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 event-based 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 continuous simulation 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 upstream 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.

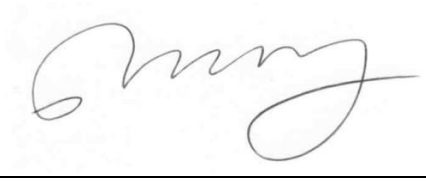
3.0 CONCLUSIONS

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

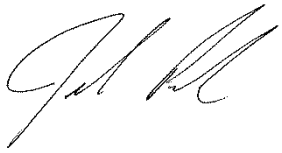


Ron Scheckenberger

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