectiveness (e.g. Is watering 90% effective at reducing dust emissions? 80% effective?)

In this particular case, there are a significant number of issues with the AQ assessment methods used in the App. E1 and associated documents and so any detailed discussion of the required mitigation is premature at this point. However, I make a few preliminary comments at this juncture.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines pg 27 Sect. 6.4 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 91-92 Sect. 8.0 GHG report pg 31 Sect. 8.0 CN response May 18 pdf pg 155-157 Att. IR23	**AQ53. Mitigation** Please provide quantification related to efficacy of all mitigation measures proposed.	There are many mitigation measures described in the App. E1 (pg 91-92 Sect. 8.0), the CN response to CEAA information request (CN response May 18 pdf pg 155-157 Att. IR23) and the GHG report (pg 31 Sect. 8.0) but none are quantified. The EIS Guidelines require that all mitigation measures are "*specific, achievable, measurable and verifiable*". The efficacy of any given mitigation measures should therefore be quantified. In order to learn if mitigation measures are effective, these measures must be quantified.

Signed this 10th day of March, 2017

Franco DiGiovanni

3. REFERENCES

AP-42: Compilation of Air Pollutant Emission Factors Volume 1: Stationary Point and Area Sources, US Environmental Protection Agency, Fifth Edition, January 1995

US EPA AP-42 Chapter 3.3 "Gasoline And Diesel Industrial Engines" (https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors)

US EPA AP-42 Chapter 13.2.1 "Paved Roads" (https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors)

US EPA AP-42 Appendix B.2 "Generalized Particle Size Distributions" (https://www3.epa.gov/ttn/chief/ap42/appendix/appb-2.pdf)

CEPA 2016: Toxic Substance List Schedule 1 http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=0DA2924D-1&wsdoc=4ABEFFC8-5BEC-B57A-F4BF-11069545E434

HC 2010: Health Canada's Useful Information for Environmental Assessment, 2010 *http://publications.gc.ca/collections/collection_2015/sc-hc/H128-1-10-599-eng.pdf*

MOECC 2012: SUMMARY of STANDARDS and GUIDELINES to support Ontario Regulation 419/05 - Air Pollution – Local Air Quality (including Schedule 6 of O. Reg. 419/05 on UPPER RISK THRESHOLDS); MOE PIBS # 6569e01, April 2012

US EPA 2016 Locomotives: Exhaust Emission Standards. OTAQ EPA-420-B-16-024, March 2016

APPENDIX A: ACRONYMS, ABBREVIATIONS, GLOSSARY

ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Dispersion Model (See Glossary: Dispersion Model)
AP-42	A Compilation of Air Pollutant Emission Factors assembled by the US EPA (see Glossary)
AQ	Air Quality
B(a)P	benzo(a)pyrene
CAC	Criteria Air Contaminant
CALA	Canadian Association for Laboratory Accreditation Inc.
CoPC(s)	Chemical(s) of Potential Concern (see Glossary)
DPM	Diesel Particulate Matter
ECA	Environmental Compliance Approvals (see Glossary)
ECCC	Environment and Climate Change Canada
GHG	Greenhouse gas
g/bhp-h	units of grams per brake horsepower-hour
g/hp-h	units of grams per horsepower-hour
HC	Health Canada
HHRA	Human Health Risk Assessment
hp	unit of horse power
hp-h	unit of horse power hour
Hub	Milton Logistics Intermodal Hub
IR	Information Request (related to CEAA Information Request, followed by numbering according to CEAA)
L/year	units of litres per year
LAA	Local Assessment Area, assumed to be equivalent to RAA in the CN AQ report
lb/MMBTU	units of pounds per million British Thermal Units
mi/h	units of miles per hour
MOECC	Ministry of the Environment and Climate Change (Ontario)
MOVES	MOtor Vehicle Emission Simulator model (US EPA)
NAPS	National Air Pollution Surveillance Program
NH_3	Ammonia

NO	nitrogen oxide
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen (NO, NO_2)
O_3	Ozone
OLM	ozone limiting method
PAHs	Polycyclic aromatic hydrocarbons (see Glossary)
PDA	Project Development Area
PM	Particulate Matter (see Glossary: Particulate Matter)
PM10	dust particles smaller than 10 µm in aerodynamic diameter (a fraction of PM) (see Glossary: Particulate Matter)
PM2.5	dust particles smaller than 2.5 µm in aerodynamic diameter (a fraction of PM10 and PM) (see Glossary: Particulate Matter)
RAA	Regional Assessment Area, assumed to be equivalent to LAA in the CN AQ report
SO_x	Sulphur oxides
SO_2	Sulphur dioxide
TSP	Total Suspended Particulates (see Glossary: Particulate Matter)
VOCs	Volatile Organic Compounds (see Glossary)
$\mu g/m^3$	units of microgram per cubic metre

GLOSSARY

Air quality criteria
: Benchmark guideline values to compare concentrations measured/calculated at a receptor. Criteria can vary from jurisdiction to jurisdiction and some criteria are more of a general guideline than an actual threshold value (above which there are adverse effects and below there are none). Types of air quality criteria include federal/provincial standards and guidelines.

AP-42
: A Compilation of Air Pollutant Emission Factors assembled by the US EPA, has been published since 1972 as the primary compilation of EPA's emission factor information. It contains emission factors and process information for more than 200 air pollution source categories. (A source category is a specific industry sector or group of similar emitting sources.) The emission factors have been developed and compiled from source test data, material balance studies, and other estimates.

Assessment Time Period
: A time frame over which contaminant emissions and resultant air quality levels are determined (so as to be correctly compared with air quality criteria of the same assessment time frame). Some contaminants have air quality criteria over different assessment time periods, depending on if there is a potential issue with odour (i.e. shorter time period, such as 10 minute), short-term exposures (acute health effects), or prolonged, repeated exposures (chronic health effects) (i.e. longer assessment time periods, such as annual), as a few examples. (Note CN refers to this as “averaging period” or “averaging hours” or “averaging times” in the App. E1)

Background/baseline
: Pre-existing levels of pollutants in a region of interest before the introduction of porject impacts on air quality. Background levels of air pollutants are not the same at all locations and levels can vary over time. A specific example would be consideration of major roadways in the area; locations closer to roadways will experience higher background levels in certain contaminants (background is used interchangeably with baseline).

Chemical of Potential Concern
: Project-related pollutants/contaminants emitted to the air that have the potential to elicit adverse human health effects or ecological effects.

Conservative
: The term “conservative” generally refers to an estimation methodology that ensures air quality levels are not underestimated. Due in part to lack of site-specific information, when estimating future emissions, it is normal practice to estimate such information or data; such estimates should be made so as not to underestimate future emissions, with a high degree of certainty; such estimates are deemed “conservative”. For example, to estimate dust emissions from future roads it is necessary to know the level of dustiness on that road; however, that information will not be known exactly because the road does not currently exist to allow site-specific measurements. Therefore the level of dustiness must be estimated; it is required that the estimate be made (in light of lack of specific data) conservatively. We must ensure that the level of road

dustiness used in our calculations is as high as it could reasonably be to ensure we do not underestimate road dust emissions under any circumstance. The term “conservative” also applies to all levels of decision-making where assumptions must be made, not just in estimating emissions; for example, where required in dispersion modelling. Note “conservative” is similar to “precautionary”, which is a general methodological approach that ensures air quality levels are not underestimated. The EIS Guidelines state that an Environmental Assessment “*is a planning tool used to ensure that projects are considered in a careful and precautionary manner in order to avoid or mitigate possible environmental effects and to encourage decision makers to take actions that promote sustainable development*.”

Contaminant — Any solid, liquid, gas, odour, heat, sound, vibration, radiation or combination of any of them resulting directly or indirectly from human activities that causes or may cause an adverse effect.

Cumulative assessment — An assessment that determines the effects on air quality likely to result from a designated project in combination with other physical activities that have been, continue to, or will be carried out in the future.

Dispersion Model — Atmospheric dispersion modelling is the mathematical simulation of how air pollutants disperse in the ambient atmosphere. It is performed with computer programs that solve the mathematical equations and algorithms which simulate the pollutant dispersion. The dispersion models are used to estimate the downwind ambient concentration of air pollutants emitted from sources at a facility. They can also be used to predict future concentrations under specific scenarios (i.e. changes in emission sources). The US EPA AERMOD model is an example of a widely used atmospheric dispersion model.

Emission Factors — An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. These factors are usually expressed as the weight of pollutant divided by a unit weight, volume, distance, or duration of the activity emitting the pollutant (e. g., kilograms of particulate emitted per megagram of coal burned). The US EPA AP-42 is a collection of emission factors for many different processes/sources and was developed from emission testing at sources.

Emission Rates — The emission rate is the amount of emission of a contaminant (i.e. mass) per unit time. It is calculated from the emission factor of that source combined with information on the operating conditions.

Environmental Compliance Approvals

A permitting approval that is a requirement in Ontario for facilities with air emissions (with respect to our scope of work and expertise). Note there are other environmental compliance approvals that can be obtained from the MOECC, such as for waste or sewage as examples.

Maximum predicted ground-level concentration

	For a particular contaminant, the highest air quality level (mass per volume) determined, via dispersion modelling, at the selected receptors (receptor grid or special receptors) used in that model run. The units of this value in this review are generally $\mu g/m^3$. The maximum predicted ground-level concentration could occur at different receptor locations for different contaminants. The choice of receptor locations for determination is very important when estimating what the maximum air quality levels induced by a project will be. These concentrations can be compared to air quality criteria and passed along to a health expert to determine if adverse effects are possible at those locations.
Non-subject source	Sources of the same contaminants as emitted by the project itself but located off-site and not a part of the project.
Participating Receptor	In the App. E1, a property that is associated with the Project, located on land owned by CN that was not initially considered as Receptors in the effects assessment.
Particulate matter	Airborne dust is commonly termed as "particulate matter" (i.e. PM). In regards to the dust emissions, dust particles vary in size and composition. The total amount of dust in the air is known as Total Suspended Particles (TSP). The size fractions of dust particles can vary from very fine particles, less than 2.5 micrometres (µm) in aerodynamic diameter, through to particles greater than 44 µm in diameter. Dust particles smaller than 10 µm in aerodynamic diameter are known as PM10. The finer dusts (especially those smaller than 2.5 µm in aerodynamic diameter) are termed PM2.5.
Polycyclic aromatic hydrocarbons	A group of more than 100 different chemicals that are released from burning coal, oil, gasoline, trash, tobacco, wood, or other organic substances such as charcoal-broiled meat. Internal combustion engines fuelled by diesel release numerous types of PAHs.
Receptor	A location off-site, or at a location of interest, that may be impacted by contaminants (also called Point of Impingement). In dispersion modelling only a limited number of points of reception can be considered (where air quality levels are calculated) due to computational limits; therefore the location and spacing of points of reception must be chosen judiciously, so as not to miss locations with highest impacts on air quality and/or where adverse effects may occur.
Receptor grid	A grid pattern of computational receptors, distributed consistently in the area where air quality predictions are made.
Sensitive receptor	A particular receptor location identified as a sensitive land use including buildings, amenity areas, or outdoor spaces where routine or normal activities occurring at reasonably expected times would experience one or more adverse effects from contaminant discharges generated by a subject source. Sensitive land uses may be a part of the natural or built environment. Examples may include, but are not limited to: residences, child day care centres, senior

citizens' residence or long-term care facility and educational and health care facilities.

Silt — Silt is dust particles on the road surface that are less than 75 µm in diameter; essentially, silt levels indicate the "dustiness" of the road. With higher silt levels one would expect higher dust emissions.

Source — An operation or piece of equipment at a facility from which emissions of a contaminant may occur.

Special receptors — Additional receptors of interest, identified by and specific to CN. The locations of these receptors were defined in CN's dispersion modelling domain before compiling output to enable prediction of dispersion at locations in addition to the standard receptor grid output.

Subject source — Air emission sources belonging to, or caused by, the proposed project/facility itself.

Volatile Organic Compounds — A group of compounds that contain carbon (i.e. organic) and that participate in atmospheric photochemical reactions. Generally, they have high vapour pressures (i.e. volatile or semi-volatile) at room temperature. There are numerous different types of VOCs emitted from engine exhausts.

Worst-case — Air quality impact assessments must, at the very least, address the worst-case impacts on AQ (which lead to the biggest increases in AQ levels). An assessment of worst-case impacts is required because it answers the basic question "what are the worst effects of this project on my community?" Worst-case impacts on air quality are usually (but not always) caused by maximal activity rates; locations of air emission sources, if they stray particularly close to off-site receptor locations, can also cause worst-case air quality impacts.

APPENDIX B: LIST OF DOCUMENTS REVIEWED

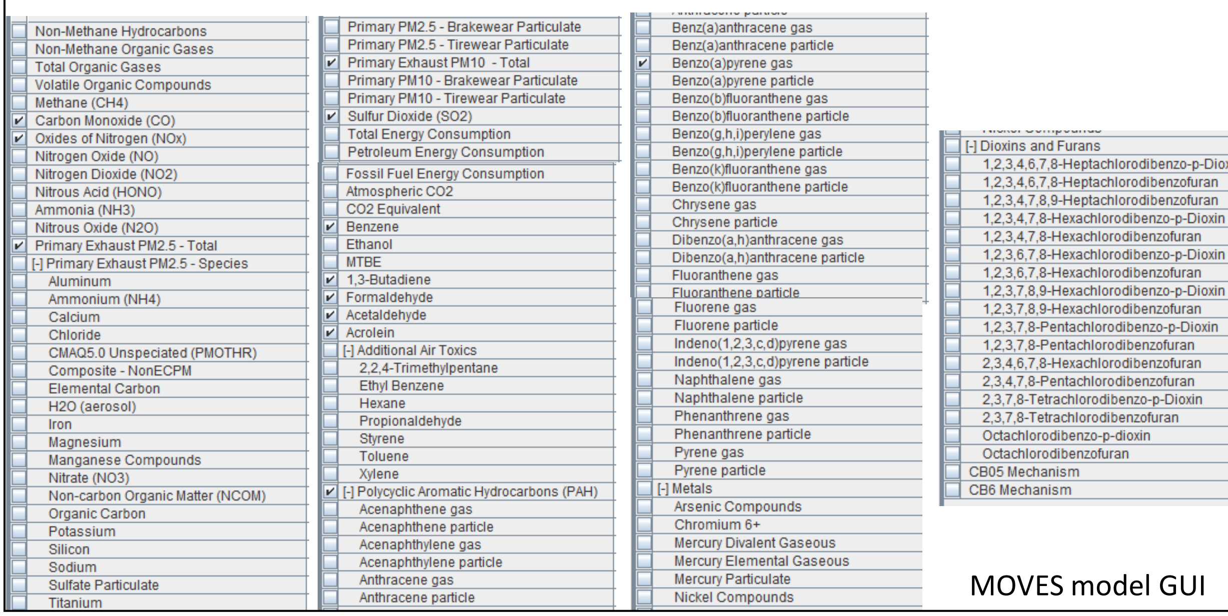
Reference	Shorthand Reference (used throughout this document)
• Cover Letter from CN, RE: Canadian National Railway Company Environmental Impact Statement – Milton Logistics Hub (December 7, 2015)	
• EIS Summary: Milton Logistics Hub Environmental Impact Statement, Summary of the Environmental Impact Statement, written by Stantec Consulting Ltd. (December 7, 2015)	
• Main EIS: Milton Logistics Hub Environmental Impact Statement, written by Stantec Consulting Ltd. (December 7, 2015)	Main EIS
• Appendix A (Final EIS Guidelines) Guidelines for the Preparation of an Environmental Impact Statement – Milton Logistics Hub Project (July 2015)	EIS Guidelines
• Appendix B of Main EIS (Figures), by Stantec Consulting Ltd. (December 7, 2015)	
• Appendix C of Main EIS (Renderings), by CN (December 7, 2015)	
• Appendix E.1 - Milton Logistics Hub Technical Data Report - Air Quality, dated December 7, 2015, written by Stantec Consulting Ltd.	App. E1
• Appendix G of Main EIS - Mitigation Measures and Commitments, dated December 7, 2015, written by Stantec Consulting Ltd.	
• CEAA Additional Information Requirements (March 15, 2016)	
• CN response to CEAA on Information Requirements Request 1 received March 15, 2016 (dated May 18, 2016, written by Stantec Consulting Ltd.)	CN response May 18
• Appendix E.7 - Milton Logistics Hub Technical Data Report - Human Health Risk Assessment, dated December 7, 2015, written by Stantec Consulting Ltd.	App. E7
• CN Report on Greenhouse Gases (June 17, 2016) [supplied in response to CEAA Requirements Mar. 15, comment IR10]	GHG report
• CEAA Additional Information Requirement (July 28, 2016)	
• CN response to CEAA Additional Information Request 2 received July 14 and July 28, 2016 (dated September 30, 2016, written by Stantec Consulting Ltd.)	CN response Sept 30
• Halton Municipalities Brief: Role of Halton Planning Framework within CEAA Panel Review of the CN Milton Logistics Hub Project, 2016 (posted on December 13, 2016 to CEAA website)	Halton Brief
• Health Canada: Conformity Review of the Milton Logistics Hub Environmental Impact Statement, February 15, 2016	HC review

Reference	Shorthand Reference (used throughout this document)
• Environment and Climate Change Canada: Conformity Review of the Milton Logistics Hub Environmental Impact Statement, February 18, 2016	ECCC review
• Compilation of comments received by the Canadian Environmental Assessment Agency re: the invitation to comment on the draft Environmental Impact Statement (EIS) Guidelines, June 21, 2015	

APPENDIX C: FIGURES

Figure 1: Contaminants available in the US EPA MOVES Model for vehicular emissions. The actual contaminants indicated with a √ are those that were assessed by CN. The others were not.

The following contaminants are from the US EPA MOVES model (2014):



MOVES model GUI

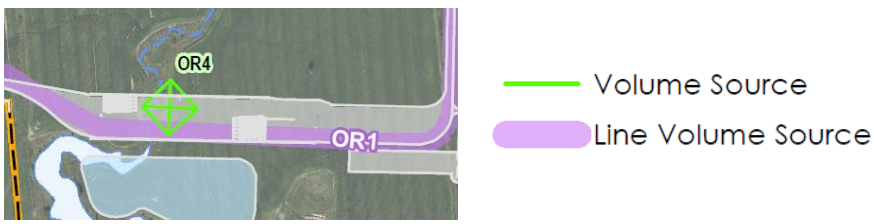
Figure 2: Conflicting assumptions made in the App. E1 concerning the On-site road traffic source called OR4. In the Table indicated at the top, it is considered a line source in the AERMOD dispersion model. In the image on the bottom, it is shown in green as a volume source.

Assumption in the model (line source for OR4, line source for OR1) according to Table 6.2:

Table 6.2: Source Summary – Project Operation

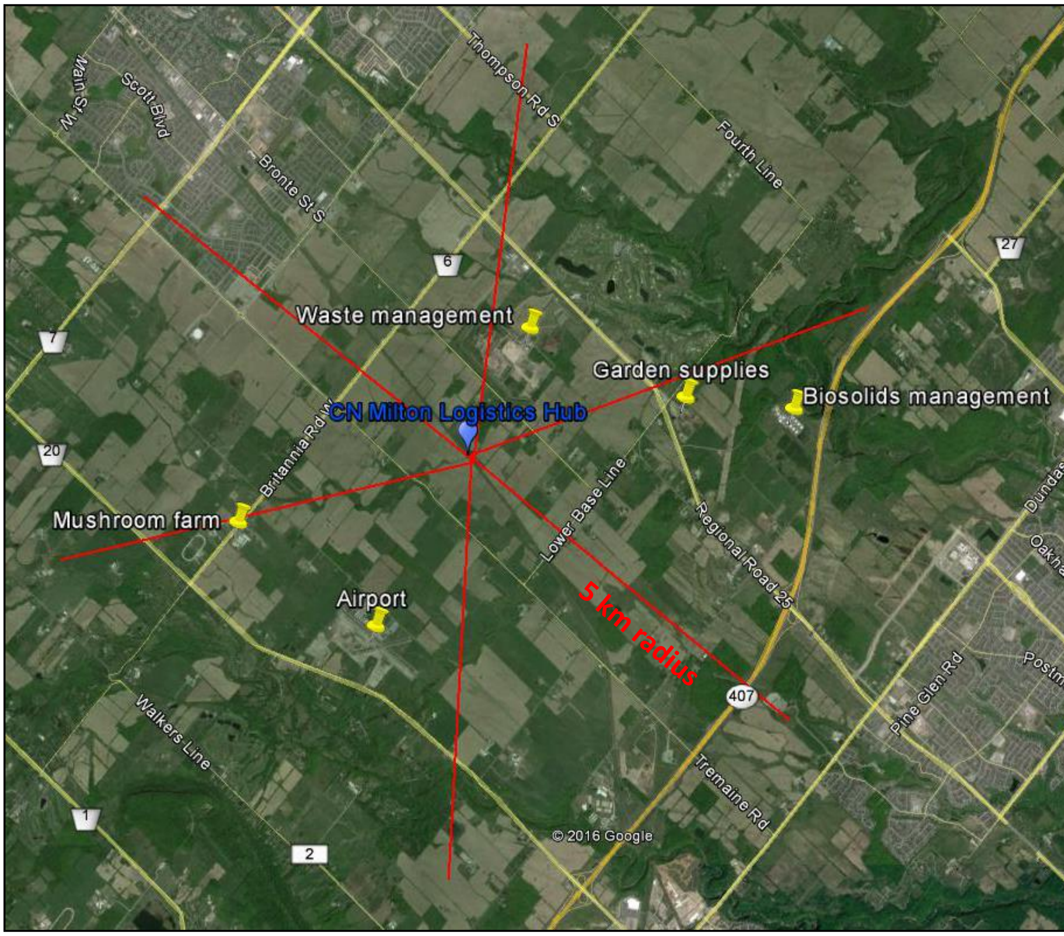
Source ID	Source Description	Type of Source and Location	Contaminant	CAS	Averaging Hours	Emission Rate (g/s)	% of Overall Emissions	Note
OR4	On-site road traffic	Line - Link4	PM_{10}	N/A (PM_{10})	24	0.035	5%	The source operates 24 hours per day.
			$PM_{2.5}$	N/A ($PM_{2.5}$)	24	0.032	6%	
			Benzene	71-43-2	24	0.0005	7%	
			1,3-Butadiene	106-99-0	24	0.0002	13%	

Assumption in the model (volume source for OR4, line source for OR1) according to Figure 5a in AQ TDR:



AQ TDR pg 59 (Sect. 6.4), AQ TDR pdf pg 131 (fig)

Figure 3: The location of the proposed CN Milton Logistics Hub (i.e. the subject source) and non-subject sources in the area that may contribute to the general baseline air quality in the area but are not related to the Hub.



Google Earth

Figure 4: The location of the proposed CN Milton Logistics Hub and the locations of the NAPS monitoring stations, the data from which were assumed as baseline concentrations in the App. E1.

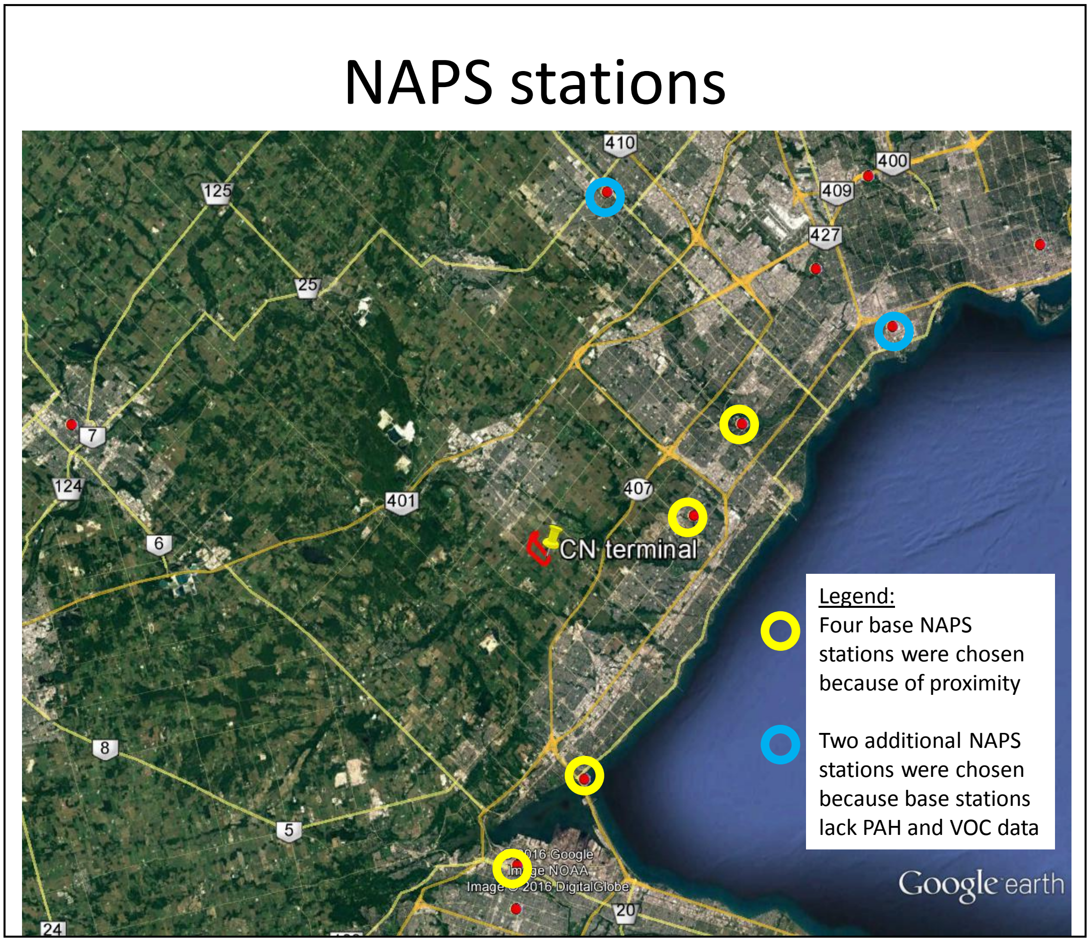
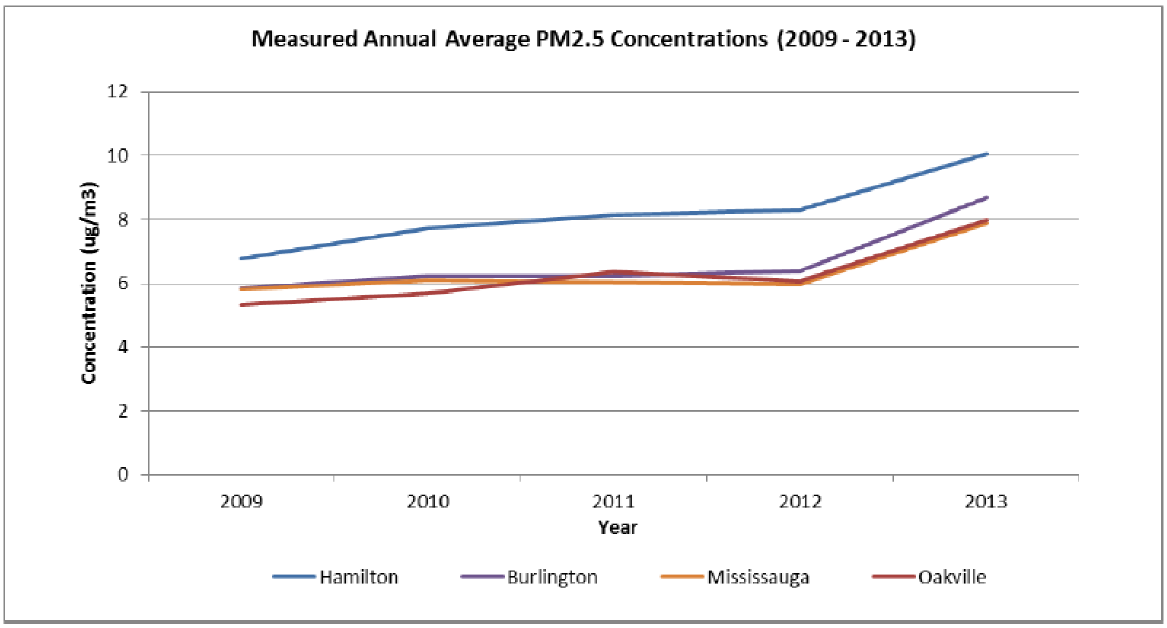


Figure 5: A copy of Graph 5.14 of NAPS PM2.5 concentration data from the App. E1, showing the increase in PM2.5 over the 5 year period for all NAPS sites examined.

Graph 5.14: Measured Annual Average $PM_{2.5}$ Concentrations (2009 - 2013)



CN Intermodal Facility
Review of the CN Environmental Impact Statement re Human Health Impact

GEORGE D. THURSTON, SC.D.

AIR POLLUTION AND ENVIRONMENTAL HEALTH CONSULTANT

3 CATHERINE COURT

CHESTER, NY 10918

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Professor of Environmental Medicine
New York University School of Medicine
Tuxedo, NY 10987

A. Introduction

I am a professor at the New York University School of Medicine, and a consultant in the field of human health effects of air pollution. I was retained by the Halton Municipalities (the Regional Municipality of Halton, the City of Burlington, the Town of Halton Hills, the Town of Milton, and the Town of Oakville) to consider the information needed to assess the health impacts of a proposed new CN Intermodal Facility in Milton, Ontario.

B. Qualifications

I am the Director of the Program in Exposure Assessment and Human Health Effects at the Department of Environmental Medicine, NYU School of Medicine, and a leading scholar on the human health effects of air pollution. I have significant experience relevant to the consideration of the CN Intermodal Facility and its potential air quality health implications.

I have led scientific investigations of the associations between air pollution exposures and health effects in the US and elsewhere in the world. This included a study of air pollution in the Toronto area, where I led a seminal investigation in the 1990's of the correlation between ozone and fine particulate matter $_{(PM2.5)}$ air pollution exposures and increases in respiratory hospital admissions.

C. Results of Review

I have reviewed the MILTON LOGISTICS HUB - Technical Data Report Air Quality (Appendix E.1), and find that it is inadequate to properly assess the environmental health impacts of the proposed facility. The following information is required to determine the health impacts of the proposed facility.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Human Health Impact EIS Guideline 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E.1	**RHH1. Traffic Induced Air Pollution Should be Modeled** Added air pollution from the proposed facility should be modeled. The model should include all the added loading and unloading equipment, and on-site and off-site traffic induced by the new facility, incorporating not only that directly from the trucks and rail vehicles transferring and carrying goods, but also any added pollution from any other local secondary (indirect) development and traffic that would be induced by the operation of the proposed new intermodal facility. Pollution impact estimates should include population weighted means by Census subdivision, for input to a subsequent health impact analysis.	Appendix E.1 fails to directly and quantitatively assess the specific environmental and health impacts of diesel particulate matter (DPM) emissions that will be added by the train and truck traffic induced by the proposed facility. In order to properly assess the environmental health impacts of the proposed facility, this information is required.

Human Health Impact EIS Guideline 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1	**RHH2. Impact on Municipalities** The human health impacts of the air pollution from the direct and indirect air emissions induced by the operation of the proposed facility should be assessed on finer Census sub-districts for the persons living in the municipalities surrounding the facility. This can be conducted, for example, using the Canadian Air Quality Benefits Assessment Tool (AQBAT) (http://www.science.gc.ca/eic/site/063.nsf/eng/h_97170.html).	The potential human health impacts of the added air pollution upon persons living in municipalities surrounding the facility have not been assessed. This is a factor that should be considered in determining impacts on the surrounding community.

March 9, 2017

DR. GEORGE D. THURSTON, SC.D.
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REVIEW OF THE CANADIAN NATIONAL RAILWAY COMPNAY ENVIRONMENTAL IMPACT STATEMENT – MILTON LOGISTICS HUB

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30 Saint Patrick Street, Suite 1000
Toronto, ON, M5T 3A3

March 10, 2017

TABLE OF CONTENTS

INTRODUCTION

A. SUMMARY OF FINDINGS

The Canadian National Railway Company (CNR) *Environmental Impact Statement – Milton Logistics Hub* (EIS) does not identify any adverse environmental effects respecting employment lands. Further, the EIS provides no conclusions as to the significance or mitigation of any effects. Additional information is required to reach any conclusions on environmental effects or mitigation.

B. PURPOSE OF REVIEW AND SCOPE OF REPORT

The purpose of the review is to determine whether the Canadian National Railway Company (CNR) provided sufficient information to determine how the Milton Logistics Hub proposal may affect the ability of the Region of Halton and Town of Milton to meet their planned goals for development of employment lands both in the employment district in which most of the Milton Logistics Hub is located and within the employment areas planned for other locations in Milton and Halton. The basis of the assessment of the sufficiency of information is the *Environmental Impact Statement – Milton Logistics Hub* (EIS) and supporting documents submitted by CNR to the Canadian Environmental Assessment Agency.

Planning for employment growth and the lands to accommodate such growth in the Region of Halton and the Town of Milton involved a lengthy and complex planning process. The selection of an appropriate amount of land in appropriate locations for urban employment-related development is part of the process. The process also involves meeting a number of policies and quantitative targets mandated by the Province of Ontario's *Growth Plan for Greater Golden Horseshoe* (*Growth Plan*) under the *Places to Grow Act*. The planning policies and targets are implemented through the *Halton Region Official Plan*, the *Town of Milton Official Plan* and, ultimately through other planning instruments such as zoning and subdivision approval.

Among other matters, the *Growth Plan* mandates the number of jobs that the Region must plan to accommodate by a certain date, in this case 2031. It also mandates minimum density targets for development on urban greenfield lands that include the development of both residential and employment lands. The analysis supporting the

Halton Official Plan urban land designations and policies involves consideration of the type of employment, the amount of employment (job counts), the employment density and the timing of development.

As a consultant to the Province of Ontario, I worked with the Province on the preparation of the growth forecasts in the 2006 G*rowth Plan* as well as the updated forecasts adopted as Amendment 2 to the *Growth Plan* in 2013. Also as a consultant, I prepared the employment land analysis for the current *Halton Region Official Plan* as described in *Sustainable Halton Report 3.07: Accommodating Growth to 2031*, April 2009.

The *Halton Regional Plan*, as amended through Regional Official Plan Amendments (ROPA) 37, 38 and 39, establishes major employment districts in the Towns of Milton and Halton Hills in the vicinity of Highway 401 as well as a new employment district in southern Milton where CNR is now proposing the Milton Logistics Hub. There are also employment districts under development to the south in Oakville and Burlington. The existing employment areas plus those added through ROPA 38 were planned to provide sufficient lands to meet the Region's 2031 employment forecast mandated in the *Growth Plan* as well as the other policy requirements including the minimum density for development in Halton's greenfield lands. The plan was based on lower-employment-density goods distribution and warehousing uses largely locating in the vicinity of Highway 401. The location for these uses is consistent with current demand and the availability of superior highway access. Other employment areas to the south in southern Milton, Burlington and Oakville are envisioned as the location of a range of employment uses with a higher employment density. The combination of areas with high and lower employment densities allows the overall urban employment land base to accommodate the planned jobs.

The documents reviewed to reach the conclusions in this report are in listed in Appendix A.

C. QUALIFICATIONS

I have almost 30 years of professional experience as a planner, land economist and demographer. Growth management and long-range planning is a major area of my expertise. I have been involved in growth management, forecasting and long-range planning assignments for numerous municipalities in the Greater Toronto Area and Hamilton (GTAH) and Greater Golden Horseshoe (GGH).

I prepared the *Growth Outlook for the Greater Golden Horseshoe*, completed in January 2005. The forecasts contained in this report are the basis for Schedule 3 to the *Growth Plan*, 2006 that mandated the growth forecasts to be used by upper- and single-tier municipalities in the GGH for long-term planning purposes. I also prepared *Greater Golden Horseshoe Forecasts to 2041*, November 2012 and its June 2013 addendum, which are the basis of Amendment 2 to the *Growth Plan*, which updated Schedule 3 and extended it to a 2041 time horizon.

I have also assisted the Region of Halton with numerous assignments on growth management, growth forecasting and land needs analysis beginning with the *Halton Urban Structure Review* work in 1990. Among these assignments was the preparation of background work for the last three major growth management amendments to the Halton Region Official Plan: ROPA 9, 1999 (*Halton Urban Structure Plan*), ROPA 25, 2004 and ROPAs 37, 38 and 39 in 2009 and 2010. My involvement in these assignments has been related to the preparation of economic and demographic forecasts and residential and employment land budgets.

I am a member of the Canadian Institute of Planners (MCIP), the Ontario Association of Land Economists (PLE) and the Royal Institution of Chartered Surveyors (RICS) and am a Registered Professional Planner (RPP).

ASSESSMENT OF CN EIS AND TECHNICAL APPENDICES: ANALYSIS AND CONCLUSIONS

The CNR EIS addressed matters related to employment briefly in several locations in the EIS and related documents, including the following:

- *Economy and Employment,* found on page 151 of the report, discusses the economies of the Town of Milton, Halton Region and the Greater Golden Horseshoe and how they have evolved since 2001.

- *Land Use,* which is found on pages 153-155, identifies provisions of presiding land use policy documents and legislation, including the provincial *Policy Statement*, local land use plans, the Halton Region Official Plan, Halton Region Transportation Master Plan, Town of Milton Official Plan, as well as a number of other community, secondary and regional planning documents.

- The *Regional and Local Benefits* of the projects are discussed on pages 326 and 327. Specific reference to resulting employment and economic contributions to the region are identified.

- Within the Follow-Up and Monitoring Program (sections 9.2 – 9.4) portion of the report, the monitoring of the *Economy and Employment* is discussed on page 339.

Having identified no adverse environmental effects respecting employment lands, the EIS provides no conclusions on the significance and mitigation of such effects. Further, the EIS states that there are no follow up or monitoring programs.

A. INFORMATION REQUESTS

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Employment Use and Density EIS Guidelines, Part 1 s. 4.3.3, Part 2, s. 3.2.1, 3.2.2, 6.1.10, and 6.3.5 Halton Brief, Table D. 8	Section 8.3.2, pages 326, 327, 328	**E1 Details of onsite Employment should be provided** Please provide the direct onsite employment by type (e.g. office/administration, container handlers, etc.).	There is no comprehensive information provided on the total employment, location or land occupancy of on-site project employment.
	Section 8.3.2, pages 326, 327, 328	**Details of Indirect Employment should be provided**. **E2** Please provide the indirect employment offsite by type (e.g. transportation, warehousing, manufacturing, etc.). **E3** Please clarify what CN defines as indirect employment – total and by type. **E4** How did CN calculate the indirect employment? Please provide supporting study/documentation. **E5** Please identify how much of the indirect employment is on CN lands outside of the project site. **E6** Please identify what proportion of the indirect employment is within approximately 2 km of the project site vs. at a distance from the South Milton employment district.	There is no comprehensive information provided on the "indirect off-site employment" or employment planned for CNR's other land holdings in the district or outside of the urban designated area in Halton Region.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
		E7 Please confirm what jobs are identified for lands that are not part of the Region's urban area but are within the project site and outside of the project site.	
	Section 8.3.2, pages 326, 327, 328	**E8 Timeline for development of CN Lands required** Please provide a timeframe for development on CN lands.	This information will clarify how the projected employment growth fits into the land use planning for Halton Region, which is based on a fixed planning period (2031).
	a) p. v, 326, 327 b) p. 23, 43, 151, 325, 326 c) p. 151 d) p. 24, 26, 151 e) p. 150 - 152	**E9 Copies of reports relied on are required** Please provide a copy of the following reports that were referenced in the EIS: a) Cushman & Wakefield 2014 b) Strategic Projections Inc. 2013 c) Metropolitan Knowledge International 2008 d) Cushman & Wakefield 2015 e) Dillon 2011	Would like to review findings of the referenced reports.

REVIEW OF MUNICIPAL STANDARDS

I have been asked to list any technical information within my expertise that is necessary to apply the standards in the Halton Brief. The below municipal standards are from the Halton Brief. My commentary is limited to the second, third and fourth columns of the below table.

Municipal Standard *with references to Halton Brief Appendices A & B (Appendix C definitions in footnotes)*	**Technical information required to apply the standard**	**Does CN propose mitigation relevant to this standard?**	**Does CN propose follow-up relevant to this standard?**
Designated Greenfield Areas To require *development*[1] in *designated Greenfield areas*[2] to contribute towards achieving the development *density target*[3] of Table 2 and the	Direct onsite employment and indirect employment offsite by type. **E1 and E2** Clarification of: what CN defines as indirect employment, and how CN calculated the indirect employment. **E3 and E4** Identification of how much of the indirect employment is on CN lands outside of the project site, what proportion of the indirect employment	No	No

[1] **Development (ROP):** the creation of a new lot, a change in land use, or the construction of buildings and structures, any of which requires approval under the Planning Act, or that are subject to the Environmental Assessment Act, but does not include: 226(1) activities that create or maintain infrastructure authorized under an environmental assessment process, 226(2) works subject to the Drainage Act, or 226(3) within the Greenbelt Plan Area, the carrying out of agricultural practices on land that was being used for agricultural uses on the date the Greenbelt Plan 2005 came into effect. **Development (PPS):** the creation of a new lot, a change in land use, or the construction of buildings and structures requiring approval under the Planning Act, but does not include: a) activities that create or maintain infrastructure authorized under an environmental assessment process; b) works subject to the Drainage Act; or c) for the purposes of policy 2.1.4(a), underground or surface mining of minerals or advanced exploration on mining lands in significant areas of mineral potential in Ecoregion SE, where advanced exploration has the same meaning as under the Mining Act. Instead, those matters shall be subject to policy 2.1.5(a).

[2] **Designated Greenfield areas (GP):** The area within a settlement area that is not built-up area. Where a settlement area does not have a built boundary, the entire settlement area is considered designated greenfield area. **Designated Greenfield areas (ROP):** The area within the Urban Area that is not Built-Up Area.

[3] ***Density targets (GP):*** *The density target for urban growth centres is defined in Policies 2.2.4.5 and 2.2.4.6. The density target for designated greenfield areas is defined in Policies 2.2.7.2, 2.2.7.3 and 2.2.7.5.*

Municipal Standard *with references to Halton Brief Appendices A & B (Appendix C definitions in footnotes)*	**Technical information required to apply the standard**	**Does CN propose mitigation relevant to this standard?**	**Does CN propose follow-up relevant to this standard?**
regional phasing of Table 2A, and provide a diverse mix of land uses to support vibrant neighbourhoods. (ROP Reference 77(2.4)) Halton Brief, Table D.8 Halton Brief, App. B, Part F.3.1	is within approximately 2 km of the project site. **E5 and E6** Confirmation of what jobs are identified for lands that are not part of the Region's urban area but are within the project site and outside of the project site. **E7** Timeframe for development on CN lands. **E8** Copies of reports that were referenced in the EIS. **E9**		
Employment Use and Density To plan for, protect and preserve the *employment areas*[4] for current and future use (ROP Reference 77.4(2)) Halton Brief, Table D.8 Halton Brief, App. B, Part F.3.2 Halton Brief, App. A, fig 32:	Direct onsite employment and indirect employment offsite by type. **E1 and E2** Clarification of: what CN defines as indirect employment, and how CN calculated the indirect employment. **E3 and E4** Identification of how much of the indirect employment is on CN lands outside of the project site, what proportion of the indirect employment is within approximately 2 km of the project site. **E5 and E6** Confirmation of what jobs are identified for lands that	No	No

[4] **Employment areas (ROP):** Areas designated in an official plan for clusters of business and economic activities including, but not limited to, manufacturing, warehousing, offices and associated retails and ancillary facilities. **Employment areas (PPS):** Those areas designated in an official plan for clusters of business and economic activities including, but not limited to, manufacturing, warehousing, offices, and associated retail and ancillary facilities.

Municipal Standard *with references to Halton Brief Appendices A & B (Appendix C definitions in footnotes)*	**Technical information required to apply the standard**	**Does CN propose mitigation relevant to this standard?**	**Does CN propose follow-up relevant to this standard?**
All Sensitive Land Uses Halton Brief, App. A, fig 38: Employment Areas: Regional Halton Brief, App. A, fig 39: Employment Areas: Project Detail Halton Brief, App. A, fig 40: Employment Areas and Future Strategic Employment Area	are not part of the Region's urban area but are within the project site and outside of the project site. **E7** Timeframe for development on CN lands. **E8** Copies of reports that were referenced in the EIS. **E9**		
Urban Employment Lands & Transportation Facilities Designate land in the vicinity of existing or planned *major highway*[5] interchanges, ports, rail yards, and airports for employment purposes, once	Direct onsite employment and indirect employment offsite by type. **E1 and E2** Clarification of: what CN defines as indirect employment, and how CN calculated the indirect employment. **E3 and E4** Identification of how much of the indirect employment is on CN lands outside of the project site, what proportion of the indirect employment is within	No	No

[5] **Major highway:** A Provincial Highway, A Major Arterial, a MultiPurpose Arterial, or a Minor Arterial as shown on Map 3 of this Plan [the ROP].

Municipal Standard *with references to Halton Brief Appendices A & B (Appendix C definitions in footnotes)*	**Technical information required to apply the standard**	**Does CN propose mitigation relevant to this standard?**	**Does CN propose follow-up relevant to this standard?**
these lands are included in the urban area (ROP Reference 77.4(6)) Halton Brief, Table D.8 Halton Brief, App. B, Part F.3.3 Halton Brief, App. A, fig 23: Major Transportation Facilities Halton Brief, App. A, fig 26: Agricultural Area and Urban Area	approximately 2 km of the project site. **E5 and E6** Confirmation of what jobs are identified for lands that are not part of the Region's urban area but are within the project site and outside of the project site. **E7** Timeframe for development on CN lands.**E8** Copies of reports that were referenced in the EIS. **E9**		

CONCLUSIONS

The Canadian National Railway Company (CNR) *Environmental Impact Statement – Milton Logistics Hub* (EIS) does not identify any adverse environmental effects respecting employment lands. Further, the EIS provides no conclusions as to the significance or mitigation of any effects. Additional information is required to reach any conclusions on environmental effects or mitigation.

Yours truly,

HEMSON Consulting Ltd.

Russell Mathew, RPP, MRICS, PLE
Partner

APPENDIX A – LIST OF DOCUMENTS REVIEWED

The documents reviewed to reach the conclusions in this report are as follows:

- The Environmental Impact Statement (EIS) Guidelines;
- The CN EIS (including the cover letter from CN dated December 7, 0215, the summary and the report); and,
- The technical appendices within this particular area of expertise:
  - Appendix A (Final EIS Guidelines)
  - Appendix B (Figures);
  - Appendix C (Renderings);
  - Appendix E.11 – Planning Justification Report – Bousfields;
  - Appendix G – Mitigation Measures and Commitments;
  - Canadian Environmental Assessment Agency (CEAA) Additional Information Requirements (March 15, 2016); and
  - CN Response to CEAA on Information Requirements (May 18, 2016).

CNR Milton Logistics Hub
Review of Environmental Impact Statement (EIS)
and Supporting Documents

Municipal Finance and Infrastructure Servicing for Water and Wastewater

Submitted to:

Region of Halton

Prepared by:

GM BluePlan Engineering Limited
Watson & Associates Economists Ltd

March 10, 2017

1.0 Introduction

1.1 Summary of Conclusions

The Environmental Impact Assessment provided by CN to support the proposed Milton Logistics Hub (the "EIS") does not have sufficient information to allow for an assessment of whether the project is likely to result in Significant Adverse Environmental Effects in respect of municipal finance and infrastructure servicing for water and wastewater.

We have set out 6 information requests that we suggest be made to CN in respect of municipal finance and infrastructure servicing for water and wastewater.

1.2 Qualifications

1.2.1 Gary Scandlan, BA, PLE

My name is Gary Daryll Scandlan. I am Professional Land Economist and I have a Bachelor of Arts from McMaster University in Economics.

My career spans 39 years, working in a management capacity for two Ontario Regional municipalities (11 years) and latterly, with Watson & Associates Economists Ltd., a firm of municipal economists, for 28 years. With a municipal client base of more than 250 Ontario municipalities and utilities, the firm is recognized as a leader in the municipal finance/local government field.

I have worked with over 125 municipalities across Canada in preparing Development Charge Background studies and by-laws, along with Fiscal Impact Assessments, Water & Wastewater Rate Studies, Asset Management and Master Plans Studies along with many other financial related studies.

I have also undertaken numerous lectures and seminars on topics such as the Development Charges Act, Revenue Alternatives to Taxation, Privatisation of Municipal Services, Municipal Financial Planning and Full Cost Pricing of Water and Wastewater services and has authored several articles and publications on these topics. I have appeared before the Ontario Municipal Board and other tribunals as an expert witness on behalf of municipalities on many occasions.

I was the Project Director for the Development Charges Studies on behalf of the Region and the Towns of Milton and Oakville along with numerous Fiscal Impact Assessment Studies for the Region and Towns of Milton, Oakville and Halton Hills.

1.2.2 Chris Hamel, P. Eng.

My name is Christopher William Hamel, P.Eng. I have my Professional Engineer license in the Province of Ontario issued by Professional Engineers of Ontario. I have my Designation as a Consulting Engineer form the Professional Engineers of Ontario. I have a Bachelor of Engineering (B.Eng.) from McGill University in Civil Engineering.

I have provided consulting engineering services since 1994. I have worked for KMK Consultants Limited, AECOM and GM BluePlan Engineering Limited (GM BluePlan). I am currently the President of GM BluePlan.

My area of focus over my 22 year career to date has been infrastructure planning and asset management primarily for water and wastewater infrastructure. I have expertise in the hydraulic analysis of water and wastewater systems. I have expertise in the completion of Master Plans for water and wastewater infrastructure as well as the completion of Development Charges background studies. Example Master Plans and Development Charges background studies include those for the Region of Peel, Halton Region, City of Hamilton, City of Brantford and Niagara Region.

I was the Project Director for the Sustainable Halton Water and Wastewater Master Plan which provides direct background and information related the servicing in the area of the CN Logistics Hub in Milton.

1.3 Purpose of Review and Scope of Report

CN Rail proposes to build a road-rail logistics hub, called the "Milton Logistics Hub Project" (the "Project"). The hub is designed to transfer containers between trucks and rail-cars. The Project also entails the construction of a railway yard and more than 20 km of track. The Project is located west of Toronto in the Town of Milton, within the Regional Municipality of Halton. Proposing the Project in Halton Region has special planning significance because Halton is one of Canada's fastest growing municipalities and is subject to comprehensive municipal land use controls and standards.

The Project is a "designated project" under the Canadian Environmental Assessment Act, 2012 ("CEAA"). On July 20, 2015, the federal Minister of the Environment (the "Minister") referred the environmental assessment (EA) of this Project to a review panel under section 38 of CEAA.

We were retained by the Regional Municipality of Halton, the City of Burlington, the Town of Halton Hills, the Town of Milton and the Town of Oakville (the "Halton Municipalities") to conduct a review of the EIS in terms of municipal finance and infrastructure servicing (water and wastewater).

2.0 Assessment of EIS

2.1 Municipal Finance

RESPONSIBLE EXPERT: GARY SCANDLAN

The background studies undertaken in support of the CN Intermodal project provide a limited level of financial evaluation of the development. Commentary in this respect is provided in the "Planning Justification Report" prepared by Bousfield Inc. Urban & Regional Planners dated December, 2015 and contained in Appendix E.11 of the EIS. This report references another report called "Economic and Financial Impact of an Intermodal Terminal in Milton" undertaken by Cushman Wakefield in 2015. The "Cushman Wakefield" report was not appended to the Planning Justification Report. Hence, the approach to the analysis, the assumptions and the conclusions therein are not available for review and comment.

Based on the limited information provided on pages 3 and 4 of the "Planning Justification Report", it appears that financial benefits identified are based on "induced" economic benefit (i.e. page 5 of the Planning Justification report identifies that "the Project can be expected to be a catalyst for employment") and not the "direct" benefits of the Project

The following provides examples where of the "Planning Justification Report" speaks to the induced benefits and not the Project directly:

- the “Cushman Wakefield” report (page 4) speaks to induced benefits of “3-5 million sq. ft. of IOD development which has the potential to generate 1,500 to 2,500 jobs” whereas Page 7 of the “Summary of the Environmental Impact Statement” (the “Economic Impact Statement”) dated December 7, 2015 prepared by Stantec identifies that the “actual” CN Intermodal project includes an Administration Building and a maintenance garage”. On page 9 of the “Economic Impact Statement” identifies that there will “130 direct jobs on the site”.
- The above “induced” development is then the basis for the “Planning Justification Report” to identify potential tax revenues ($7.7-$12.9 annually) and development charges ($36.1 to $85.9 million). The EIS fails to address what direct taxation revenue will be generated by the Project along with the potential to recover capital costs (either by development charge related payments and/or funding direct localized capital cost impacts).
- The report fails to identify the direct and broader capital costs resulting from the Project. It is then difficult to determine whether the Project will require the Region and Town to finance the capital infrastructure without recovery from the development.
- Similar to the prior item, direct and broader operating cost impacts of the Project are not provided and hence it is not clear if the Project would cost the Region and Town annual amounts to support the development.
- The “Planning Justification Report” fails to discuss whether the “Induced” Intermodal oriented development (IOD) is in addition to the development anticipated within the Town boundaries or whether this is in place of planned development. The employment lands in the area are planned for prestige industrial development. It is unclear whether the IOD will replace this planned development or is in addition to this development. This information is not included in the EIS.
- The prior item is important as taxation revenue generated by IOD development is at a lower level than the planned prestige development for the area. The EIS does not provide information regarding the impact a lower IOD taxation yield could have on the Region and Town are not presented within the reports.

Based on the above observations, CN has not provided sufficient information to fully evaluate the EIS with respect to Municipal Finance.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Municipal Finance EIS Guidelines, Part 1, s. 3.3.2, Part 2, 3.1, 3.2.2, 6.1.10, 6.3.5, and 6.4 Halton Brief, Table D.8	Appendix E.11 Planning Justification Report, Section 3.4	**EW#1 Complete Fiscal Impact Study** Please conduct a fiscal impact study that addresses the following: *For the CN Project:* 1. What are the direct capital cost impacts on all Region and Town services? 2. What are the direct capital cost recoveries, including development charges, for all Region and Town services? 3. What are the direct operating expenditure impacts on all Region and Town services? 4. What are the direct operating revenue recoveries, including property taxes for all Region and Town services? 5. Identify the impact of the CN Project displacing the prestige industrial development planned for the area on capital and annual operating expenditures, and Property tax revenues and Development Charge revenues. *For the induced IOD (Intermodal Oriented Development):* 1. What are the capital cost impacts on all Region and Town services?	Appendix E.11 undertaken in support of the CN Intermodal project provides a limited level of financial evaluation of the development. A fiscal impact study is intended to identify the potential long term capital and operating costs for a municipality and, as an offset, the potential property taxes and user fee related revenues to assess the net financial impacts of a particular development onto the municipality. This assessment allows municipalities, in the first instance, to evaluate the financial contributions of different development alternatives and secondly, to budget for the additional cost and revenues in the future. It is expected that the study include identification of the following: • Infrastructure needed to support the development directly (e.g. local roads, water/sewer servicing, etc.) along with broader needs (e.g. major road system, fire protection, water/sewer treatment facilities, etc.) • Potential funding available to pay for the infrastructure (e.g. development charges, direct funding by the development) • Annual operating expenditures to maintain the infrastructure along with the day to day expenditures to provide the municipal services to the development (e.g. snow clearing, road maintenance, water treatment, etc.) • Annual property taxes and user fee revenue generated by the development to offset the annual

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
		2. What are the capital cost recoveries, including development charges, for all Region and Town services? 3. What are the operating expenditure impacts on all Region and Town services? 4. What are the direct operating revenue recoveries, including property taxes for all Region and Town services? 5. Identify if the IOD is in addition to or displaces the prestige industrial development planned for the area and if so, what are the impacts on capital and annual operating expenditures and Property tax revenues and Development Charge revenues.	operating expenditures
Municipal Finance EIS Guidelines, Part 1, s. 4.3.3, Part 2, 3.1, 3.2.2, 6.1.10, 6.3.5, and 6.4 Halton Brief, Table D.8	Appendix E.11 Planning Justification Report, Section 3.4	**EW#2 Cushman Wakefield 2015 Report.** Please provide a copy of the Cushman Wakefield 2015 report referred to in Appendix E.11.	This report references a report called "Economic and Financial Impact of an Intermodal Terminal in Milton" undertaken by Cushman Wakefield in 2015. The "Cushman Wakefield" report was not appended to the Planning Justification Report.
Municipal Finance EIS Guidelines, Part 1, s. 3.3.2, Part 2, 3.1, 3.2.2, 6.1.10, 6.3.5, and 6.4 Halton Brief, Table D.8	Appendix E.11 Planning Justification Report, Section 3.4 Main EIS – Table 4.3: Public and Interest	**EW#3 Complete Property Value Impact Assessment.** Please provide an assessment of the impact of the Project on the property value and correspondingly property taxes for surrounding residences and businesses.	Appendix E.11 undertaken in support of the CN Intermodal project provides a limited level of financial evaluation of the development. A fiscal impact study is intended to identify the potential long term capital and operating costs for a municipality and, as an offset, the potential property taxes and user fee related revenues to assess the net financial impacts of a particular

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			development onto the municipality. This would include impacts on property tax revenue generated from existing homes and businesses.

2.2 Infrastructure Servicing – Water and Wastewater

RESPONSIBLE EXPERT: CHRIS HAMEL

The EIS and background studies contained in the EIS have limited information regarding water and wastewater servicing requirements of the Project. It is generally identified that the proposed site will address servicing through private systems and not connect to municipal infrastructure. However, the background information also indicates that the provision for connection to municipal systems in the future could be considered.

Additional information is required to provide further understanding:

- There is not comprehensive documentation on the water needs and wastewater generated by the Project's land use. Additional information is required to ensure that private systems can (i) address typical daily operations, fire flow requirements, and other emergency uses and (ii) operate at proposed capacities without negative environmental impact. This additional information would provide clarity on ensuring no capacity from the municipal systems is required.

- There has not been any information provided on what conditions would merit future consideration for municipal servicing for the Project lands. There has not been any documentation or identification of potential future conditions such as water shortage or change in land use requiring additional water supply. A risk analysis would provide further clarity on water and wastewater servicing security of supply and future requirements.

- There is no information on the approach, process or coordination required to consider and implement future connection of the Project lands to the municipal systems. Additional information is required to address the following issues:

    - The existing and planned municipal systems do not consider additional capacity generated by the Project's use

    - The municipal systems are sized and financed by planned land use

- Should municipal system capacity be required in the future, how would the current infrastructure financing be reconciled and what would the plan be for municipal system capacity

The EIS and background documentation contained in the EIS did not address the potential "halo effect" of additional related development and the servicing requirements for this surrounding development.

Additional information is required to provide further understanding:

- The Planning Justification Report indicates that the Project will stimulate new employment development in the area. There is no context as to the size or rate of development. Although the preliminary servicing strategy for the Project lands is identified as private systems, it would be reasonable to expect the surrounding new development to require municipal servicing.
- Additional information regarding the servicing requirements and financing for the surrounding development is required.
- Information that identifies the understanding of the servicing requirements of this potential development including the need to connect to the municipal systems should be provided.
- Information related to the capacity analysis, impact analysis, and financing of the required infrastructure to support the new surrounding development should be provided.

Based on the above observations, CN has not provided sufficient information to evaluate the EIS with respect to infrastructure servicing related to water and wastewater.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Water and Wastewater Servicing EIS Guidelines, Part 2, 3.1, 3.2.2, 6.1.10, 6.3.5 and 6.6.3 Halton Brief, Table D.3 and D.8	EIS Section 2.2.3.4 and 2.2.3.5 EIS Section 9.4.10 Appendix E.11 Planning Justification Report, Section 4.6 and 5	**EW#4 Servicing Requirements and Capacity Analysis** Please provide information regarding: • The daily water use and wastewater generation and basis for the calculations for the Project • The fire flow requirements for the Project • Detailed specifications of the proposed private systems	There is no information on the approach, process or coordination required to consider and implement future connection of the Project lands to the municipal systems. Additional information is required to address the following issues: • The existing and planned municipal systems do not consider additional capacity generated by the Project's use • The municipal systems are sized and financed by planned land use

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			• Should municipal system capacity be required in the future, how would the current infrastructure financing be reconciled and what would the plan be for municipal system capacity
Water and Wastewater Servicing EIS Guidelines, Part 2, 3.1, 3.2.2, 6.1.10, 6.3.5 and 6.6.3 Halton Brief, Table D.3 and D.8	EIS Section 2.2.3.4 and 2.2.3.5 EIS Section 9.4.10 Appendix E.11 Planning Justification Report, Section 4.6 and 5	**EW#5 Servicing Risk Analysis** Please provide information regarding • Overall water and wastewater servicing risk analysis • Water and wastewater system protection and mitigation measures • Private system contingency plan	There is no information on the approach, process or coordination required to consider and implement future connection of the Project lands to the municipal systems. A risk analysis would provide further clarity on water and wastewater servicing security of supply and future requirements.
Water and Wastewater Servicing EIS Guidelines, Part 2, 3.1, 3.2.2, 6.1.10, 6.3.5 and 6.6.3 Halton Brief, Table D. 3 and D.8	EIS Section 2.2.3.4 and 2.2.3.5 EIS Section 9.4.10 Appendix E.11 Planning Justification Report, Section 4.6 and 5	**EW#6 Surrounding New Development Servicing Requirements and Capacity Analysis** Please provide information regarding • Anticipated level of surrounding development including potential land uses and servicing requirements • References to industry examples of “halo effect”	The EIS and background documentation contained in the EIS did not address the potential “halo effect” of additional related development and the servicing requirements for this surrounding development. This information is needed to understand the servicing requirements of this potential development including the need to connect to the municipal systems

3.0 Standards in Halton Brief

As part of our mandate, we have been asked to list any technical information within our expertise that is necessary to apply the standards in the Halton Brief. The below municipal standards are from the Halton Brief. Our commentary is limited to the second, third and fourth columns of the below table.

Municipal Standard *with references to Halton Brief Appendices A & B (Appendix C definitions in footnotes)*	**Technical information required to apply the standard**	**Does CN propose mitigation relevant to this standard?** (If so, comment on sufficiency)	**Does CN propose follow-up relevant to this standard?** (If so, comment on sufficiency)
Urban Water quality and quantity To permit *development*[1] in the Urban Area on private wells and/or private sewage disposal systems only on an interim basis until *urban service*[2] is available. Halton Brief, Table D.3, (ROP reference 89(4). Halton Brief, App. B, Part A.3.3 Halton Brief, App. A, fig 26: Agricultural Area and Urban Area	Please provide information that addresses the information identified in **EW4** and **EW5**.	No	No
Employment Use and Density To plan for, protect and preserve the *employment areas*[3] for current and future use (ROP Reference 77.4(2)) Halton Brief, Table	A fiscal impact study that addresses the information identified in **EW1**	No	No

[1] **Development (ROP):** The creation of a new lot, a change in land use, or the construction of buildings and structures, any of which requires approval under the Planning Act, or that are subject to the Environmental Assessment Act, but does not include: 226(1) activities that create or maintain infrastructure authorized under an environmental assessment process, 226(2) works subject to the Drainage Act, or 226(3) within the Greenbelt Plan Area, the carrying out of agricultural practices on land that was being used for agricultural uses on the date the Greenbelt Plan 2005 came into effect. **Development (PPS):** The creation of a new lot, a change in land use, or the construction of buildings and structures requiring approval under the Planning Act, but does not include: a) activities that create or maintain infrastructure authorized under an environmental assessment process; b) works subject to the Drainage Act; or c) for the purposes of policy 2.1.4(a), underground or surface mining of minerals or advanced exploration on mining lands in significant areas of mineral potential in Ecoregion 5E, where advanced exploration has the same meaning as under the Mining Act. Instead, those matters shall be subject to policy 2.1.5(a).

[2] **Urban services (ROP):** Municipal water and/or wastewater systems or components thereof which are contained within or extended from Urban Area designations or from municipalities abutting Halton Region.

[3] **Employment areas (ROP):** Areas designated in an official plan for clusters of business and economic activities including, but not limited to, manufacturing, warehousing, offices and associated retails and ancillary facilities. **Employment areas (PPS):** Those areas designated in an official plan for clusters of business and economic activities including, but not limited to, manufacturing, warehousing, offices, and associated retail and ancillary facilities.

Municipal Standard *with references to Halton Brief Appendices A & B (Appendix C definitions in footnotes)*	**Technical information required to apply the standard**	**Does CN propose mitigation relevant to this standard?** (If so, comment on sufficiency)	**Does CN propose follow-up relevant to this standard?** (If so, comment on sufficiency)
D.8 Halton Brief, App. B, Part F.3.2 Halton Brief, App. A, fig 32: All Sensitive Land Uses Halton Brief, App. A, fig 38: Employment Areas: Regional Halton Brief, App. A, fig 39: Employment Areas: Project Detail Halton Brief, App. A, fig 40: Employment Areas and Future Strategic Employment Area			
Urban Services for Employment Areas The urban area consists of areas designated on Map 1 where *urban services*[4] are or will be made available (ROP Reference 74) Halton Brief, Table D.8 Halton Brief, App. B, Part F.3.4 Halton Brief, App. A, fig 26: Agricultural Area and Urban Area Halton Brief, App. A, fig 27: Prime Agricultural Areas (Map 1) Halton Brief, App. A, fig 38: Employment Areas: Regional Halton Brief, App. A, fig 39: Employment Areas: Project Detail Halton Brief, App. A, fig 40:	A fiscal impact study that addresses the information identified in **EW1**	Yes, on an interim basis. However, over the long term, water and wastewater servicing will be provided in close proximity to the Project. CN does not propose mitigation relevant to this standard if the Project lands are connected to municipal services.	Yes, CN proposes follow up in the EIS 2.2.3.4 and 2.2.3.5. However, the follow up is insufficient because it does not propose any specific follow up if the Project lands are connected to municipal services.

[4] **Urban services:** Municipal water and/or wastewater systems or components thereof which are contained within or extended from Urban Area designations or from municipalities abutting Halton Region.

Municipal Standard *with references to Halton Brief Appendices A & B (Appendix C definitions in footnotes)*	**Technical information required to apply the standard**	**Does CN propose mitigation relevant to this standard?** (If so, comment on sufficiency)	**Does CN propose follow-up relevant to this standard?** (If so, comment on sufficiency)
Employment Areas and Future Strategic Employment Area			
Municipal Finances Ensure that the development industry absorbs the cost of providing services to new development or redevelopment and that any financial impact be based on a financing plan (ROP Reference 210(6)) Halton Brief, Table D.8 Halton Brief, App. B, Part F.3.5 Halton Brief, App. B, Part F.3.5	A fiscal impact study that addresses the information identified in **EW1** Please provide an assessment of the impact of the Project on the property value and correspondingly property taxes for surrounding residences and businesses. **EW3**	No	No

4.0 Other Standards

With respect to water and wastewater servicing, the Project will require adherence to existing policies and standards for the Town of Milton, Region of Halton and Province of Ontario. Relevant standards include but are not limited to:

- Town and Region design criteria
- Town and Region design standards for water and wastewater infrastructure
- MOECC Design Guidelines for water and wastewater systems
- Ontario Environmental Compliance Approval

5.0 Conclusions

The EIS does not have sufficient information to allow for an assessment of whether the project is likely to result in Significant Adverse Environmental Effects in respect of municipal finance and infrastructure servicing for water and wastewater.

We have set out 6 information requests that we suggest be made to CN in respect of municipal finance and infrastructure servicing for water and wastewater.

Respectfully submitted by:

Gary Scandlan, BA, PLE
Director, Watson & Associates Economists Ltd.

Chris Hamel, P.Eng.
President, GM BluePlan Engineering Limited

APPENDIX A – List of Documents Reviewed

- Cover Letter from CN (December 7, 2015)
- EIS Summary
- Main EIS
    - Appendix A (Final EIS Guidelines)
    - Appendix B (Figures)
    - Appendix C (Renderings)
    - Appendix E.11 - Planning Justification Report - Bousfields
    - Appendix E.12 - Milton Logistics Hub Technical Data Report - Socio-Economic Baseline
    - Appendix F - Site Selection Study
    - Appendix G - Mitigation Measures and Commitments
- CEAA Additional Information Requirements (March 15, 2016)
- CN Response to CEAA on Information Requirements (May 18, 2016)

ASI Providing Archaeological & Cultural Heritage Services
528 Bathurst Street Toronto, ONTARIO M5S 2P9
T416-966-1069 F416-966-9723 asiheritage.ca

CN Milton Mobility Logistics Hub
Review of Environmental Impact Statement (EIS)
and Supporting Documents

Archaeology

Submitted to:

Regional Municipality of Halton

Prepared by:

Lisa Merritt, M. Sc.
Archaeological Services Inc. (ASI)

March 10, 2017

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 SUMMARY OF FINDINGS

The Environmental Impact Statement provided by CN ("CN EIS") in support of the proposed Milton Mobility Logistics Hub (the "Project") does not provide sufficient information to allow the Joint Panel to assess whether the Project is likely to result in Significant Adverse Environmental Effects with respect to archaeological resources. In particular, CN has not yet provided Stage 3 archaeological assessment reports.

In **Appendix B** to this report, I have set out **2** information requests that I suggest be made to CN in respect of its work on archaeological resources.

1.2 PURPOSE OF REVIEW AND SCOPE OF REPORT

I was retained by the Regional Municipality of Halton, the City of Burlington, the Town of Halton Hills, the Town of Milton and the Town of Oakville (the "Halton Municipalities") to conduct a review of the CN EIS with respect to archaeological resources.

This report provides an analysis of the sufficiency of the CN EIS as it relates to my area of technical expertise. I have focused the report on whether sufficient information has been provided in the EIS to determine whether the Project meets the requirements of the EIS Guidelines dated July 2015 (the "EIS Guidelines"), as well as the standards set out in the Halton Brief.

As directed by the Joint Panel, I have considered sufficiency in the context of whether adequate information has been provided to allow a proper assessment of the technical validity of the information, methods, analysis, and conclusions regarding the significance of any environmental effects, mitigation, and proposed follow-up programs.

1.3 QUALIFICATIONS

I am currently a Partner at Archaeological Services Inc. (ASI) and Director of ASI's Environmental Assessment Division. I have worked as an archaeological consultant in the province of Ontario since 1996 and hold a Professional Archaeological licence for the Province of Ontario (#P094). I received my Master of Science (Anthropology) from the University of Toronto, and my BA Hons from York University. Prior to joining ASI, I operated my own archaeological consulting firm for five years. I joined ASI in 2008 to help manage the Highway 407 East Extension project, the largest archaeological project of its kind in Ontario. In 2010, I was promoted to Senior Archaeologist and in 2014 became a Manager in ASI's Environmental Assessment (EA) division. On October 1st 2016, I assumed my current role. As Director of EA, I manage a team of dedicated staff from ASI's Toronto and Burlington offices in the preparation of proposals and the successful completion of hundreds of archaeological assessment projects annually, including Class EA's, Transit Project Assessments, and Individual EAs.

1.4 DOCUMENTS REVIEWED

Please see the list of documents I have reviewed at **Appendix A**.

2.0 ASSESSMENT OF EIS

Section 3.3.2 of the EIS Guidelines require CN to identify and examine Valued Components ("VCs") that may be impacted by the Project and to describe them "in sufficient detail to allow the reviewer to understand their importance and to assess the potential for environmental effects arising from the project activities."

Under Section 6.3.5 of the EIS Guidelines, CN must consider the following effects:

> *effects to physical and cultural heritage, and structures, sites or things of historical, archaeological, paleontological or architectural significance to local heritage, including, but not limited to:*
>
> - *the loss or destruction of physical and cultural heritage;*
> - *changes to access to physical and cultural heritage; and*
> - *changes to the cultural value or importance associated with physical and cultural heritage.*

Under Section 6.2.2 of the CN EIS, CN identifies "archaeological and cultural heritage resources" as a VC.

2.1 STAGE 1-2 ARCHAEOLOGICAL ASSESSMENT REPORT

To date, Stantec has completed a Stage 1-2 archaeological assessment report, *Milton Logistics Hub – Technical Data report Stage 1-2 Archaeological Assessment*, that details the Stage 1 background research conducted for the Local Assessment Area ("LAA") and the Stage 2 field results for Stantec's assessment of the Project Development Area ("PDA"). The report is included as Appendix E.14 to the CN EIS.

The Stage 2 assessment documents 56 locations where archaeological resources were identified, and recommends that 14 of these have sufficient cultural heritage value to require a Stage 3 assessment. Further, Stantec states that at least five of these archaeological sites may require Stage 4 mitigation of impacts (salvage excavation).

In the CN EIS, Stantec states that the Stage 3 assessments are scheduled for 2016 (CN EIS, p. 261) and in its September 30, 2016 response to Information Request 9 ("IR9"), Stantec advises that the Stage 3 field investigations are underway and scheduled to be completed in 2016 (IR9 Response, Sept. 30, 2016, p. 6). However, to date, CN has not provided any Stage 3 assessments. In the same response to IR9 Stantec also states that Stage 4 excavations, if required, are planned for Spring 2017 (IR9 Response, Sept. 30, 2016, p. 6).

The Stage 1-2 archaeological assessment report is, for the most part, detailed and well organized and has been structured to meet the appropriate provincial requirements (the 2011 *Standards and Guidelines for Consultant Archaeologists* ("S & G")). However, Stantec archaeologists have not recommended an archaeological site, identified as 'Location 5' for a Stage 3 assessment when it clearly meets provincial requirements for further archaeological assessment.

In section 6.5 of the CN EIS Stantec states that Location 5 (AiGx-391) does not fulfill the criteria for a Stage 3 archaeological investigation as per Section 2.2 of the Ministry of Tourism Culture and Sport's ("MTCS") 2011 Standards and Guidelines (Stantec 2016: 231; Table 138). However, Location 5 contains a projectile point (or arrowhead) that is "manufactured from Flint Ridge Chalcedony" (Stantec 2016: 64). This material is considered to be "exotic" in that it does not occur naturally in Ontario. As per S & G Section 2.2 Standard 1, single examples of exotic chert (*i.e.*, the projectile point) require Stage 3 assessment.

ASI

2.2 MINISTRY OF TOURISM, CULTURE AND SPORT

All archaeological activities in Ontario are legislated by the *Ontario Heritage Act*, which is administered by the MTCS. As per the *Ontario Heritage Act* R.S.O. 1990, c O.18, all professional consulting archaeologists must have a valid archaeological licence from MTCS. It is a licensing condition to submit archaeological technical reports for each project undertaken to MTCS for review and acceptance into the Provincial Registry of Reports.

In 2011, the Ministry of Tourism and Culture (as it was then named) published a technical document, the *Standards and Guidelines for Consultant Archaeologists* ("S & G") that provides regulations for conducting and reporting on all archaeological assessments in Ontario.

Compliance with the S & G for all four stages of the archaeological assessment process is a critical test for the sufficiency of the technical studies that have been undertaken by CN's archaeologists for the Project.

2.3 INFORMATION REQUESTS

Stage 3 and 4 Reports

As noted above, the Stantec Stage 1-2 report recommends that Stage 3 assessments must be undertaken on 14 archaeological sites (or "Locations"). A Stage 3 assessment is required for all archaeological sites that demonstrate cultural heritage value and/or interest (CHVI). The intention of a Stage 3 is to assess the CHVI and to determine if the CHVI has been sufficiently documented or if further measures are required to protect or document the site fully through excavation. If the Stage 3 determines that the site has not been fully documented, then a recommendation will be made that the site has further CHVI and requires Stage 4 mitigation of impacts. The Stage 3 report with recommend appropriate strategies for either a) protection and/or future conservation of the archaeological site; or b) detailed excavation strategies. The MTCS states that the preferred approach is always to protect an archaeological site from development impacts. Stage 4 excavation can only proceed when the development proponent can demonstrate that it is not feasible to protect the site for engineering or practical purposes. Insufficient methodological approaches can be determined upon review of the Stage 3 reports.

Stage 4 mitigation of impacts is the final step in an archaeological assessment and it entails either: a) the complete excavation of the archaeological resource; or, b) the long term protection and avoidance of the archaeological resource. The approach to be taken with respect to mitigation is determined at Stage 3. If the site is to be fully excavated then the Stage 4 report becomes the ultimate record of all the data gathered during the excavation. Because excavation is an inherently destructive process, the excavation has to be undertaken correctly from the start. This is critical to ensure that the archaeological site becomes a valuable part of the record of the heritage of Ontario. Ultimately, a review of the Stage 4 work would allow for a determination regarding whether potential impacts to the archaeological resource have been sufficiently mitigated.

According to the Stage 1-2 report, Stantec makes the preliminary determination that 12 of the 14 sites recommended for Stage 3 may also require Stage 4 mitigation of impacts (Stantec 2016: 227; Table 137). These excavations will presumably proceed in 2017, if the sites cannot be protected from the proposed Project.

To summarize, without the Stage 3 archaeological assessment reports and the Stage 4 mitigation of development impacts reports, the archaeological assessment process is incomplete for the Project. More importantly, I cannot assess the Project's potential impacts to archaeological resources until I am provided with and review all of Stantec's Stage 3 assessment reports, which will include its recommendations with respect to any required Stage 4 mitigation work.

In addition, for the reasons set out above, Location 5 should be added to Stantec's list of sites requiring Stage 3 archaeological assessment.

Information Request:

Topic *(include reference(s) to relevant sections of the EIS Guidelines and/or Halton Brief)*	**Reference to CN EIS** (*section or page # of EIS, CN responses to Information Requirements, etc.)*	**Requested Information**	**Rationale**
Stage 3 Archaeological Assessment EIS Guidelines, Section 3.3.2 and Part 2, Sections 6.3.4 and 6.3.5 Halton Brief: F.3.6 Cultural Heritage Resources	CN EIS, section 6.2.2 CN EIS, App. E.14 - *Milton Logistics Hub – Technical Data report Stage 1-2 Archaeological Assessment* IR 9 Response, Sept. 30, 2016, page 6	**ECA1. Stage 3 Archaeological Assessment Reports** Please provide all Stage 3 Archaeological Assessment Reports, including a Stage 3 report for Location 5.	Stage 3 reports are required in order to assess the potential impacts of the Project on archaeological resources and to determine if the archaeological assessments have been conducted sufficiently to ensure the conservation of these heritage resources. CN has advised that Stage 3 field investigations are scheduled to be completed in 2016 (IR9 Response). However, to date, CN has not provided any Stage 3 assessments. CN has also advised that Stage 4 excavations, if required, are planned for Spring 2017 (IR9 Response).

MTCS Letters of Acceptance

After reviewing an archaeological assessment report, MTCS issues to the archaeological licensee a Letter of Acceptance into the Ontario Public Register of Archaeological Reports. If the report is deemed not to meet the S & G then MTCS will request revisions in order for it to be accepted. A critical test to determine if an archaeological assessment meets provincial requirements is to know the outcome of the MTCS review of the report.

To date, CN has not provided a MTCS acceptance letter for the Stage 1-2 assessment report. Once the Stage 3 and 4 reports are completed, MTCS letters are expected for those as well.

Information Request:

Topic *(include reference(s) to relevant sections of the EIS Guidelines and/or Halton Brief)*	**Reference to CN EIS** (*section or page # of EIS, CN responses to Information Requirements, etc.)*	**Requested Information**	**Rationale**
MTCS Approval EIS Guidelines, Section 3.3.2 and Part 2, Sections 6.3.4 and 6.3.5 Halton Brief: F.3.6 Cultural Heritage Resources *Ontario Heritage Act* and MTCS Standards and Guidelines	CN EIS, section 6.2.2 CN EIS, App. E.14 - *Milton Logistics Hub – Technical Data report Stage 1-2 Archaeological Assessment*	**ECA 2 – MTCS Approval** Please provide the Ministry of Tourism Culture and Sport (MTCS) Letter of Acceptance into the Ontario Public Register of Archaeological Reports for Stantec's Stage 1 and 2 Archaeological Assessment as well as MTCS Letters of Acceptance for all Stage 3 and Stage 4 reports once available.	The MTCS letters are required to determine the reports' compliance with MTCS provincial Standards and Guidelines.

3.0 MUNICIPAL STANDARDS

3.1 STANDARDS IN HALTON BRIEF

The Halton Brief identifies the following Halton Region Official Plan standard applicable to archaeological resources:

> *Prior to development occurring in or near areas of archaeological potential, require assessment and mitigation in accordance with provincial requirements and the Regional archaeological management plan.* (ROP Reference 167(6)) Halton Brief, Table D.8)

I have been asked to review the applicable standard in the Halton Brief, and to list any technical information within my area of expertise that is required to inform the application of the standard. My commentary is found in the last three columns of the table below.

Review of Municipal Standards as set out in the Halton Brief – Employment Lands – Table D.8

Municipal Standard *with references to Halton Brief Appendices A & B (Appendix C definitions in footnotes)*	**Technical information required to inform the application of the standard**	**Does CN propose mitigation relevant to this standard?**	**Does CN propose any follow-up relevant to this standard?**
Cultural Heritage Resources Prior to *development*[1] occurring in or near *areas of archaeological potential*[2], require assessment and mitigation in accordance with provincial requirements and the Regional archaeological management plan (ROP Reference 167(6)) Halton Brief, Table D.8	Sufficient Stage 3 assessment work and Stage 4 mitigation work are required in order to apply the standard. **ECA1**	No, given that Stage 3 assessment reports have not yet been provided.	Yes, CN proposes Stage 3 assessments and Stage 4 work. However, an additional Stage 3 assessment report should be required for one site (Location 5) that was not recommended for further work in the Stage 1-2 report.

3.2 OTHER MUNICIPAL STANDARDS

The Regional Municipality of Halton ("Halton Region") has an archaeological management plan, created in 1998 and updated in 2008, that provides Halton Region with guidance and policy recommendations on how to adequately undertake archaeological planning in land use and development contexts: *Master Plan of Archaeological Resources of the Regional Municipality of Halton, 2008 Update* ("Halton's Archaeological Master Plan").

The Stage 1-2 archaeological assessment report is, for the most part, detailed and well organized and has been structured to meet the requirements of Halton's Archaeological Master Plan, with the exception of the lack of a recommendation for Stage 3 assessment for 'Location 5' as is noted above in Section 2.1.

[1] **Development (ROP):** the creation of a new lot, a change in land use, or the construction of buildings and structures, any of which requires approval under the Planning Act, or that are subject to the Environmental Assessment Act, but does not include: 226(1) activities that create or maintain infrastructure authorized under an environmental assessment process, 226(2) works subject to the Drainage Act, or 226(3) within the Greenbelt Plan Area, the carrying out of agricultural practices on land that was being used for agricultural uses on the date the Greenbelt Plan 2005 came into effect.
Development (PPS): the creation of a new lot, a change in land use, or the construction of buildings and structures requiring approval under the Planning Act, but does not include: a) activities that create or maintain infrastructure authorized under an environmental assessment process; b) works subject to the Drainage Act; or c) for the purposes of policy 2.1.4(a), underground or surface mining of minerals or advanced exploration on mining lands in significant areas of mineral potential in Ecoregion SE, where advanced exploration has the same meaning as under the Mining Act. Instead, those matters shall be subject to policy 2.1.5(a).
[2] **Areas of archaeological potential (PPS):** Areas with the likelihood to contain archaeological resources. Methods to identify archaeological potential are established by the Province, but municipal approaches which achieve the same objectives may also be used. The Ontario Heritage Act requires archaeological potential to be confirmed through archaeological fieldwork.

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4.0 CONCLUSIONS

CN has not provided sufficient information to assess the adequacy of the CN EIS's prediction of effects on archaeological resources. The following additional information is required:

- Stage 3 archaeological assessment reports;
- MTCS Letter of Acceptance for the Stage 1-2 report, as well as for the Stage 3 reports once they are available;
- The Stage 4 reports and associated MTCS Letters of Acceptance will also be required if/when Stage 4 is complete.

I request that the Joint Panel ask CN to remedy these sufficiency issues by providing the requested information.

Signed this 10th day of March, 2017

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Appendix A

Documents Reviewed

1) EIS Guidelines

2) CN EIS (including the cover letter from CN dated December 7, 2015, the summary and the report); and

    a) Appendix A - Final EIS Guidelines

    b) Appendix B (Figures)

    c) Appendix C (Renderings)

    d) Appendix E.14 - Stage 1 and 2 Archaeology

    e) Appendix F – Site Selection Study

    f) Appendix G - Mitigation Measures and Commitments

3) CEAA Information Requests (March 15, 2016)

4) CN Response to CEAA Information Requests (May 18, 2016)

5) CEAA Additional Information Requests (July 14, 2016)

6) CN Response to CEAA Additional Information Requests (Sept. 30, 2016)

7) Letter from Mississaugas of the New Credit First Nation to Review Panel Secretariat dated January 25, 2017

8) Letter from Mississaugas of the New Credit First Nation to Review Panel Secretariat dated February 21, 2017

9) Halton Municipalities Brief

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