Environmental Impact Assessment Registration Document

Distribution Center (PID 70489349 and PID 70502919) – Caledonia Industrial Park, Moncton

Ruedebusch Development & Construction

EIA Registration Document - Version 0A

September 9, 2022
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Ruedebusch Development & Construction

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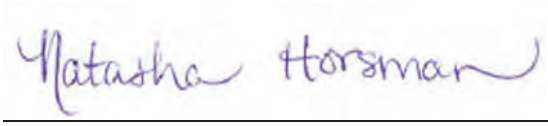

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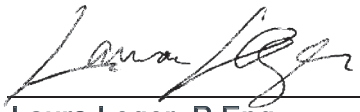

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REVISION No.	DATE	DESCRIPTION
0A	September 9, 2022	Preliminary version published for Owner review

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APPENDICES

Registration Form

PURSUANT TO SECTION 5 (2) OF
THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATION 87-83
CLEAN ENVIRONMENT ACT

1 The Proponent

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Property Ownership

This project is located on PID 70489349 and PID 70502919, in Moncton, NB. The land is owned by Moncton Industrial Development. A letter of consent from the Owner is attached in Appendix A by way of indicating their consent to the project as stated herein.

2 Project Description

2.1 Project Name

New Distribution Center - Ruedebusch Development & Construction

2.2 Project Overview

The Proponent (Ruedebusch Development & Construction) proposes to construct a distribution center over a total footprint of approximately 82,100 sq.m. on two vacant land parcels (PID 70489349 and PID 70502919) within a commercial/industrial area of Moncton, known as the Caledonia Industrial Park. This distribution center would support the Proponent's business, as well as reduce the potential for delayed shipment or lost packages in the area.

The project will generally include the following:

— A 9,300 sq.m. building;

— Tractor staging area;

— Van staging area;

— Long trailer parking area;

— An auto parking area;

— Municipal servicing;

— Storm water management infrastructure;

— Ingress and egress to the site from Galloway Street.

Regarding historical land use and development, the road directly south of the subject parcels, Galloway Street, underwent an extension in 2016-2017. Furthermore, tree clearing on PID 70489349 was previously completed while a densely wooded area remains on PID 70502919. Site preparation conducted between 2001 and 2012 (see aerial photo observations in section 3.3), and orally reported to be conducted in 2008 has also included tree clearing and ditching and/or berming at the northern limit of PID 70489349.

The project's construction will be located outside of mapped watercourses, but partially located within the delineated wetland identified during a Wetland Delineation (refer to Appendix B). Refer to Appendix C for an illustration of the site plan, including the existing ditch and delineated wetland.

While these properties are owned by Moncton Industrial Development, the Proponent is expecting to purchase the required land for development from Moncton Industrial Development.

This EIA Registration Document is being submitted in accordance with Schedule A of the NBDELG Guide to Environmental Assessment since the desired distribution center development site is partially situated on a wetland that is greater than 2 ha in size. In fact, this site is partially situated within a 51-ha mapped wetland which is connected to the Irishtown Road Reservoir and Humphrey's Brook. The wetland delineation report in Appendix B depicts and describes the wetland delineation conducted in June 2022 which determined that the proposed site included wetland area.

2.3 Purpose / Rationale / Need for the Undertaking

The purpose of the work proposed is to support the Proponent's business. The work proposed herein will also create both economic and job creation benefits to the City of Moncton, and consequently, the province of New Brunswick. Several jobs will be created once the distribution center is operational. Furthermore, this project will create consumer benefits by reducing the potential for delayed or lost shipments. Given Moncton's central location in the Maritimes, the selected location should provide the greatest consumer benefits.

Alternative site layouts were originally explored on the subject parcels, however, following the wetland delineation of the site, and in an effort to minimize the environmental impacts, a site layout impeding on approximately 12,800 sq.m. of the wetland itself was developed. Other site layouts impeded on approximately 18,500 sq.m. of the wetland itself and were therefore ruled out because of their increased impact on the wetland.

A "do-nothing" approach would hinder the Proponent's business and stunt the Caledonia Industrial Park growth, thus limiting the economic benefit of development for the City of Moncton.

2.4 Project Location

The proposed project site is located just north of Galloway Street in Moncton, New Brunswick and within the Caledonia Industrial Park. It is located within the limits of the Westmorland County and the parish of Moncton.

As identified in Section 1, the proposed site is located on the properties defined as PID No. 70489349 and PID No. 70502919.

The approximate latitude and longitude of the proposed site within the delineated wetland is as follows:

— Latitude: 46.141093, Longitude: -64.742912

A 1:10,000 scale map (Dwg no. 2200406-1P-C100) showing the proposed site in reference to the existing features is also included in Appendix D.

2.5 Siting Considerations

2.5.1 General Site Considerations

The proposed land is part of the Caledonia Industrial Park and is currently owned by the Moncton Industrial Development. These lots are available for purchase for commercial or industrial development in accordance with their zoning. The Proponent is expecting to purchase the required land for development from Moncton Industrial Development.

The surrounding area is serviced by municipal water, sanitary sewer, and storm sewer infrastructure owned and maintained by the City of Moncton. Electrical service to the area is supplied by overhead power infrastructure owned and maintained by NB Power. Access to the site is from the south via Galloway Street.

The selected properties are sloped toward the south. This is consistent with the regional topography. As such, surface runoff is expected to flow toward the south as well. As mentioned herein, tree clearing on PID 70489349 was previously completed while PID 70502919 remains densely wooded.

An Environmental Site Assessment conducted by Englobe also indicated that the general surface soil layer in Moncton consists of a combination of loamy lodgment till, minor ablation till, silt, sand, gravel,

and rubble. This soil layer thickness ranges from 0.5 m to 3.0 m in the area. Meanwhile, the underlying layer consists of bedrock.

Through a site visit conducted by Englobe on March 31, 2022 which was conducted as part of the Phase I Environmental Site Assessment, it was determined that there was no evidence of aboveground storage tanks or underground storage tanks. Likewise, a request for information through NBDELG confirmed that there is no record of storage tank registration. Furthermore, NBDELG did not have record of remedial activity or contamination.

The March 31, 2022 site visit also consisted of inspecting the site for the presence of potential environmental concerns relative to surface staining, hazardous materials, chemicals and waste storage, and potential contamination from adjacent properties. During the inspection, hazardous materials, chemicals and waste storage were not determined to be of concern, but a petroleum sheen was observed in the surface drainage water within the subject parcels. A phase II Environmental Site Assessment was therefore recommended and is expected to be carried out to investigate the potential for impacts that may be originating from the neighbouring property to the west (GFL Liquid East Moncton).

The Land Gazette status of PID 70489349 and PID 70502919 was reviewed to verify the potential existence of land related notices or restrictions (such as petroleum storage, dump sites, etc.) that may have an impact on land use. No records were shown for these parcels.

According to a search of the Land Gazette database, information is on file with NBDELG for the property PID No. 70375779 (Civic No. 45 Galloway Street – GFL Liquid East Moncton) located directly to the west of the subject parcels. The request to NBDELG revealed that the site contains 10 active petroleum storage tanks and that petroleum contamination was reported on the parcel in 2003. Furthermore, an Environmental Site Assessment conducted by CBCL in November 2021 concluded that soil and groundwater near the eastern boundary of PID No. 70375779 (and directly adjacent to the subject parcels) satisfied applicable Atlantic RBCA Tier I criteria (refer to attached Phase I Environmental Site Assessment in Appendix E for further details regarding this information).

The Phase I Environmental Site Assessment for the subject properties concluded that a Phase II Environmental Site Assessment is recommended to perform an additional round of groundwater monitoring from existing wells in order to confirm subsurface conditions. A Phase II Environmental Site Assessment is therefore expected to be carried out.

Other parcels within 500 meters yielded information on file with NBDELG:

— PID no. 70491329 (Loblaw Inc. Atlantic Freezer Distribution on 775 Frenette Avenue): 1-5390 L active above ground diesel storage tank installed in 2018.

— PID no. 70643135 (Air Liquide Canada Inc. on 59 Galloway Street): 1-2500 L active above ground waste oil storage tank installed in 2001.

— PID no. 70015441 (Air Liquide Canada Inc. on 95 Galloway Street): 1-2270 L active above ground diesel storage tank installed in 2007.

Furthermore, petroleum contamination was reported on PID no. 70015441 (94 Galloway Street – Air Liquide Canada Inc.) in 2003. A record of site condition shows that acceptable remediation was completed and that no further remedial or management action is required as of 2011.

There is no GeoNB flood mapping in the area of the proposed development, however, based on the site elevations being in the range of 45 to 50 m, flooding is not expected to be a concern. Furthermore, the 2100 projected high-water geodetic elevation is currently estimated at 10.25 m for the greater Moncton Area (Amec Foster Wheeler, 2011).

2.5.2 Other Location(s) Considered

In selecting the proposed site in Moncton, NB, the following factors were considered:

— Proximity to highway for semi trucks and trailers;

— Ability to access site with long combination vehicles such as tractor trailers;

— Availability of Industrial Sites in the Moncton area;

— Proximity to services including water, sewer, and electrical;

— Distance to known features such as mapped wetlands and watercourses;

— Size of available site.

Based on these factors, no other sites appeared as suitable for the required development.

2.5.3 Zoning

The subject properties are located in the “Heavy Industrial Zone (HI)” in accordance with the zoning map for the City of Moncton. The proposed work will not require rezoning of the land. Nearby properties consist of a mixture of commercially and industrially used land.

2.5.4 Proximity to Wetlands and Watercourses

Based on wetland mapping from GeoNB, the project limits are not located within 30 meters of the mapped wetlands. However, wetland delineation was conducted for this site, and wetlands extending beyond the limits of mapped wetlands were identified. Therefore, the anticipated disturbed area within the wetland is approximately 12,800 sq.m. while the anticipated disturbed area within the 30-meter wetland buffer is approximately 26,600 sq.m. The Wetland Delineation Report can be found in Appendix B.

The Wetland Delineation Report also indicated the wetland types. These were identified as bog and forested wetland. While the bog type wetland is characterized by saturated ground and sphagnum moss, the forested wetland is characterized forest trees, sphagnum moss, and saturated soil with a water table approximately 30 cm below soil surface. In order to further characterize the delineated wetland, a functional assessment will be conducted, and its findings submitted as soon as available.

2.5.5 Species at Risk and Wildlife

Regarding the proposed distribution center location, tree clearing on PID 70489349 was previously completed while a densely wooded area remains on PID 70502919. Both parcels remain vacant and undeveloped.

A species at risk survey is being carried out by a Biologist, to verify whether the project site and surrounding area contain sufficient vegetation or habitat to support wildlife, and to evaluate the species at risk of conservation concern. Results of this survey will be submitted once available.

2.6 Physical Components and Dimensions of the Project

2.6.1 Land Requirements

The proposed site development will span approximately 82,100 sq.m. in total with a total boundary perimeter of 1345 m. Meanwhile, property boundary itself is expected to span approximately 100,800 sq.m. the This will generally include a 9,300 sq.m. building, tractor staging area, van staging area, long trailer parking area, and an auto parking space. Approximately 39,400 sq.m. of the total project footprint will be within the 30m wetland buffer or within the wetland limit itself. Of the work within the wetland buffer area, 12,800 sq.m. will occur within the wetland itself. Appendix D shows the overall

location and Appendix C shows the configuration of the proposed site development relative to existing features such as roadways. The PIDs affected by this proposed development and their estimated disturbance areas are as follows:

— PID No. 70489349: Disturbed area of approximately 44,700 sq.m.

— PID No. 70502919: Disturbed area of approximately 37,400 sq.m.

The Proponent is in the process of acquiring the required land to complete the proposed development.

The following figure depicts a conceptual drawing of the distribution center's facility and surrounding site.

Figure 1 - Conceptual Image of Distribution Center in Moncton, NB (by Ruedebusch Development & Construction, 2022)

2.6.2 Physical Components and Infrastructure

In order to carry out the site development, the following components and infrastructure will be required:

— **Distribution Center Building:** This project will consist in the construction of a 9,300 sq.m. distribution center building which will consist of office space, a cosmetic vehicular washing station, and warehouse space.

- **Parking Lots and Driveways:** As part of the construction of the distribution center, several parking lots will be required for a total asphalted surface area of approximately 34,500 sq.m. and a total concrete surface area of approximately 12,900 sq.m. These parking lots include a long trailer parking area, dolly parking, a van staging area, a tractor staging area, and an auto parking area.
- **Municipal Site Servicing:** In order to provide water and sanitary sewer collection, these services will be extended from the Galloway Street right-of-way to the building. This will be achieved through installation of appropriate piping, appurtenances, and structures. The exact layout and sizing of site services will be confirmed during detailed design.
- **Electrical Site Servicing:** In order to provide power to the site, electrical servicing will be routed from the existing overhead electrical wiring along Galloway Street.
- **Storm Water Management:** A storm water network consisting of ditches/swales, structures, and underground piping will be required in order to direct the storm water runoff from rainfall events and the impervious asphalt and concrete surfaces to the storm water detention pond, prior to discharging into the municipal storm water piping network. As a result of the Net-Zero policy by the City of Moncton, a stormwater detention pond is anticipated to provide temporary storage of runoff water to limit the increase in post-development storm water discharge to the pre-development rate. The exact layout and sizing of the storm retention pond will be confirmed during detailed design.
- **External Lighting:** External lighting will be installed in parking areas and egress / ingress locations of the building and site egress / ingress gates to provide safety and security at the site.
- **Ingress and Egress Gates and Fencing:** Chain-link fencing will surround the parking areas (with the exception of the auto parking area), the building, and the loading areas dolly parking area. Two gates will be installed to control access to these components.
- **Oil-Water Separator**: An oil-water separator will be installed inside the building where cosmetic vehicular washing will occur, to segregate oil from water prior to discharging water into the municipal network. Likewise, oil-water separators will be install under the parking lots if required to separate oil and water prior to discharging into the municipal network.

2.6.3 Additional Features

In addition to the new major physical features, the following should be noted:

- **Impervious surfaces:** The total expected impervious area when combining both the building roof area, asphalted surface areas, and concrete surface areas is approximately 56,600 sq.m.
- **Set-backs or buffers:** This construction will remain a minimum of 30 m from watercourses and wetlands except as otherwise noted herein. Additionally, applicable zoning by-law setbacks will also be adhered to. For instance, the building will be at least 15 meters from the street line for front and flankage yards.
- **Off-site facilities:** Off-site facilities will not be required for this project.
- **Construction activities:**

  Various construction activities will be required as part of this project. As such, various materials and equipment will be hauled to and from site resulting in an increase of vehicular traffic in the area during construction.

  Additionally, increased vehicular traffic can be expected once the distribution center is operational. As such, a Traffic Impact Study was carried out and concluded that the project's development traffic does not have a significant impact on the operation of the road network. Nevertheless, signal timing improvements were recommended at the following intersections: Harrisville Blvd. at Trans Canada Highway Eastbound Ramps and Elmwood Drive at Caledonia Road.

Furthermore, a traffic control upgrade was recommended at the Harrisville Blvd. at Trans Canada Highway Westbound Ramps to support projected background traffic in 2028. Refer to Appendix F for the Traffic Impact Study Report.

2.7 Construction Details

Access to the site is via existing streets: Galloway Street and Parsons Drive. At this time, no detours are anticipated as the work will be carried out outside of the roadways.

The following preliminary schedule has been developed for the EIA Registration and subsequent design, bidding, and construction work. The exact timing of each component will be refined as the project progresses depending on the actual time taken to complete the preceding task(s):

Component	Approx. duration (weeks)	Anticipated start date	Anticipated completion date
EIA Registration and Review	17	September 2, 2023	January 6, 2023
Engineering Design	4	January 9, 2023	February 3, 2023
Bidding & Award	4	February 6, 2023	March 3, 2023
Construction	50	March 13, 2023	February 23, 2024

The estimated hours of construction will be from Monday to Friday between 7:00 A.M. and 7:00 P.M. Shorter days may be required early on in the construction phase given the earlier sunset time during winter months.

The following equipment is anticipated to be used for the construction procedures:

— Site Clearing: Dozers, chippers, and chainsaws;

— Earthwork: Excavators, dozers, dump trucks, compaction equipment;

— Pipe Installation: Excavators, dump trucks, compaction equipment - installation to be completed through open-cut trenching;

— Building: Excavator for foundation, concrete trucks, supply trucks for trade materials and equipment; cranes for lifting items such as trusses and beams;

— Driveway and Parking Lot Construction: dozers for site grading, concrete trucks for concrete surfaces, trucks for granular material and asphalt, compaction and paving equipment;

— Landscaping: trucks importing topsoil and fencing materials.

The actual work will be done by a qualified contractor and its subcontractor(s) selected following the design completion. The specific contractors who will be involved, sources of materials, etc., cannot be confirmed until the contract award has been carried out.

Imported materials will include, where “imported” is interpreted to mean “brought in from off the construction site”:

— Imported bedding for pipes;

— Imported granular material for building foundation, parking lot, and driveway construction;

— Imported asphalt and concrete for parking lot and driveway surface;

— Imported construction materials for site servicing including water piping, sanitary sewer piping, storm sewer piping and structures;

— Imported building material including structural, architectural (windows, doors, etc.), electrical, and mechanical components.

Potential sources of pollutants during the construction period are anticipated to include:

— Exhaust and other emissions from construction equipment.

— Noise from construction equipment.

— Runoff from disturbed surface areas during wet weather events and silt from disturbed surface areas. This will be minimized by requiring the contractor to install silt fences and other erosion protection devices prior to ground disturbance and to reinstate disturbed areas as soon as practical.

— Petroleum hydrocarbons from possible leaks, spills, or accidents from construction equipment and vehicles. This will be minimized by requiring the Contractor to have spill kits on-site and to conduct daily inspections of its equipment. No refueling or maintenance of vehicles will occur within 30 m of watercourses or wetlands.

All waste generated during construction will be stored in containers and removed off-site by the Contractor and disposed of at appropriate facilities.

The following sequence and procedures are recommended during the construction process. It is anticipated that in order to complete the excavation and storm water piping work during colder months as planned, multiple crews may be required for work on various portions of the work simultaneously:

— Mobilization and installation of environmental protection devices;

— Clearing and grubbing along with disposal of materials off-site;

— Stripping;

— Excavation related to underground piping and structures, building foundation, and storm detention pond;

— Underground municipal service piping installation;

— New electrical site service connection;

— Importing of structural fill if required to bring site up to sub-grade level;

— Building construction;

— Site grading, and ditching as required;

— Supply and installation of new security fencing and gates;

— Concrete and asphalt parking lot and driveway construction;

— Property restoration with topsoil/hydroseed, and granular materials.

— Start up and commissioning of facility.

The site will be accessed through the existing Galloway Street. Because this street is directly adjacent to the subject lot, no access road will be required from Galloway Street. No detours will be required.

There may be some minor impacts to vehicular and pedestrian movement such as when construction vehicles are entering or exiting the site.

Merchantable timber removed during the clearing and grubbing stage will recycled.

The origin of the required granular materials will be confirmed at the time of the contract award. However, the Contractor will be required to source these materials from clean, reputable quarries.

It was noted that some of the work is necessary within 30m of a delineated wetland, and within the wetland itself. This includes the construction of a portion of the long trailer parking, a loading area, some landscaped area, and a driveway for traffic circulation within the fenced area, Such work will be subject to the conditions of both the Environmental Management Plan (EMP) and a future WAWA permit to be obtained from the NBDELG, and the remainder of the wetland will be protected from silt run-off by installing silt fencing that will be maintained for the duration of the construction. Furthermore, the contractor will be required to utilize heavy-duty mats for travel of construction equipment within the wetland area if the work is to occur outside of the winter months/when the ground is frozen. Construction equipment will be limited to the limits of the project development and as such, no travelling of equipment will be done in the wetland that is located outside of the project limits.

The proposed Environmental Management Plan has been prepared for review, and is included in Appendix G.

2.8 Operation and Maintenance Details

Structures that collect vehicular pollutant runoff (oil-water separators) will be installed inside the building in order to prevent pollutants such as oil and grease to migrate into the municipal network. Likewise, if required, oil-water separators will be installed under the parking lots if required to prevent pollutants such as oil and grease to migrate into the municipal network. Hydraulic vacuuming of such pollutants will be required whenever the storage volume of the oil-water separators nears capacity. This will be triggered by an alarm system.

Civil components including municipal servicing, drainage, etc. will be designed in accordance with the latest Commercial, Industrial, Institutional, and Multi-Unit Residential Development Guidelines. Maintenance of underground piping is expected to be limited, but may include flushing, removal of sediment accumulation, among others.

Minor asphalt surface maintenance is expected to occur every few years and will generally consist of asphalt patching. Meanwhile, major rehabilitation is expected to take place every ± 20 years (asphalt surface rehabilitation) and 60 years (full depth reconstruction).

Routine maintenance of the building components, exterior lighting, and ingress/egress gates is expected to occur at regular intervals as specified by the manufacturer.

Water use will be limited to normal washroom and lunchroom usage and cosmetic washing of delivery vehicles. Water will be supplied through the municipal water main on Galloway Street.

Typical waste generated on site will be recycled. Any non-recyclable waste will be disposed of at an appropriate facility.

Components of the distribution center facility have varying life expectancies, but generally, the building shell could be expected to last 75 years, while underground piping has an expected life of 50 years.

Power will be provided to the site through the overhead power lines on Galloway Street. Energy requirements will be limited to lighting the building's interior and exterior perimeter, general power consumption of equipment such as computers, small appliances, etc., as well as lighting the parking areas for safety.

Approximately 540 vehicles, consisting of a mixture of autos, trailers, and vans, are expected to enter and exit the site on a daily basis.

The facility will be operational 24 hours per day and 7 days per week. Daytime and nighttime shifts are expected to approximately 8 hours ± 1 hour.

2.9 Future Modification, Extensions, or Abandonment

Although extensions are not foreseen, updates and upgrades to components are expected as they near their end of useful life. Should decommissioning of this facility be required at the end of its useful life, the Decommissioning of Existing Facilities guideline will be followed.

2.10 Project-Related Documents

The following project-related documents are appended:

— Wetland Delineation of PID No. 70502919 prepared by Viridis;
— Phase I Environmental Site Assessment for Lot 21-23 (PID No. 70489349 and portion of PID No. 70502919) prepared by Englobe Corp.
— Distribution Facility Traffic Study prepared by Englobe Corp.
— Environmental Management Plan
— ACCDC. (2022). Data Report 7380. Ruedebusch Caledonia Development, NB.

In addition to the project-related documents, a Watercourse and Wetland Alteration (WAWA) application has also been submitted as a result of the planned work within 30 metres of a wetland. Finally, the following documents were reviewed as part of the preparation of the present EIA Registration Document:

— Phase II Environmental Site Assessment, Galloway Street, Moncton, NB (PID 70489349 and portions of 70502919) prepared by CBCL Limited and dated November 12, 2021.

3 Description of the Existing Environment

3.1 Physical and Natural Features

3.1.1 Site Topography and General Surface Drainage Regime

The location of the proposed project is shown on Drawing no. 2200406-1P-C100 (Appendix D). The entire project will be located within the limits of PID No. 70489349 and a portion of PID No. 70502319. The project site is vacant; PID No. 70489349 is tree-cleared, while PID No. 70502919 remains densely wooded. The project site is situated in a mixed commercial/industrial area of Moncton and is bound by forested land and mapped wetlands to the north and east, and commercial/industrial properties to the south and west.

The properties slope downward toward the south; therefore, surface runoff and groundwater flow are expected to flow in this direction.

As part of the Wetland Delineation report (Appendix B), wetland delineations were carried out which included site reconnaissance to ground truth the boundaries of the mapped wetland. Numerous test pits were advanced to confirm the soil and hydrology conditions, the locations of these test pits are presented on the Figure in Appendix A of the Wetland Delineation report, Wetland Delineation forms were produced to represent the conditions observed at these locations and can be found in the report mentioned above (Appendix B).

The dominant hydrophytic vegetation observed includes Balsam Fir (Abies balsamea), Black Spruce (Picea mariana), Tamarack (Larix laricina), Red Maple (Acer rubrum), Speckled Alder (Alnus incana), Northern Wild Raisin (Viburnum nudum), Mountain Holly (Nemopanthus mucronatus), Starflower (Trientalis borealis), Bunchberry (Cornus canadensis), Sphagnum Moss.

Two different wetland types were identified at the site, Wetland 1: Bog, and Wetland 2: Forested Wetland. The Bog covers an approximate area of 131,000 m^2 (13.1 ha) and contains low to high shrubs with minimal trees. The ground of the Bog is saturated to the surface and covered in sphagnum moss. The limits of the bog wetland extend beyond the project boundaries and were projected in the Wetland Delineation report using the provincially mapped outline.

The Forested wetland covers an approximate area of 41,500 m^2 (4.2 ha) and contains more tree species. The floor is covered in sphagnum moss and the surface soil is saturated. The water table was observed to be <30 cm from surface where the test pits were advanced (some areas appeared dry at the surface; however, had high water table and hydric soil indicators). The limits of this forested wetland were along the berm/ditch located between the two parcels at the site as indicated in Appendix C.

The wetlands receive water from the Irishtown Road Reservoir to the north. The wetland discharges from an eastern portion of the bog wetland (approximately 460 m east of the site) to a mapped unnamed watercourse that runs from north to south to Humphrey's Brook which ultimately discharges into the Petitcodiac River. The Petitcodiac River flows southeasterly into the Shediac Bay.

Based on oral reports, some site preparation on PID No. 70489349 was completed in 2008 in anticipation of development which did not ultimately proceed. This site preparation reportedly included ditching at the northern limit of this PID to manage overland flows resulting in the formation of a slight berm on the northern side of the ditch, which may have contributed to the expansion of the field-delineated forested wetland (Viridis, 2022). In 2017, Caribou Street, was constructed and the ditch at the rear of PID No. 70489349 was connected to a stormwater management system that passes under Caribou Street and proceeds southeast to Humphrey's Brook. Site investigation of this drainage ditch will be conducted before the end of the growing season and its findings will be reported under separate cover.

The wetlands will require a WAWA permit for project activities within 30 meters of the wetlands.

3.1.2 Significant Natural and Managed Areas

There is one (1) Managed Area (MA) identified by ACCDC within 5 km of the site.

— Ducks Unlimited Canada Conservation Lands

The Ducks Unlimited Canada Conservation Lands are located approximately 4.9 km southeast of the site; therefore the project activities will not impact this managed area. No additional information was reported on the ACCDC report, however, these areas are known to attract birds.

3.1.3 Protected Watersheds and Wellfields

The site is located within the Petitcodiac Watershed. Project activities are not anticipated to affect the watershed.

There are no protected watersheds within the project area. The surrounding area is serviced by municipal water infrastructure provided by the city of Moncton. The work is not anticipated to impact municipal water sources.

A review of the GeoNB mapping indicated there are existing wellfield protection zones that have been delineated in the vicinity of the project area, resulting in the project site being located within "Management Zone C" of Protected Wellfield Area Number 61 as shown on Drawing 2200406-1P-C102 in Appendix D. Based on a review of GeoNB, these zones have not been designated to date, and so no associated restrictions on land usage have been identified to date. However, in the event the City chooses to designate these protection zones, land use restrictions would be imposed. An exemption to such restrictions may be permitted as long as certain conditions (to be defined in the future if applicable) could be met.

3.1.4 Species at Risk (SAR)

A background investigation was conducted to determine previous records of species at risk (SAR) in the project area. As part of this investigation, a request was made to the ACCDC who provided a report of the flora and fauna in the area.

The ACCDC report was queried for all rare flora and fauna identified within a 5km radius of the project site. For the purpose of this assessment, SAR are defined as only those species which meet one or more of the following criteria:

— Species Listed as 'Endangered', 'Threatened', 'Vulnerable', or 'Special Concern' under the *Federal Species at Risk Act* (SARA), *New Brunswick Species at Risk Act* (NBSARA) or by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

— Species provincially ranked as "S1" (Critically Imperiled) or "S2" (Imperiled).

In addition to the above-mentioned protections, protection for individual and populations of birds and their nests against harm or destruction is also provided under the *Migratory Birds Convention Act* (MBCA).

Thirty (30) vertebrate fauna were listed within a 5 km radius of the site including thirteen (13) species listed as 'Endangered', 'Threatened' or 'Special Concern' under COSEWIC, SARA, or NB SARA. Seven (7) invertebrate fauna were listed within a 5 km radius of the site including one (1) species listed as 'Special Concern' under COSWEIC.

Five (5) vascular flora plants were listed within a 5 km radius of the subject property including one (1) species provincially ranked as "S2" (Imperiled). In addition to the thirteen (13) fauna species listed as 'Endangered', 'Threatened' or 'Special Concern' under COSEWIC, SARA, or NB SARA, twelve (12) vertebrate fauna and one (1) invertebrate fauna species were provincially ranked as "S1" or "S2" within 5 km of the site.

Habitat descriptions for the identified SAR along with the ACCDC report are included in Appendix H.A field survey was completed by a qualified biologist on August 31, 2022. The field survey includes a Species at Risk Survey and Wetland Functional Assessment, as well as the collection of baseline wetland monitoring data. Desktop analysis of historical migratory activities, nesting, spawning breeding, and feeding within the project site will also be completed. The information collected from this field survey and desktop analysis will be provided under separate cover.

3.2 Cultural Features

There are no known cultural features at or in the immediate vicinity of the proposed project. The project site is located within the limits of an industrial park, and various buildings and expansion constructed has occurred nearby. Likewise, there are no know heritage features within the project area.

3.3 Existing and Historic Land Uses

As previously noted, the subject parcels (PID No. 70489349 and PID No. 70502919) are located within the Caledonia Industrial Park.

The adjacent property to the west of PID No. 70489349 is owned by GFL Environmental Inc. Meanwhile, the property to the west of PID No. 70502919 is owned by Trouw Nutrition Canada Inc. The property to the east of PID No. 70489349 is owned by Carter's Septic Tank Services Ltd., but the project area is separated from this lot by Parsons Drive. Adjacent properties to the north of PID No. 70502919 are owned by the City of Moncton, while adjacent properties to the east of PID No. 70502919 are owned by Moncton Industrial Development (MID) Limited. Adjacent properties to the south of Galloway Street are as follows (from east to west):

— Caber Industrial Properties Inc.

— Gestion P.D.G.C. Inc.

— Wimco Holdings Incorporated

— Stericycle Inc.

As noted herein, this project area is within the limits of the Caledonia Industrial Park. As such, adjacent properties to the west and south are used for commercial / industrial purposes. Meanwhile, lots owned by Moncton Industrial Development and the City of Moncton have not yet been developed or cleared.

The subject lot has been partially cleared (on PID No. 70489349) while the rest remains forested. Based on oral reports, site preparation and ditching in this clearing was completed in 2008 in anticipation of development which did not ultimately proceed. Prior to this work, the site appears to have been forested based on aerial imagery.

A historical search of the property was conducted as part of the Phase I Environmental Site Assessment. This search indicated that PID No. 70502919 has never been purchased from Moncton Industrial Development. Meanwhile, PID No. 70489349 was previously owned by 625822 NB Inc. and most recently (until 2021) owned by Ri-Mar Properties Ltd. before being reacquired by Moncton Industrial Development.

Prior to 2008, the subject sites were composed of two parcels (Parent PID Nos. 70356621 &70015466), and in 2008 these parcels were divested to form the two current parcels. No other information for the properties prior to 1986 was discovered during this search.

Historical land uses, and development as presented in the Phase I Environmental Site Assessment and supplemented by additional desktop investigation can be summarized as follows:

Date	Source	Observations
1944	Aerial Photograph	The subject properties are tree-covered. The surrounding lands are mostly tree-covered or agriculturally developed with some residential dwellings present further west.
1953	Aerial Photograph	No significant changes have occurred on the subject properties or to the surrounding lands.
1963	Aerial Photograph	No significant changes have occurred on the subject properties or to the surrounding lands.
1976	Aerial Photograph	No significant changes have occurred on the subject property or to the immediate surrounding properties other than some areas have been tree-cleared for what appears to be for municipal side streets. Some residential development can be seen farther northwest.
1982	Aerial Photograph	No significant changes can be seen on the subject properties. Side streets have been developed to the neighboring properties to south and west. The neighboring property farther west (95 Galloway Street, currently occupied by Air

Date	Source	Observations
		Liquide Canada) has been developed and one commercial building and large aboveground tanks are now visible.
2001	Aerial Photograph	No significant changes can be seen on the subject properties. The neighboring property to the immediate west (45 Galloway Street, currently occupied by GFL Liquid East Moncton) has been developed and a commercial building with visible tanks and cars are present. The neighboring property to the northwest (currently occupied by a Shur-Gain plant and owned by Trouw Nutrition Canada Inc.) has also been developed with a large commercial building and several storage containers/trailers present. Some neighboring properties to the southwest have also been developed where storage sheds appear to be present.
2012	Google Earth Imagery	PID 70489349 has been mostly tree cleared and a drainage ditch is present along the northern limit of this parcel. No significant changes can be seen on PID 70502919. More neighboring properties to the south and southwest have also been developed and commercial buildings and storage sheds are now present.
2014	Google Earth Imagery	No significant changes have occurred on the subject properties. Further commercial development can be seen on the properties to the southwest, south and southeast.
2017	Google Earth Imagery	No significant changes have occurred on the subject properties. Further commercial development can be seen on the properties to the south. An extension of Parsons Drive is visible along the east boundary of the site. A new road, Caribou Street, is seen extending to the east. This road construction was completed in 2017. As part of the road construction the ditch at the rear of PID 70489349 was connected to a stormwater management system that passes under Caribou Street and proceeds southeast to Humphrey's Brook.
2021	Google Earth Imagery	No significant changes have occurred on the subject properties. Further industrial development can be seen on the properties to the south (intersection of Parsons Drive and Frenette Avenue).
2022	Google Earth Imagery	No significant changes have occurred on the subject properties. The Carter's Septic Tank Services Ltd. property to the immediate east of Parsons Drive (immediately east to PID 70489349) has been developed.

Through a site visit on March 31, 2022 conducted as part of the Phase I Environmental Site Assessment, it was determined that there was no evidence of aboveground storage tanks or underground storage tanks. Likewise, as part of the Phase I Environmental Site Assessment, a request for information to NBDELG on PID 70489349 and PID 70502919 confirmed that there is no record of the following (refer to attached Phase I Environmental Site Assessment in Appendix E for further details regarding this information):

- Ministerial Orders or Remediation Orders related to the subject parcels;
- Storage tank registration with the Department;
- Remedial activity or contamination;
- Registry with the Department as a PCB Storage site;
- Landfill sites or former dumpsite located near the subject parcels.

The March 31, 2022 site visit also consisted of inspecting the site for the presence of potential environmental concerns relative to surface staining, hazardous materials, chemicals and waste storage, and potential contamination from adjacent properties. During the inspection, a petroleum sheen was observed in the surface drainage water (refer to attached Phase I Environmental Site Assessment in Appendix E for further details regarding this information).

The Land Gazette status of PID 70489349 and PID 70502919 was reviewed to verify the potential existence of land related notices or restrictions (such as petroleum storage, dump sites, etc.) that may have an impact on land use. No records were shown for these parcels.

According to a search of the Land Gazette database, information is on file with NBDELG for the property PID No. 70375779 (Civic No. 45 Galloway Street – GFL Liquid East Moncton) located directly to the west of the subject sites. The request to NBDELG revealed that the site contains 10 active petroleum storage tanks and that petroleum contamination was reported on the parcel through a remediation site management file was opened (and remains open) by NBDELG in April 2003. This site has no record of Ministerial Orders or Remediation Orders. Finally, the site is not registered as a PCB site and there are no records of landfill sites or former dumpsites near this PID (refer to attached Phase I Environmental Site Assessment in Appendix E for further details regarding this information).

A Phase II Environmental Site Assessment (ESA) conducted on PID 70489349 by CBCL Limited in November 2021, due to environmental concerns identified in a Phase I ESA, concluded that concentrations of xylenes (BTEX) and modified petroleum hydrocarbons (mTPH) were below Atlantic RBCA Tier I regulatory limits. Therefore, no further assessment of the parcel was recommended (refer to attached Phase I Environmental Site Assessment in Appendix E for further details regarding this information).

Other parcels within 500 meters yielded information on file with NBDELG:

— PID no. 70491329 (Loblaw Inc. Atlantic Freezer Distribution on 775 Frenette Avenue): 1-5390 L active above ground diesel storage tank installed in 2018.

— PID no. 70643135 (Air Liquide Canada Inc. on 59 Galloway Street): 1-2500 L active above ground waste oil storage tank installed in 2001.

— PID no. 70015441 (Air Liquide Canada Inc. on 95 Galloway Street): 1-2270 L active above ground diesel storage tank installed in 2007.

Furthermore, petroleum contamination was reported on PID no. 70015441 (94 Galloway Street – Air Liquide Canada Inc.) in 2003. A record of site condition shows that acceptable remediation was completed and that no further remedial or management action is required as of 2011.

The Phase I Environmental Site Assessment for the subject properties concluded that a Phase II Environmental Site Assessment is recommended to perform an additional round of groundwater monitoring from existing wells in order to confirm subsurface conditions. A Phase II Environmental Site Assessment is therefore expected to be carried out.

4 Summary of Environmental Impacts

As stated herein, the purpose of this project is to reduce the Owner's potential for lost or delayed shipment through the construction of a distribution center. Anticipated environmental impacts as a result of this project are identified below in accordance with headings included in Appendix B of the Guide to Environmental Impact Assessment in New Brunswick (2018).

In order to expedite the review of information presented in this Registration Document, the proposed avoidance, mitigation/reduction, and compensation measures for each of the possible impacts described below will be indicated immediately following.

4.1 Air Quality

Dust: Dust is possible during the construction phase when soil is exposed, pipelines are being installed, during backfilling activities and when the parking lots / driveways and the building are being constructed.

- **Avoidance / Mitigation / Compensation:** Construction contracts will require the contractor to apply water to control dust when performing these activities. The exact locations where water is to be applied, the amount of water to be applied, and the times at which it shall be applied will be determined on-site based on conditions. Waste oil will not to be used for dust control under any circumstances. Local streets will be swept if necessary.

Odours: Odours are possible during the construction phase, primarily from exhaust fumes expelled from trucks and equipment.

- **Avoidance / Mitigation / Compensation:** Work will be limited to within 7:00 AM to 7:00 PM.

4.2 Biology and Ecology (Aquatic & Terrestrial)

Wetland Habitat: A delineated wetland is present on the north-east portion of the subject property development. As such, the wetland vegetation and other species will be disturbed. Sediment runoff from construction work and contamination of the wetland soil are other potential impacts to the wetland habitat.

- **Avoidance / Mitigation / Compensation**:

  Work within the wetland located within the site boundaries is to be carried out during the winter months / early spring, when the ground is typically frozen, to limit the disturbance in the wetland. However, if any project activities are to occur outside of the winter months/when the ground is not frozen, heavy mats, and silt fencing will be utilized in order to prevent any impacts to the wetlands outside of the project boundaries. Construction equipment will be limited to the limits of the project development and as such, no travelling of equipment will be done in the wetland that is located outside of the project limits. Furthermore, the stipulations of the WAWA permit will be adhered to, for work within the wetland and its buffer zone.

  Runoff protection such as sediment/silt fencing will be placed and maintained during construction. Any exposed soil areas will also have its cover re-established prior to sediment/silt fencing removal. Material stripped from the site will be re-used where practical to avoid importing invasive plant species to the site, and the contractor will be required to wash equipment prior to it being brought to the site. All environmental mitigation strategies included in the EMP will be adhered to.

  Weather conditions are to be assessed on a daily basis to determine the potential risk of weather on the wetland habitat. Work will be scheduled to avoid periods of heavy precipitation.

  Machinery and equipment will be checked for leakage of lubricants and fuel prior to beginning work each day. Basic petroleum spill clean-up equipment will be kept on site. All spills or leaks will be promptly contained, cleaned up, and reported to the 24-Hour Environmental Emergencies Report System (1-800-565-1633).

  Hazardous materials (e.g., fuels, lubricants, hydraulic oil) and wastes (e.g., waste oil) will be managed so as to minimize the risk of chronic and/or accidental releases. A designated storage area for hazardous materials will be identified and will be at least 30m from the delineated and mapped watercourse and wetland.

  The site layout of the distribution center has been adjusted to minimize the wetland disturbance to 12,800 sq.m. As such, the proponent will work with Ducks Unlimited Canada to offset the net loss of wetland habitat.

Monitoring of the wetland will be conducted for the 5 years following completion of the construction work in order to determine if neighboring wetland is disturbed as a result of the development. Samples will be collected in years 1, 3, and 5 following the initial construction expected to take place in 2023. Sample vegetation plots will be selected prior to the end of the appropriate season in 2022 in order to establish a baseline for monitoring the impact to the wetland in the neighbourhood of the planned wetland disturbance.

Populations/Communities of Aquatic Species (including flora, fish, birds, marine mammals, etc.): The habitat within the site boundaries consists of a cleared lot to the south, a forested wetland and bog wetland to the north. No fish habitat is present at the site. The dominant hydrophytic vegetation observed includes various tree species (i.e. balsam fir, black spruce, red maple, red spruce, tamarack) and sphagnum moss in the forested wetland, and low to high shrubs with minimal trees and sphagnum moss in the bog wetland. Disturbance to the wetland habitat outside of the project boundaries is not anticipated, the mitigative measures outlined above will be implemented to prevent this. Birds that prefer wetland habitats may occasionally occur onsite (refer to migratory bird discussion below).

- **Avoidance / Mitigation / Compensation**: A species survey will be conducted to determine not only species at risk, but also other species on site. Mitigative measures will be established depending on the results stemming from this survey. However, where feasible, activities will be limited to the time between dawn and dusk to avoid using artificial lighting which can potentially affect bird and bat use of nearby habitats (Canada, 2017). If construction timing restrictions are not possible, Environment and Climate Change Canada's Canadian Wildlife Service (CWS) Guidelines for Migratory Birds and the Province of New Brunswick's Fish and Wildlife Act which provides guidance for species not protected under the MBCA will be followed.

Natural Vegetation Cover: The existing vegetation consists of a densely wooded area, and an area that was previously cleared with regrowth established.

- **Avoidance / Mitigation / Compensation**: Vegetative cover must be removed to permit construction of the parking lots, walkways, driveways, and building. Stripped materials will be stock-piled and re-used on-site for restoration where possible and exposed soils will be seeded to restore growth and prevent soil erosion. Clearing and grubbing will be limited to only the areas required for the current development. A field survey will be conducted prior to the end of the 2022 field season to confirm presence or absence of potential flora SAR and SAR critical habitat, and to collect baseline wetland data from selected sample plots in order to establish a baseline for monitoring the potential impact to the wetland outside of the project boundaries. The results to this field survey will be provided once available.

Migratory Birds:

Migratory birds may occasionally occur at the site; however, this is to be confirmed through desktop analysis combined with a field assessment of habitat. The field assessment was conducted on August 31, 2022, and the results will be provided once available.

Spawning, Nesting, Breeding, Feeding sites

No known spawning, nesting, breeding, and feeding areas are known within the site boundaries. However, a field survey (including a habitat assessment and SAR survey) will be completed prior to the commencement of project activities to determine if suitable habitat for spawning, nesting, breeding or feeding is present at the site.

Species at risk and other species of conservation concern

The ACCDC data report identified the following SAR within a 5km radius of the subject site; thirty (30) vertebrate fauna were listed within a 5 km radius of the site including thirteen (13) species listed as 'Endangered', 'Threatened' or 'Special Concern' under COSEWIC, SARA, or NB SARA. Seven (7) invertebrate fauna were listed within a 5 km radius of the site including one (1) species listed as 'Special Concern' under COSWEIC. Five (5) vascular flora plants were listed within a 5 km radius of

the subject property including one (1) species provincially ranked as “S2” (Imperiled). In addition to the thirteen (13) fauna species listed as ‘Endangered’, ‘Threatened’ or ‘Special Concern’ under COSEWIC, SARA, or NB SARA, twelve (12) vertebrate fauna and one (1) invertebrate fauna species were provincially ranked as “S1” or “S2” within 5 km of the site. Preliminary habitat descriptions and the likelihood of their occurrence at the site based on habitat requirements are available in Appendix H. A field survey (including a habitat assessment and SAR survey) will be conducted prior to the end of August 2022 to confirm the presence/absence of habitat for the identified SAR. Results of this survey will be provided once available.

— **Avoidance / Mitigation / Compensation (for migratory birds/ spawning, nesting, breeding, feeding sites / Species at risk and other species of conservation concern)**:

  The disturbance of the vegetative cover, including clearing and grubbing activities is planned for late winter and thus is not anticipated to impact spawning, nesting or breeding seasons. Furthermore, all work is to be conducted in accordance with the Migratory Birds Convention Act, which outlines that no migratory bird nests or eggs will be moved or obstructed during the construction or operational phase of the project. To ensure project activities are in compliance with the MBCA, tree clearing will take place outside of the migratory/nesting bird season, or a qualified person will be onsite to confirm the absence of nesting or migratory birds prior to and during clearing. If bird breeding activity is identified during activities, work will stop immediately.

  A species at risk field survey is being conducted for the project specific area during the appropriate 2022 season. Results of this survey will be provided once available and mitigative measures will be established as a result.

  Given the proximity of the site to nearby industrial land use, species at risk are not expected to be nesting within the project limit. However, should any nests or unfledged chicks be discovered during project activities, all work will pause, CWS and/or NBDELG will be contacted, and these will be protected by an appropriate-sized buffer (if required). If nests are discovered and require buffers, the nests will not be marked using flagging tape (or other similar materials) in order to prevent an increased risk of nest predation.

  All machinery will be well muffled (if required). Contractors will avoid any sharp or loud noises (e.g., not blow horns or whistles). If necessary, trucks may be required to avoid the use of “hammer” braking along specific sections of the site, while radio communications will replace whistle blasts and horns.

  Construction activities will be limited to the time between dawn and dusk to avoid using artificial lighting which can potentially affect bird and bat use of nearby habitats. If construction timing restrictions are not possible, Environment and Climate Change Canada’s Canadian Wildlife Service (CWS) Guidelines for Migratory Birds and the Province of New Brunswick’s Fish and Wildlife Act which provides guidance for species not protected under the MBCA will be followed.

  The excavated materials should be covered so that birds do not nest in the stockpiled materials.

  Surveys will be completed by a qualified environmental professional, as required, as breeding periods vary from species to species.

  The harassment of wildlife, littering and feeding of wildlife on the property during project activities is prohibited. Waste materials will not to be buried on site. Any construction debris will be disposed of in a provincially approved manner. Wildlife habitat features will be protected by appropriate setback distances (or buffer zones) where required.

4.3 Physical

Noise or Vibration: Construction activities will result in noise caused by the use of equipment and machinery (excavator, trucks, compaction equipment, etc.)

— **Avoidance / Mitigation / Compensation**: Noise is expected to impact the area, which is why the work will be limited to within 7:00 AM to 7:00 PM.

Soil Erosion: Soil erosion is possible during construction.

— **Avoidance / Mitigation / Compensation**: Disturbed areas will be reinstated as soon as is practical, silt fences and other erosion protection devices around disturbed soils, excavations and stockpiles will also be installed and maintained throughout construction and after completion of construction until the vegetation has fully grown. There will be no extreme slopes to limit potential soil erosion (Maximum slopes are 3H:1V).

Total Site Imperviousness: Construction of approximately 47,300 sq.m. of concrete or asphalt parking lots, walkways, and driveways will contribute to an increase of the site's imperviousness. Furthermore, the building footprint of approximately 9,300 sq.m. will also contribute to the site's imperviousness.

— **Avoidance / Mitigation / Compensation**: A storm water detention pond in accordance with the municipal regulatory requirements will be constructed to offset the increased runoff generated by the increased impervious surface. The storm detention pond will direct the water to the municipal storm sewer system.

Soil Moisture/Drainage: The surface drainage pattern will be modified as required to promote positive drainage away from the facility and into the proposed detention pond.

— **Avoidance / Mitigation / Compensation**: There will be no isolated areas created by the site development, and existing surface drainage will be maintained where possible. The storm detention pond location will be selected to limit the modifications required to surface drainage. A storm water collection system will be installed in order to collect the draining surface water before being transmitted to the storm detention pond, followed by the municipal storm water collection network.

Groundwater Quality: Groundwater quality could be affected in the event of a spill from construction machinery.

— **Avoidance / Mitigation / Compensation**: The Contractor will be responsible to have on site the proper leak and spill prevention equipment prior to commencement of any work. In the event of a spill, the contaminated soils will be removed from the site and disposed of at an approved decontamination site. No re-fueling will be conducted within the 30m buffer zone of a watercourse of wetland.

Surface Water Quantity:

— **Avoidance / Mitigation / Compensation**: Although surface water quantity will not change, a greater runoff will be generated by the increased impervious surface. This will be offset by the storm detention pond which will ensure the additional storm water runoff does not surcharge the municipal storm sewer system.

Quantity and Quality of Wetlands: The site development will disturb approximately 12,800 sq.m. of wetland.

— **Avoidance / Mitigation / Compensation**: Following the wetland delineation for the subject area, the proposed site development plan was revised to reduce the impacted wetland. This revision allowed the impacted wetland disturbance to be reduced from approximately 18,500 sq.m.

Watercourse: No watercourses are present within the site boundaries; the nearest watercourse is located approximately 460 m east of the site. A drainage ditch is present along the northern limit of PID 70489349.

— **Avoidance / Mitigation / Compensation:** Although no mapped watercourses are present within the site boundaries, given the required site area for the development, the ditch to the northern limit of PID 70489349 will be disturbed. Evaluation of the site layout options proved difficult to avoid disturbance of the ditch. Site investigation of this drainage ditch will be conducted before the end of the growing season and its findings will be reported under separate cover.

Domestic/Municipal/Industrial/Agriculture Supplies: The site will be serviced by the municipal water, sanitary sewer, and storm sewer networks that are available from Galloway Street.

— **Avoidance / Mitigation / Compensation**: Although this will add additional water supply for the City of Moncton and additional sanitary sewer collection for treatment, the City of Moncton will ensure the additional water supply can be accommodated based on current capacity through a design review submission prior to providing construction permission.

4.4 Community Structure

Employment Opportunities: The development of the site will positively impact employment opportunities.

— **Avoidance / Mitigation / Compensation**: No mitigation required given the positive impact on employment opportunities. Several hundred employment opportunities will be available following the completion of the subject site's development.

Municipal Income: Municipal income will be increased through the lot purchase and the recurring taxes to be paid to the municipality.

— **Avoidance / Mitigation / Compensation**: No mitigation required given the positive impact on the municipal income.

Land Use Compatibility: The proposed project is compatible with current land uses since the land is designated for industrial usage.

5 Summary of Proposed Mitigation

Different mitigation measures will be used throughout the project to minimize environmental impacts. Many impact avoidance, mitigation/reduction, and compensation measures were identified in Section 4 to expedite the review of information and more conveniently connect the relationship of mitigation with possible impacts presented in this Registration Document. However, general mitigation measures for this site are as follows:

— Disturbed areas will be reinstated as soon as is practical, sediment/silt fences and other erosion protection measures will also be used until disturbed vegetation is fully re-grown.

— Clearing and stripping activities will be limited to the necessary area to complete the work.

— Construction will be limited to the site limits and equipment requirement.

— The stipulations of the WAWA permit will be adhered to, for work within the wetland and buffer zone.

— A setback of 30 meters from wetlands and watercourses will be respected for areas that do not require within the limit of the wetland.

— The Contractors will be responsible to have on-site leak and spill prevention equipment prior to commencement of any work. In the event of a spill, the contaminated soils will be removed from the site and disposed of at an approved decontamination site. Any spills will be reported to the

DELG Local Regional Office during business hours or to the Canadian Coast Guard's 24-hour reporting system after-hours.

— The Contractors will be responsible to provide machinery in good working condition.

5.1 Other Considerations

All work will follow the Terms and Conditions of the NBDELG WAWA, TRC letters and any other provincial or federal letters of advice.

As stated herein, 12,800 sq.m. of wetland is expected to be impacted. As such, the proponent will work with Ducks Unlimited Canada to compensate for the net loss of wetland habitat.

6 Public and First Nations Involvement Process

The typical steps to involve the Public and First Nations are outlined below. Confirmation from the NBDELG will be required to ensure that the following steps are required for this specific project (or if additional steps are necessary).

The minimum public and First Nations consultation requirements outlined in Appendix C of the Provincial EIA registration guide will be followed (NBDELG, 2018). Stakeholders include the owners of all properties within a 500m radius as shown on the attached figures. A public notice containing the information specified in the registration guide will be delivered to the above noted stakeholders, in addition to the local Member of the Legislative Assembly (MLA), and the local service district, prior to concluding the EIA process.

Although no First Nation communities are located within the immediate study area, a project notification/information letter will be prepared and submitted to potentially affected First Nations if required by the Department and the Aboriginal Affairs Secretariat in accordance with provincial Duty to Consult requirements.

Following the completion of the consultation process, a summary report on the public and First Nation involvement will be prepared and submitted to NBDELG in accordance with the EIA process requirements.

7 Approval of Undertaking

The following technical approvals are anticipated as being required for this project:

— Approval under the EIA Legislation from the NBDELG.

— Watercourse and Wetland Alteration Permit from the NBDELG for the work in the Delineated Wetland and its Buffer zone.

8 Funding

No application for a grant or loan of capital funds will be requested from government agencies. Costs will be born by the land owner (following purchase from Moncton Industrial Development (Limited)).

9 Signature

David Hull

David Hull
Project Manager
Ruedebusch Development & Construction

9/12/2022

Date

Appendix A
Letter of Consent from Owner

Moncton Industrial Development
Développement Industriel de Moncton

655 rue Main Street,
Moncton, NB E1C 1E8
T: 506.857.0700
Fax/Télé: 506.859.7206
Email/Courriel: info@moncton4business.com

August 15, 2022

N.B. Department of Environment and Local Government
P. O. Box 6000
Fredericton, NB
E3B 5H1

Subject: Environmental Impact Assessment Registration (PID 70489349 and 70502919)

To Whom it may Concern:

Please be advised that the Moncton Industrial Development (MID) hereby consents to Ruedebush completing an EIA registration for the above-referenced lands for the purposes of pursuing development.

We trust the enclosed is to your satisfaction. If, however, additional information should be required, please communicate with the undersigned.

Yours very truly,

Pierre Dupuis
General Manager

Appendix B Wetland Delineation by Viridis

Att: Garrett Donaher, P.Eng.
Senior Engineer | Team Lead
Civil & Transportation Engineering
Englobe
Phone: 506-857-2777 | email: garrett.donaher@englobecorp.com

Date of Report: June 20, 2022 (**rev.2, July 20/22**)

Wetland Consultant(s): Adam Collins, Chris Collins

Date of Delineation: June 2 & 7, 2022

Assessed Property(s): PID 70502919

Weather: Sunny (both days)

1. INTRODUCTION / SCOPE OF WORK

Viridis Design Studio Ltd. was engaged to delineate the wetland boundary for the southern area of the property (PID 70502919) for planning consideration in the design of a proposed parking lot by Englobe (focus area outlined in Appendix A).

A desktop review and field assessment were conducted. Multiple sample points were taken to determine the wetland boundary including two paired pits and an additional confirmatory wetland pit.

> *Note: it was agreed that focus was to be placed on the southern half of the property which is being considered for future development.*

2. SITE DESCRIPTION

The project property is approximately 45.2 hectares and contains a mapped wetland (according to SNB wetland mapping). The wetland on the property appears to be connected to the Irishtown Road Reservoir (to the north) and Humphrey's Brook (to the south). The wetland on the property is part of the greater mapped wetland and is approx. 51 ha.

3. SITE HISTORY

During the desktop review, a number of clearing operations, developments, ditching, etc. were evident and are visible through aerial photographs taken at different years (Google Earth) (See APPENDIX B).

Historic Clearing Operations

- The property and adjacent properties appear to have had multiple clearing operations performed on the uplands (west) of the property (previous to 2005 see APPENDIX B).
- Additional tree clearing operations were likely conducted throughout various areas on the west side of site between 2015 and 2016 (see APPENDIX B).

- Various pink flagging tape markers were visible at both the tree clearing limits and the perceived limit of wet ground. It is assumed that these are left over from machined tree clearing operations. Pink flags in the south-western half appeared recent and not faded. Pink flags in the north-western half of the property were much older and faded (suggesting at least two different clearing operations were performed).
- Throughout the western half of the property evidence of skidder tracks (some older and some more recent) were scatted throughout.

Adjacent Development

- To the south of the property land preparation for commercial development was conducted. This included a large infill, ditch, and berm (see PROPBLEMATIC AREAS). The ditch and berm likely changed the hydrology of the forest and may have increased/varied the wetland boundary. (See PROBLEMATIC AREAS)

4. OBSERVED DOMINANT WETLAND SPECIES

Most of the wetland boundary (both upland and wetland) consisted of species consistent with a forested wetland and varied from FAC to FACW. The transitional area was wide (especially in the southern half of the property).

Common Dominant Species within Forested Wetland

- Balsam Fir (*Abies balsamea*)
- Black Spruce (*Picea mariana*)
- Tamarack (*Larix laricina*)
- Red Maple (*Acer rubrum*)
- Speckled Alder (*Alnus incana*)
- Northern Wild Raisin (*Viburnum nudum*)
- Mountain Holly (*Nemopanthus mucronatus*)
- Starflower (*Trientalis borealis*)
- Bunchberry (*Cornus canadensis*)
- Sphagnum Moss

5. METHODOLOGY

Desktop Review

A desktop review was conducted before and after the field assessment using LiDAR hillshade, aerial photography (Google, GeoNB), and Provincially Mapped Wetland (SNB). The bog was evident from aerial photography and on site observations. The forested wetland was not evident until site delineation was completed.

Northern Area of Property

The wetland limits were more distinct on the northern half of the property. A small wetland (<1 ha) was identified, and the boundaries outlined (not visibly connected to larger bog).

Southern Area of Property

Two separate paired sample pits were used to help determine the boundary of the wetland. The installation of the long 1m high (+/-) berm along the southern property line has increased the water table and saturation which has likely widened the boundary. There were many areas that appeared high/dry, however, with soil pits a high water table was found and soil was hydric. (See PROBLEMATIC AREAS)

A GPS was used to mark the boundary so is approximate and should be treated as such.

6. DATA SAMPLES SUMMARY

Sample pit: **UP1**

- Hydrophytic Vegetation Present: **no**
- Hydric Soils Present: **no**
- Wetland Hydrology Present: **no**

Sample pit: **WL1**

- Hydrophytic Vegetation Present: **yes** (prevalence index: 2.72)
- Hydric Soils Present: **yes**
- Wetland Hydrology Present: **yes**

Sample pit: **UP2**

- Hydrophytic Vegetation Present: **no**
- Hydric Soils Present: **no**
- Wetland Hydrology Present: **no**

Sample pit: **WL2**

- Hydrophytic Vegetation Present: **yes** (prevalence index: 2.87)
- Hydric Soils Present: **yes**
- Wetland Hydrology Present: **yes**

Sample pit: **WL3**

- Hydrophytic Vegetation Present: **yes** (prevalence index: 2.71)
- Hydric Soils Present: **yes**
- Wetland Hydrology Present: **yes**

Note: confirmatory soil samples were taken throughout delineation and a very wide transitional area was found.

See APPENDIX C for field data forms.

7. WETLAND BOUNDARIES

Two different wetland types were identified on the property.

Wetland 1: Bog

- Approximately 131,000m^2 [13.1ha] in size (within project property boundary only) and contains low to high shrubs with minimal trees. The ground is saturated to the surface and covered is sphagnum moss.
- Approximately follows provincially mapped outline.
- Limits beyond project property were projected using provincially mapped outline.

Wetland 2: Forested Wetland

- Approximately 41,500m2 [4.2ha] in area (within project property boundary only) and contained more trees (i.e. balsam fir, black spruce, red maple, red spruce, tamarack) than the adjacent bog. The forest floor is covered in sphagnum moss and soil surface is saturated. Water table is <30cm from surface where test pits were taken (Note: some areas appear dry on surface however had high water table and hydric soil indicators).
- Not included in provincially mapped outline.
- Limits along the south were to the berm/ditch.

8. PROBLEMATIC AREAS

<u>South-western area of property</u>

The southwestern part of the property has been recently developed causing irregular flooding, soil saturation and mixed hydric soil readings. The following operations occurred:

- Large Tree Clearing operations appr. 6 years (air photo 2016)
- Land development on southern property including installing a ditch and berming up north side of ditch (between 2005-2012).

Hydrophytic Vegetation in problem areas: most the areas exhibited signs of FAC species with very few upland species until deep into the upland. The transitional area was very wide.

Hydric Soils in problem areas: hydric soils were present throughout the very wide transitional area.

Hydrology in problem areas: hydrology was evident in many areas with surface water or very saturated soils present. Other areas were dry and had a slight increase in elevation which lowered the water table and saturation (however, signs of hydric soil were present in these areas).

Topography: there is very little change in elevation throughout the site making the transitional area wide.

9. CONCLUSION

The wetland boundary is identified as mapped (Appendix A). It should be noted that the width of the transitional areas is wide (especially in the southern half of the property) and some areas included within the wetland boundary outlined appear to be upland (on the surface) until soil test pits confirm hydric soils and hydrological indicators.

This report was prepared for use by Englobe as per their outlined scope of delineation requirements. All delineated wetlands (including those outlined in this report) are subject to approval by the Department of Environment through the submission of a WAWA permit.

The following report and boundary depicts Viridis Design Studio's interpretation of wetland presence, delineated limits, and types for the property(s) noted. Focus has been placed on the proposed development site as supplied. All information provided is derived from desktop review(s), observations, and field work completed on June 2, 2022 and June 7, 2022. The final determination of wetland presence, limits, types, and significance are subject to approval by the Department of Environment and Local Government of New Brunswick via the Wetland and Watercourse Alteration Permit Process available here:
https://www2.gnb.ca/content/gnb/en/services/services_renderer.2935.Watercourse_and_Wetland_Alteration_Permit_.html

Any use of this report & map other than what was intended is strictly prohibited and Viridis Design Studio accepts no responsibility for damages, if any, suffered by any party as a result of decisions or actions made based on this boundary.

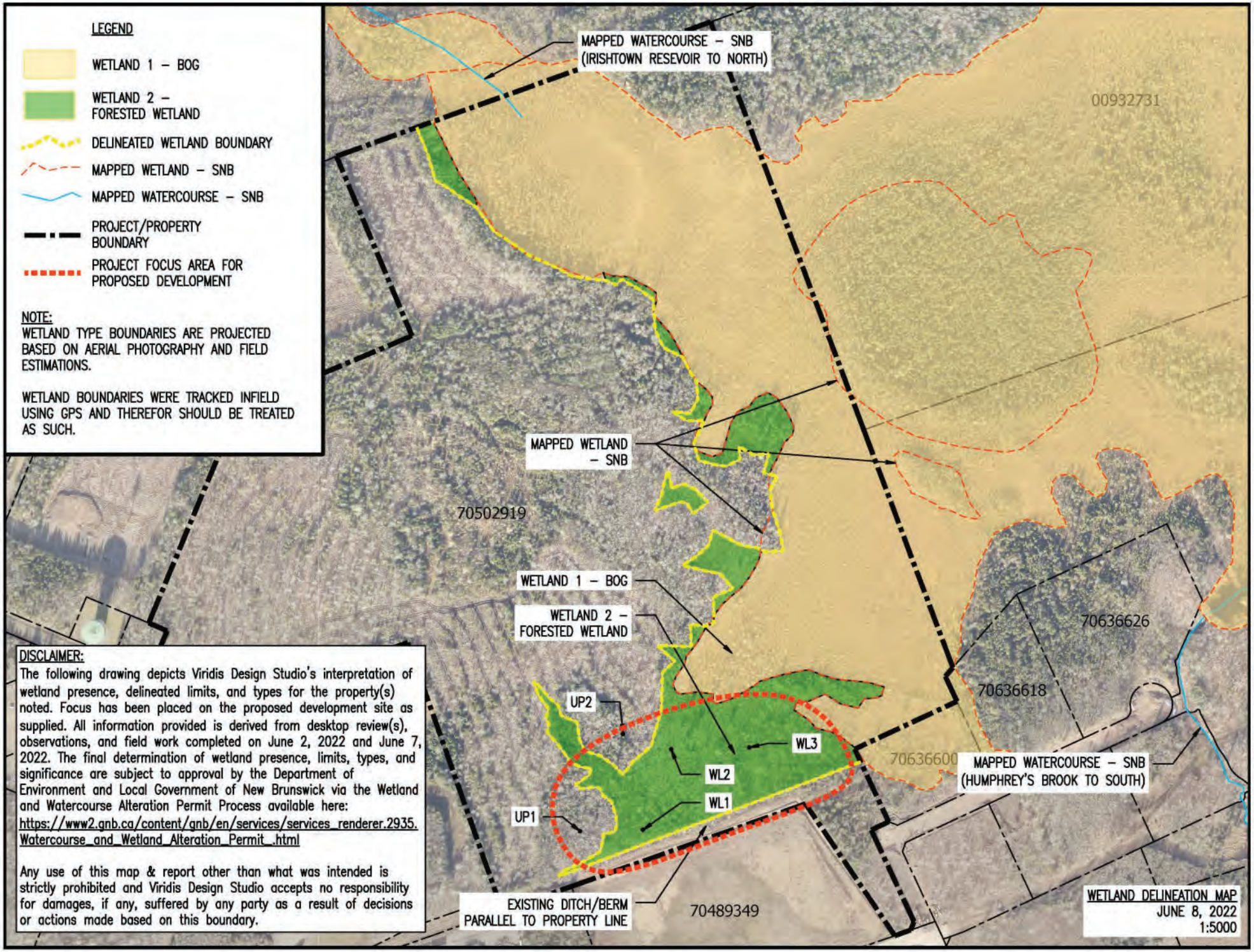
Should you have any questions, please contact us back.

Sincerely,

Adam Collins, *Ptech*
Technologist/Wetland Delineator
Viridis Design Studio Ltd.

Wetland Delineator(s) Qualifications:
Adam Collins - Wetland Delineation Training (Maritime College of Forest Technology), 2021
Chris Collins - Wetland Delineation Training (Maritime College of Forest Technology), 2021

APPENDIX A – Delineated Wetland Boundary


LEGEND
WETLAND 1 – BOG
WETLAND 2 – FORESTED WETLAND
DELINEATED WETLAND BOUNDARY
MAPPED WETLAND – SNB
MAPPED WATERCOURSE – SNB
PROJECT/PROPERTY BOUNDARY
PROJECT FOCUS AREA FOR PROPOSED DEVELOPMENT
NOTE:
WETLAND TYPE BOUNDARIES ARE PROJECTED BASED ON AERIAL PHOTOGRAPHY AND FIELD ESTIMATIONS.
WETLAND BOUNDARIES WERE TRACKED INFIELD USING GPS AND THEREFOR SHOULD BE TREATED AS SUCH.
MAPPED WATERCOURSE – SNB (IRISHTOWN RESEVOIR TO NORTH)
00932731
MAPPED WETLAND – SNB
70502919
WETLAND 1 – BOG
WETLAND 2 – FORESTED WETLAND
70636626
70636618
70636600
UP2
WL3
WL2
WL1
UP1
MAPPED WATERCOURSE – SNB (HUMPHREY'S BROOK TO SOUTH)
EXISTING DITCH/BERM PARALLEL TO PROPERTY LINE
70489349
DISCLAIMER:
The following drawing depicts Viridis Design Studio's interpretation of wetland presence, delineated limits, and types for the property(s) noted. Focus has been placed on the proposed development site as supplied. All information provided is derived from desktop review(s), observations, and field work completed on June 2, 2022 and June 7, 2022. The final determination of wetland presence, limits, types, and significance are subject to approval by the Department of Environment and Local Government of New Brunswick via the Wetland and Watercourse Alteration Permit Process available here: https://www2.gnb.ca/content/gnb/en/services/services_renderer.2935.Watercourse_and_Wetland_Alteration_Permit_.html
Any use of this map & report other than what was intended is strictly prohibited and Viridis Design Studio accepts no responsibility for damages, if any, suffered by any party as a result of decisions or actions made based on this boundary.
WETLAND DELINEATION MAP
JUNE 8, 2022
1:5000

APPENDIX B – Photos & Aerial Imagery

Photo 1 – photo taken from southern ditch facing up toward wetland. Groundwater is visible seeping through side of bank.

Photo 2 – photo taken of UP1 sample point.

Photo 3 – photo taken of UP2 site.

Photo 4 – Photo taken of typical forest wetland.

Photo 5 – Photo taken of typical upland (opposite to photo 4)

Photo 6 – Photo taken of WL1 pit.

Photo 7 – Photo taken of typical upland.

Photo 8 – Photo taken of typical water table within forested wetland.

Photo 9 – photo taken of bog

Photo 10 – photo taken of ditch & berm along the southern property.

Figure 1 – Aerial Imagery taken approx. June 2005 (Google Earth). Before southern development ditching/berming. Clearing operations visible on western side of property.

Figure 2 – Aerial Imagery taken approx. March 2012 (Google Earth). After southern development.

Figure 3 – Aerial Imagery taken approx. July 2016 (Google Earth). Apparent clearing operations on southwest of property.

Figure 4 - Aerial Imagery taken approx. September 2017 (Google Earth).

Figure 5 - Aerial Imagery taken approx. June 2021 (Google Earth).

APPENDIX C – Sample Pit Data Forms

WETLAND DELINEATION DATA FORM – NEW BRUNSWICK

Project/Site: 537-22 Wetland Delineation Municipality/County: Moncton, NB Sampling Date: June 7, 2022

Applicant/Owner: Englobe Sampling Point: UP1

Investigator(s): Adam Collins & Chris Collins Affiliation: Viridis Design Studio Ltd.

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): Concave/none

Slope (%): <1% Lat: 46.14053002 Long: -64.74454453 Datum: NAD83 (CSRS)

Soil Map Unit Name/Type: Wetland Type: -

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No _____ (If no, explain in Remarks.)

Are Vegetation no, Soil no, or Hydrology no significantly disturbed? Are "Normal Circumstances" present? Yes x No _____

Are Vegetation no, Soil no, or Hydrology no naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No x	**Is the Sampled Area within a Wetland?** Yes _____ No x
Hydric Soil Present?	Yes _____ No x	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes _____ No x	

Remarks: (Explain alternative procedures here or in a separate report.)

significant clearing operations were done in the past. Transition line is wide.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10m)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum (Red Maple)	60		FAC
2. Picea glauca (White Spruce)	30		FAC
3. Populus tremuloides (Quaking Aspen)	60		FAC
4.			
5.			
	150	= Total Cover	

Sapling/Shrub Stratum (Plot size: 5m)			
1. Viburnum nudum var. cassinoides (Wild Raisin)	10		FAC
2. Nemopanthus mucronatus (Mountain Holly)	10		FAC
3. aralia nudicaulis (Wild sarsaparilla)	10		FAC
4. Kalmia angustifolia (Sheep Laurel)	10		FAC
5.			
	40	= Total Cover	

Herb Stratum (Plot size: 1m)			
1. Vaccinium angustifolium (Lowbush Blueberry)	20		FAC
2. Cornus canadensis (Bunchberry)	5		FAC
3. Carex intumescens (Bladder Sedge)	30		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	55	= Total Cover	

Woody Vine Stratum (Plot size: 1m)			
1.			
2.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species 245	x 3 =	735
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: 245 (A)		735 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

___ Rapid Test for Hydrophytic Vegetation

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No x

Remarks: (Include photo numbers here or on a separate sheet.)

Transition area is wide. Not Hydrophytic because no hydric soils or hydrology present.

Adapted from U.S. Army Corps of Engineers form for North Central and North East Region (Version 2.0), and Field Indicators for Identifying Hydric Soils in New England (Version 4.0) Supplement for use in New Brunswick (2019)

SOIL

Sampling Point: UP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (cm)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	7.5YR 2.5/1	100					sandy/loam	
2-40+	7.5YR 4/4	100					sandy.loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surfaces (S7)
___ Polyvalue Below Surface (S8)
___ Thin Dark Surface (S9)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ Coast Prairie Redox (A16)
___ 5 c Mucky Peat or Peat (S3)
___ Iron-Manganese Masses (F12)
___ Piedmont Floodplain Soils (F19)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
Depth (cm): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ Marl Deposits (B15)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (cm): _____
Water Table Present? Yes _____ No X Depth (cm): _____
Saturation Present? (includes capillary fringe) Yes _____ No X Depth (cm): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DELINEATION DATA FORM – NEW BRUNSWICK

Project/Site: 537-22 Wetland Delineation Municipality/County: Moncton, NB Sampling Date: June 7, 2022

Applicant/Owner: Englobe Sampling Point: WL1

Investigator(s): Adam Collins & Chris Collins Affiliation: Viridis Design Studio Ltd.

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none

Slope (%): <1% Lat: 46.14053022 Long: -64.74369874 Datum: NAD83 (CSRS)

Soil Map Unit Name/Type: Wetland Type: forested wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No _____ (If no, explain in Remarks.)

Are Vegetation no, Soil no, or Hydrology no significantly disturbed? Are "Normal Circumstances" present? Yes x No _____

Are Vegetation no, Soil no, or Hydrology no naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No _____	**Is the Sampled Area within a Wetland?** Yes x No _____
Hydric Soil Present?	Yes x No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes x No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

significant clearing operations were done in the past. Transition line is wide.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10m)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum (Red Maple)	70		FAC
2. Betula populifolia (Gray Birch)	20		FAC
3. Abies balsamea (Balsam Fir)	15		FAC
4.			
5.			
	105	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5m)			
1. Alnus incana (Speckled Alder)	60		FACW
2. Viburnum nudum var. cassinoides (Wild Raisin)	25		FAC
3.			
4.			
5.			
	85	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Osmunda cinnamomea var. cinnamomea (Cinnamon Fern)	10		FAC
2. Trientalis borealis (Starflower)	5		FAC
3. Doellingeria umbellata (Parasol White-top)	10		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	25	= Total Cover	
Woody Vine Stratum (Plot size: 1m)			
1. *moss covered ground			
2.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species 60	x 2 =	120
FAC species 155	x 3 =	465
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: 215 (A)		585 (B)

Prevalence Index = B/A = 2.72

Hydrophytic Vegetation Indicators:

___ Rapid Test for Hydrophytic Vegetation

___ Dominance Test is >50%

x Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Adapted from U.S. Army Corps of Engineers form for North Central and North East Region (Version 2.0), and Field Indicators for Identifying Hydric Soils in New England (Version 4.0) Supplement for use in New Brunswick (2019)

0-7	10YR 3/1	100					loamy/clay (organics)
7-23	10YR 6/1	95	10YR 5/6	5	RM	M	clay
23-40	10YR 5/6	50	10YR 6/4	50	C	M	clay

x

x

x

x

x

x

28

x

x

WETLAND DELINEATION DATA FORM – NEW BRUNSWICK

Project/Site: 537-22 Wetland Delineation Municipality/County: Moncton, NB Sampling Date: June 7, 2022

Applicant/Owner: Englobe Sampling Point: UP2

Investigator(s): Adam Collins & Chris Collins Affiliation: Viridis Design Studio Ltd.

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): Concave/none

Slope (%): <1% Lat: 46.14143020 Long: -64.74393670 Datum: NAD83 (CSRS)

Soil Map Unit Name/Type: Wetland Type: -

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No _____ (If no, explain in Remarks.)

Are Vegetation no, Soil no, or Hydrology no significantly disturbed? Are "Normal Circumstances" present? Yes x No _____

Are Vegetation no, Soil no, or Hydrology no naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No x	**Is the Sampled Area within a Wetland?** Yes _____ No x
Hydric Soil Present?	Yes _____ No x	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes _____ No x	

Remarks: (Explain alternative procedures here or in a separate report.)

significant clearing operations were done in the past. Transition line is wide.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10m)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum (Red Maple)	70		FAC
2. Populus tremuloides (Quaking Aspen)	40		FAC
3. Betula papyrifera (Paper Birch)	10		FACUP
4. Abies balsamea (Balsam Fir)	50		FAC
5.			
	170	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5m)			
1.			
2.			
3.			
4.			
5.			
	_____	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Trientalis borealis (Starflower)	10		FAC
2. Dryopteris carthusiana (Spinulose wood Fern)	5		FAC
3. Cornus canadensis (Bunchberry)	10		FAC
4. Viburnum nudum var. cassinoides (Wild Raisin)	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
	30	= Total Cover	
Woody Vine Stratum (Plot size: 1m)			
1.			
2.			
	_____	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species 190	x 3 =	570
FACU species 10	x 4 =	40
UPL species	x 5 =	
Column Totals: 200 (A)		610 (B)

Prevalence Index = B/A = 3.05

Hydrophytic Vegetation Indicators:

___ Rapid Test for Hydrophytic Vegetation

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No x

Remarks: (Include photo numbers here or on a separate sheet.)

Adapted from U.S. Army Corps of Engineers form for North Central and North East Region (Version 2.0), and Field Indicators for Identifying Hydric Soils in New England (Version 4.0) Supplement for use in New Brunswick (2019)

UP2

0-5	7.5YR 2.5/1	100					sandy/loam
2-40+	7.5YR 4/3	80	7.5YR 5/6	20	C	M	sandy/loam

x

x

x

x

x

x

water stained leaves were only in surrounding puddles

WETLAND DELINEATION DATA FORM – NEW BRUNSWICK

Project/Site: 537-22 Wetland Delineation Municipality/County: Moncton, NB Sampling Date: June 7, 2022

Applicant/Owner: Englobe Sampling Point: WL2

Investigator(s): Adam Collins & Chris Collins Affiliation: Viridis Design Studio Ltd.

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none

Slope (%): <1% Lat: 46.14127790 Long: -64.74329405 Datum: NAD83 (CSRS)

Soil Map Unit Name/Type: Wetland Type: forested wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No _____ (If no, explain in Remarks.)

Are Vegetation no, Soil no, or Hydrology no significantly disturbed? Are "Normal Circumstances" present? Yes x No _____

Are Vegetation no, Soil no, or Hydrology no naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes x No _____

Hydric Soil Present? Yes x No _____

Wetland Hydrology Present? Yes x No _____

Is the Sampled Area within a Wetland? Yes x No _____

If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10m)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum (Red Maple)	60		FAC
2. Betula populifolia (Gray Birch)	15		FAC
3. Abies balsamea (Balsam Fir)	30		FAC
4. Picea rubens (Red Spruce)	5		FAC
5.			
	110	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5m)			
1. Alnus incana (Speckled Alder)	40		FACW
2. Nemopanthus mucronatus (Mountain Holly)	50		FAC
3. Viburnum nudum var. cassinoides (Wild Raisin)	20		FAC
4. Kalmia angustifolia (Sheep Laurel)	40		FAC
5.			
	150	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Cornus canadensis (Bunchberry)	30		FAC
2. Carex intumescens (Bladder Sedge)	10		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	40	= Total Cover	
Woody Vine Stratum (Plot size: 1m)			
1. *moss covered ground			
2.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	40	x 2 =	80
FAC species	260	x 3 =	780
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	300 (A)		860 (B)

Prevalence Index = B/A = 2.87

Hydrophytic Vegetation Indicators:

___ Rapid Test for Hydrophytic Vegetation

___ Dominance Test is >50%

x Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Adapted from U.S. Army Corps of Engineers form for North Central and North East Region (Version 2.0), and Field Indicators for Identifying Hydric Soils in New England (Version 4.0) Supplement for use in New Brunswick (2019)

0-7	10YR 2/1	100					organic muck
7-15	10YR 3/1	100					Organic/ sandy muck
15-40+	10YR 5/3	95	10YR 5/8	5	D	M	sandy

x

x

x
x
x

x

x
x

25
0

x

WETLAND DELINEATION DATA FORM – NEW BRUNSWICK

Project/Site: 537-22 Wetland Delineation Municipality/County: Moncton, NB Sampling Date: June 7, 2022

Applicant/Owner: Englobe Sampling Point: WL3

Investigator(s): Adam Collins & Chris Collins Affiliation: Viridis Design Studio Ltd.

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none

Slope (%): <1% Lat: 46.14127810 Long: -64.74224299 Datum: NAD83 (CSRS)

Soil Map Unit Name/Type: Wetland Type: forested wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No _____ (If no, explain in Remarks.)

Are Vegetation no, Soil no, or Hydrology no significantly disturbed? Are "Normal Circumstances" present? Yes x No _____

Are Vegetation no, Soil no, or Hydrology no naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No _____	**Is the Sampled Area within a Wetland?** Yes x No _____
Hydric Soil Present?	Yes x No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes x No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10m)	Absolute % Cover	Dominant Species?	Indicator Status
1. Larix laricina (Tamarack)	50		FAC
2. Acer rubrum (Red Maple)	10		FAC
3. Abies balsamea (Balsam Fir)	20		FAC
4. Picea mariana (Black Spruce)	30		FACW
5.			
	110	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5m)			
1. Alnus incana (Speckled Alder)	40		FACW
2. Nemopanthus mucronatus (Mountain Holly)	10		FAC
3. Kalmia angustifolia (Sheep Laurel)	30		FAC
4. Rhododendron canadense (Rhodora)	20		FAC
5.			
	100	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Iris versicolor (Blueflag Iris)	5		FAC
2. Carex intumescens (Bladder Sedge)	10		FAC
3. Spiraea alba var. latifolia (White Meadow Sweet)	5		FAC
4. Vaccinium angustifolium (Lowbush Blueberry)	10		FAC
5.			
6.			
7.			
8.			
9.			
10.			
	30	= Total Cover	
Woody Vine Stratum (Plot size: 1m)			
1. *moss covered ground			
2.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species 70	x 2 =	140
FAC species 170	x 3 =	510
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: 240 (A)		650 (B)

Prevalence Index = B/A = 2.71

Hydrophytic Vegetation Indicators:

___ Rapid Test for Hydrophytic Vegetation

___ Dominance Test is >50%

x Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Adapted from U.S. Army Corps of Engineers form for North Central and North East Region (Version 2.0), and Field Indicators for Identifying Hydric Soils in New England (Version 4.0) Supplement for use in New Brunswick (2019)

0-7.5	5YR 2.5/1	100	sandy/loam muck (lots of organic)
7.5-40+	2.5YR 5/2	100	sandy/loam muck (lots of organic)

x

x

x
x
x

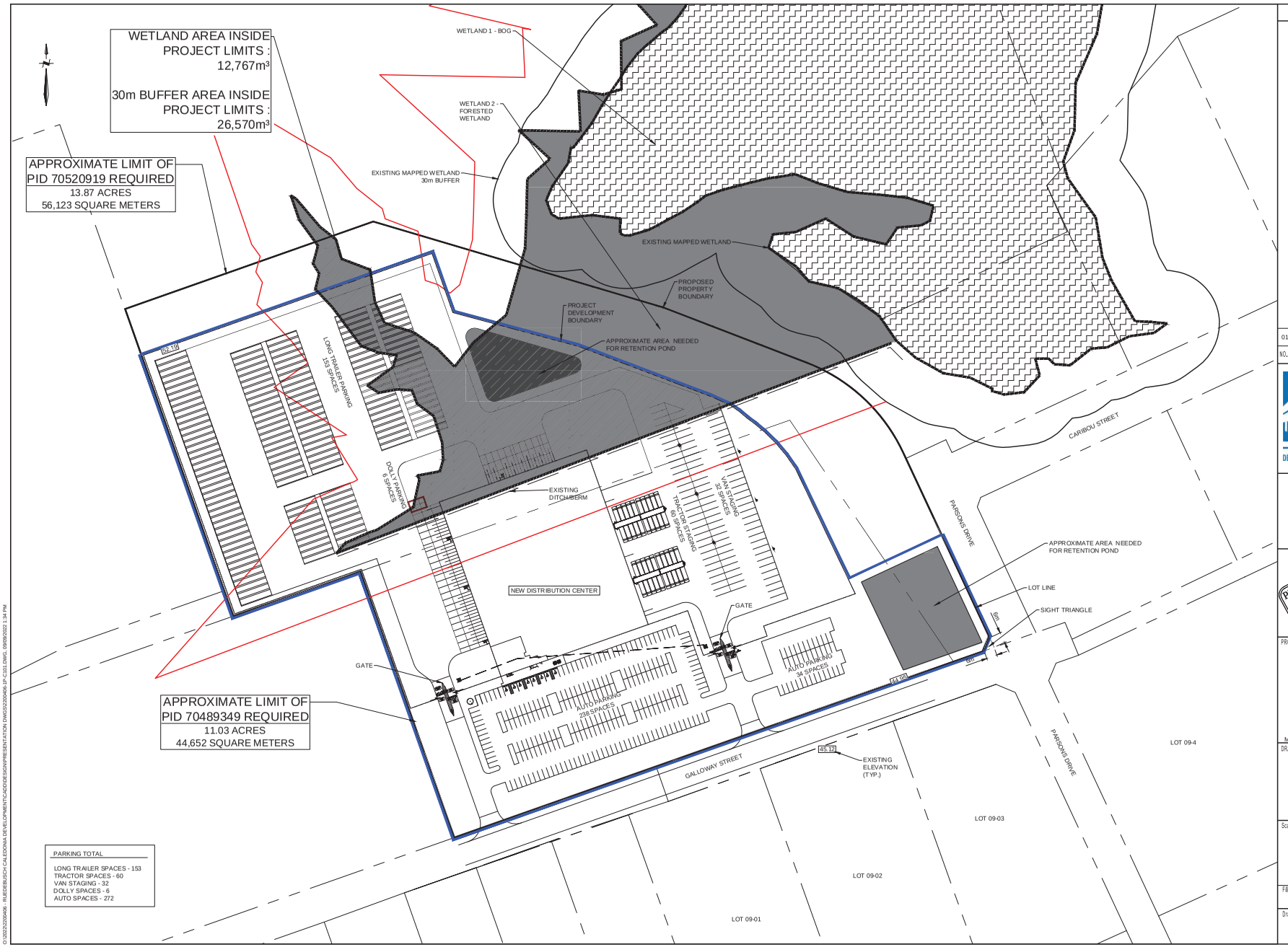
x
x
x

0
15
0

x

x

Appendix C Englobe Corp. Dwg 2200406-1P-C101 – Conceptual Site Layout



NOTES

LEGEND

- EXISTING PROPERTY LINES
- EXISTING R.O.W.
- PROPOSED PROPERTY BOUNDARY
- 30m BUFFER ZONE - FIELD DELINEATED WETLAND
- PROJECT DEVELOPMENT BOUNDARY
- EXISTING MAPPED WETLAND (GEONB)
- FIELD DELINEATED WETLAND

NO.	DATE	REVISIONS	BY	APPR.
01	AUG 30/22	ISSUED FOR EIA REGISTRATION	MH	GD

RUEDEBUSCH DEVELOPMENT & CONSTRUCTION
DEVELOPMENT • CONSTRUCTION • BROKERAGE • CONSULTING

ENGLOBE

PRELIMINARY ONLY
DATE PLOTTED: Sept 28, 2022
NOT TO BE USED FOR CONSTRUCTION

PROJECT TITLE
NEW DISTRIBUTION CENTER
MONCTON N.B.

DRAWING TITLE
CONCEPTUAL SITE LAYOUT

Scale	Drawn By	Design By
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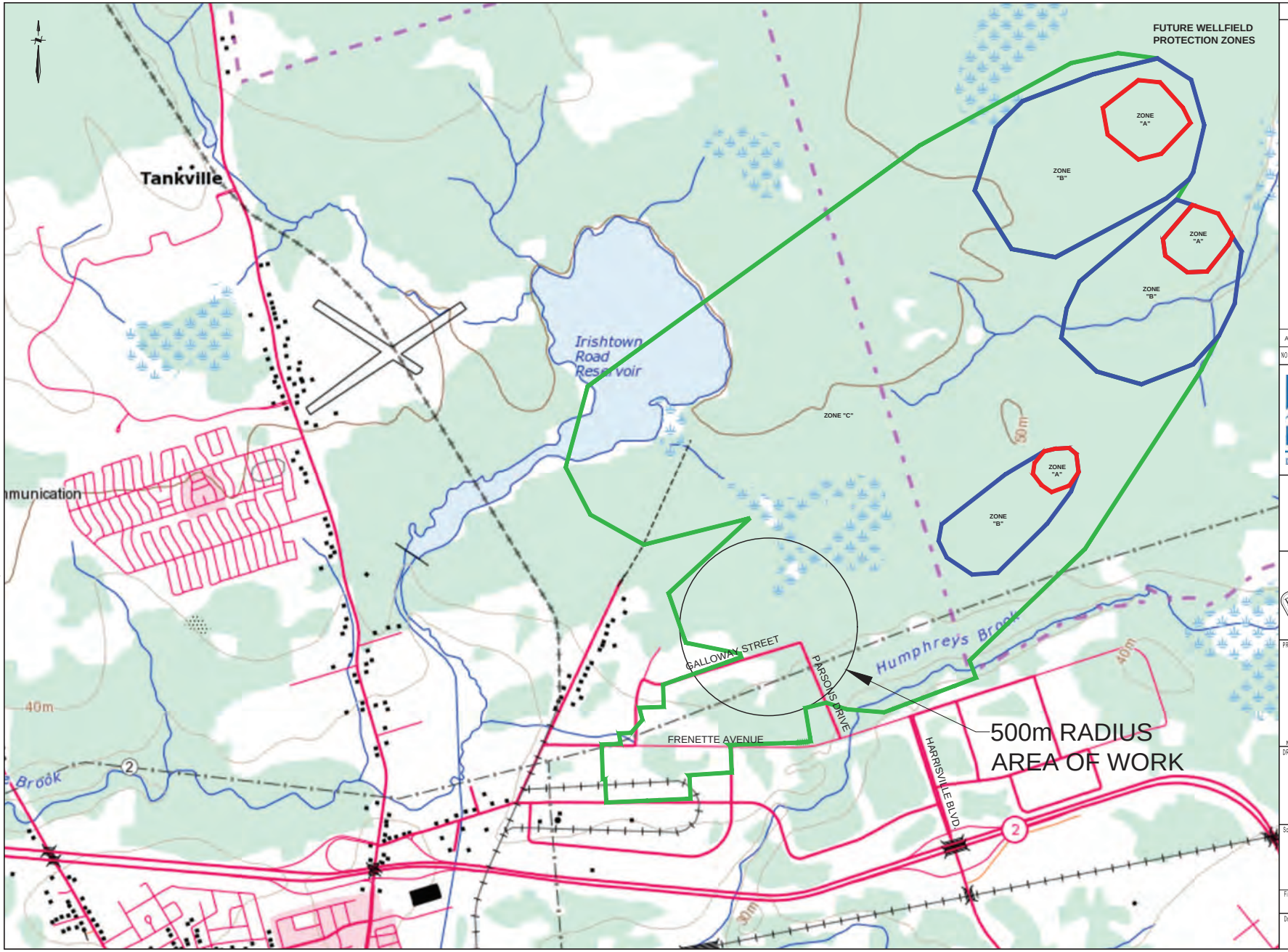
	Checked By: GD	Cadd Check: - - -
	Sheet 101 of ----	

File Name: 2200406-1P-C101.DWG

Drawing No.: 2200406-1P-C101

Appendix D Englobe Corp. Dwg 2200406-1P-C100 - 1:10,000 Scale Map - Overall Location Plan & Englobe Corp. Dwg 2200406-1P-C102 - Overall Site Plan



NOTES

NO.	DATE	REVISIONS	BY	APPR.
A	AUG 23/22	ISSUED FOR EIA REGISTRATION	AC	NH

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DEVELOPMENT • CONSTRUCTION • BROKERAGE • CONSULTING

eNGLOBE

PRELIMINARY ONLY

PROJECT TITLE

NEW DISTRIBUTION CENTER

MONCTON N.B.

DRAWING TITLE

OVERALL LOCATION PLAN

Scale	Drawn By	Design By
100m 0 200m (1:10 000 FULL SCALE)	AC	NH
	Checked By	Cadd Check
	NH	TWA
	Sheet 01 of 01	

File Name
2200406 - 50K OVERALL IMAGE.DWG

Drawing No.
2200406-1P-C100

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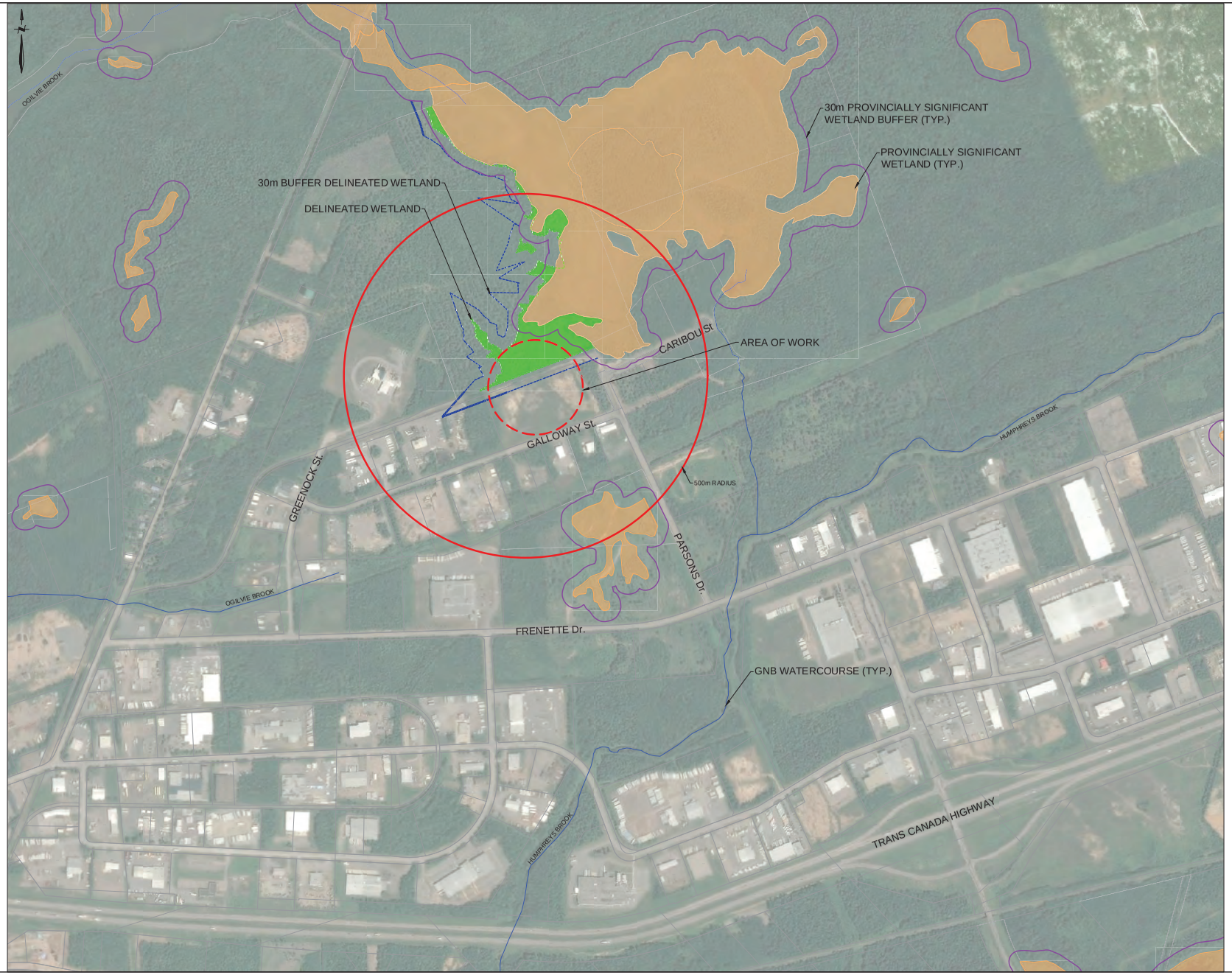

NOTES

NO.	DATE	REVISIONS	BY	APPR.
A.0	SEP. 1/22	ISSUED FOR EIA REGISTRATION	MS	NH

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PROJECT TITLE

NEW DISTRIBUTION CENTER

MONCTON N.B.

DRAWING TITLE

OVERALL SITE PLAN

Scale	Drawn By	Design By
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	Checked By: NH	Cadd Check: MS
	Sheet 01 of 01	

File Name: 2200406-1P-C102.DWG

Drawing No.: 2200406-1P-C102

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Appendix E Phase I - Environmental Site Assessment

Phase I Environmental Site Assessment

Lot 21-23 (PID No. 70489349 and portion of PID No. 70502919), Moncton, New Brunswick

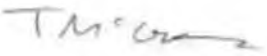
Ruedebusch Development & Construction
Final Report

June 3, 2022
2200406

ENGLOBE

Ruedebusch Development & Construction

Prepared by:



Taylor McGregor, P.Eng.
Environmental Engineer
Environmental Engineering

Reviewed by:

Scott Fisher, P.Eng.
Team Leader- NB
Geotechnical, Materials, and Environmental

Production team

Client

Ruedebusch Development & Construction	David Hull

Englobe Corp.

Project manager	Garratt Donaher, P.Eng.
Site assessor	Alexis Robitaille, B.Sc.
Report preparer	Taylor McGregor, P.Eng.
Report review	Scott Fisher, P.Eng.

Revisions and publications log

REVISION No.	DATE	DESCRIPTION
00	June 3, 2022	Final report published

Executive Summary

Englobe Corp. (Englobe) was retained by Ruedebusch Development & Construction to undertake a Phase I Environmental Site Assessment (ESA) at the subject properties identified as Lot 21-23 (PID No. 70489349 and a portion of PID No. 70502919) located on Galloway Street in Moncton, New Brunswick (NB). The Phase I ESA carried out by Englobe was based on the principles and practices outlined in the Canadian Standards Association (CSA) Z768-01 (R2016), *Phase I Environmental Site Assessment*.

The purpose of the Phase I ESA is to present factual environmental information and render an opinion regarding the environmental data collected and information reviewed for the site and adjacent properties.

A background investigation was conducted to determine property ownership and historical land use information. A site inspection was made on March 31, 2022, at which time the subject properties were visually inspected for unique physical and terrestrial features, and the presence of potential environmental concerns such as petroleum storage tanks, hazardous materials and waste storage, evidence of contamination such as surface staining, and potential contamination from adjacent properties.

The assessment revealed that the subject properties are located in a mixed commercial and industrial area of Moncton, known as the Caledonia Industrial Park. The properties are currently vacant and partially tree-cleared and densely wooded and have been vacant since at least the mid-1940s.

Adjacent properties consist of forested land and mapped wetlands to the north, Parsons Drive and forested lands and mapped wetlands to the east, Galloway Street and several commercial/industrial businesses to the south, and, forested land followed by an industiral business (GFL Liquid East Moncton)) to the west.

Based on the information gathered and observations made by Englobe during site reconnaissance, the assessment has revealed potential evidence of environmental contamination at the subject properties and a Phase II ESA is recommended to investigate the potential for impacts that may be originating from the neighbouring property to the west (GFL Liquid East Moncton).

Site observations indicate that the existing monitoring wells onsite are suitable for re-use, however, if issues with the wells are identified or if re-use is not desirable to the client, then the new wells could be advanced. In addition, it is recommended that the surface drainage near the western property boundaries be examined for any petroleum sheen as minor impacts were noted during the site inspection.

In addition, some considerations to note with respect to preventative maintenance and to any future renovations or redevelopment are outlined below.

- Complete a wetland and watercourse delineation during the appropriate delineation season as an unmapped watercourse is located on the site and a mapped wetland is located close to the north/eastern property boundaries prior to conducting any site development to ensure compliance with wetland and watercourse regulations.
- Remove and dispose of any debris at a landfill prior to any site development.

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If tests have been carried out, the results of these tests are valid only for the sample described in this report.

Englobe Corp.'s subcontractors who have carried out on-site or laboratory work are duly assessed according to the purchase procedure of our quality system. For further information, please contact your project manager."

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TABLES

FIGURES

APPENDICES

1 Introduction

A Phase I Environmental Site Assessment (ESA) has been conducted by Englobe Corp. (Englobe) at the properties identified as Lot 21-23 (PID No. 70489349 and portion of PID No. 70502919) located on Galloway Street in Moncton, New Brunswick. The request for the assessment was made by Mr. David Hull of Ruedebusch Development & Construction. At the time of the assessment, future development of the subject properties was being considered.

The purpose of the Phase I ESA is to present factual environmental information and render an opinion regarding the environmental data collected and information reviewed for the site and adjacent properties. The assessment is useful in reducing uncertainty about potential environmental liabilities and may form the basis for further investigation of the site.

2 Scope of the Assessment

The Phase I ESA carried out by Englobe was based on the principles and practices outlined in the Canadian Standards Association (CSA) Z768-01 (R2016), Phase I Environmental Site Assessment. As part of the background investigation, property ownership information available at the Service New Brunswick (SNB) was reviewed for each property. This information was supplemented by a review of aerial photographs and geologic maps on file with New Brunswick Department of Department of Energy and Resource Development (NBDERD). The New Brunswick Department of Environment and Local Government (NBDELG) was contacted with respect to registered petroleum storage tanks, environmental reports or spill incidences and non-compliance issues that may be recorded in their database for the subject properties and select adjacent properties. A recorded questionnaire was conducted with a representative from the property owner, Mr. Marc-Andre Boucher, Business Development Officer with Moncton Industrial Development and is included in Appendix A.

A site inspection was conducted to visually assess the site for evidence of actual or potential environmental concerns, including the following:

- petroleum storage tanks;
- asbestos, lead, polychlorinated biphenyls (PCBs), chlorofluorocarbons (CFCs), urea-formaldehyde foam insulation (UFFI), stored wastes and chemicals, radon and other hazardous substances;
- surface stains; and,
- neighbouring land uses that have the potential to impact the environmental condition of the subject properties.

It should be noted that information and opinions in this report are based on the above-noted research and visual observations during a walkabout of the site on March 31, 2022. Sampling, testing or moving large objects is typically not included in the scope of work for a Phase I ESA.

3 Property Description

3.1 Site Description

The properties of interest are identified as Lot 21-23 (PID No. 70489349 and portion of PID No. 70502919) located on Galloway Street within the Caledonia Industrial Park in Moncton, New Brunswick. The site consists of two parcels with an approximate combined area of 90,366 m² (22.33 acres). Property map and parcel information reports obtained from SNB are provided in Appendix A. Site photographs are provided in Appendix B. A site location map is presented in Figure 3-1.

Figure 3-1 - Site Location Map - PID No. 70489349 and portion of PID No. 70502919, Moncton, NB

The subject sites are vacant; PID No. 70489349 has been tree-cleared while PID No. 70502919 remains densely wooded. The subject properties slope downward toward the south. The local regional topography also slopes toward the south, therefore, surface runoff and groundwater flow are expected to flow in this direction.

Access to the sites is via Galloway Street located to the south. The surrounding area is serviced by municipal water and sewer infrastructure provided by the City of Moncton. Electrical service to the area is provided by NB Power pole mounted transformers located along Parson Drive and Galloway Street.

The properties are situated in a mixed commercial and industrial area of Moncton. Neighboring properties include forested land and mapped wetlands to the north and east, and commercial/industrial businesses to the south and west.

3.2 Geology

Surficial geology mapping of the Moncton area (Generalized Surficial Geology Map of New Brunswick) indicates that the surficial geology consists of Late Wisconsinan blanket and veneer: loamy lodgment till, minor ablation till, silt, sand, gravel, rubble. The blanket is generally 0.5 to 3.0 meters thick.

Geological mapping (Bedrock Geology of the Moncton Area (NTS 21 I/02), Westmorland and Albert Counties, New Brunswick) indicates that the bedrock underlying the site is from the late Carboniferous period, Pictou Group (Richibucto Formation) consisting of grey and brownish red, commonly micaceous, lithic and arkosic sandstone, pebbly sandstone and intraformational mudstone-clast conglomerate, brownish red to brick-red and lesser gray, siltstone and mudstone, minor intraformational limestone-cobble conglomerate and thin, laterally extensive limestone beds minor thin coal seams.

4 Background Investigation

At the outset of the project, a background study of the subject properties was undertaken. The purpose of this work was to obtain information on previous land use activities and possible types of contamination or hazardous materials arising from past operational practices. Information collected has been based largely on a review of aerial photographs, deeds and previous environmental reports.

4.1 Historical Information Review

4.1.1 Property Ownership

A preliminary title search was conducted of available online deeds from SNB Online to determine past ownership of the properties. The subject properties are currently owned by Moncton Industrial Development Limited. Past ownership information uncovered by Englobe as part of this assessment is provided in the following Table 4-1.

Table 4-1 - Ownership History - PID Nos 70489349 and 70502919

Subject Property (PID No. 70489349)	
Owner	Years Held
Moncton Industrial Development Limited	2021 to Present
Ri-Mar Properties Ltd. (Previously Named Blastcoat Holdings Inc.)	2008 to 2021
Moncton Industrial Development Limited	1993 to 2008
625822 NB Inc.	2006-2007
Subject Property (PID No. 70502919)	
Owner	Years Held
Moncton Industrial Development Limited	Present
Parent Parcel (PID No. 70356621)	
Owner	Years Held

Moncton Industrial Development Limited	2008 to Present
The City of Moncton	Unknown to 2008
Moncton Industrial Development Limited	1993 to Unknown
Economic Development and Tourism	Prior to 1993
Parent Parcel (PID No. 70015466)	
Owner	Years Held
Economic Development and Tourism	1986 to 1993
[redacted]	Prior to 1986

Prior to 2008, the subject sites were composed of two parcels (Parent PID Nos. 70356621 &70015466), and in 2008 these parcels were divested to form the two current parcels. No other information for the properties prior to 1996 was discovered by Englobe during the preliminary title search conducted for this report. Ownership information was obtained through cursory review of select online deeds and is not intended to be a legal title search.

4.1.2 Aerial Photograph

Aerial photographs for the years 1945, 1953, 1976, 1982, 2001 and 2011 were available for review and copies of the photos are provided in Appendix C. Google Earth imagery from 2004 to 2021 were also reviewed. A copy of the 2017 Google Earth aerial image is also provided in Appendix C.

4.2 Historical Land Use

Historical property use observed in aerial photographs and Google Earth aerial imagery is summarized in Table 4-2, below.

Table 4-2 - Historical Land Use - PID Nos. 70489349 and 70502919, Moncton, NB

Date	Source	Observations
1944	Aerial Photograph	The subject properties are tree-covered. The surrounding lands are mostly tree-covered or agriculturally developed with some residential dwellings present further west.
1953	Aerial Photograph	No significant changes have occurred on the subject properties or to the surrounding lands.
1963	Aerial Photograph	No significant changes have occurred on the subject properties or to the surrounding lands.
1976	Aerial Photograph	No significant changes have occurred on the subject property or to the immediate surrounding properties other than some areas have been tree-cleared for what appears to be for municipal side streets. Some residential development can be seen farther northwest.
1982	Aerial Photograph	No significant changes can be seen on the subject properties. Side streets have been developed to the neighboring properties to south and west. The neighboring property farther west (95 Galloway Street, currently occupied by Air Liquide Canada) has been developed and one commercial building and large aboveground tanks are now visible.
2001	Aerial Photograph	The site has been mostly tree-cleared. The neighboring property to the immediate west (45 Galloway Street, currently occupied by GFL Liquid East Moncton) has been developed and a commercial building with visible tanks and cars are present. The neighboring property to the northwest (currently occupied by a Shur-Gain plant) has also been developed with a large commercial building and several storage containers/trailers present. The neighboring properties to

Date	Source	Observations
		the south and southwest have also been development and two commercial buildings and storage sheds are now present.
2011	Aerial Photograph	No significant changes have occurred on the subject properties or to the surrounding lands.
2017	Google Earth Imagery	No significant changes have occurred on the subject properties or to the surrounding lands. Further commercial development can be seen on the properties to the southwest, south and east.

4.3 Environmental Source Information

4.3.1 Previous Environmental Reports

There was one previous environmental report available for review for the subject properties:

— *Phase II Environmental Site Assessment, Galloway Street, Moncton, NB (PID 70489349 and Portions of 70502919).* Prepared by CBCL Limited, dated November 12, 2021.

In November 2021, CBCL Limited conducted a Phase II ESA on PID 70489349 due to environmental concerns associated with the adjacent neighbouring property that were identified during a previous Phase I ESA. The Phase II ESA involved drilling three boreholes, each completed as monitoring wells. One select soil sample and one groundwater sample from each monitoring well was submitted for the analysis of benzene, toluene, ethylbenzene and xylenes (BTEX) and modified petroleum hydrocarbons (mTPH). The results of the Phase II ESA revealed the following:

— The soil samples submitted for analysis reported BTEX/mTPH concentrations below laboratory detection limits and therefore below the referenced Atlantic RBCA Tier I Risk Based Screening Levels (RBSLs) and the Tier I Ecological Screening Levels (ESLs) for the protection of human and environmental health.

— BTEX/mTPH concentrations in the groundwater sample collected from one of the monitoring wells (MW-01) indicated trace concentrations of mTPH of 0.52 mg/L, which is below the referenced Atlantic RBCA Tier I RBSLs and Tier I ESLs.

— BTEX/mTPH concentrations reported in the groundwater samples collected from the two other monitoring wells (MW-02 and MW-03) were reported below the laboratory detection limits and therefore below the referenced Tier I RBSLs and Tier I ESLs.

Based on the assessment above, no further assessment was recommended.

4.3.2 NBDELG Property-Based Environmental Information

4.3.2.1 Subject Sites

As part of the background investigation, a request was submitted to NBDELG for information in their database pertaining to registration, installation or removal of petroleum storage tanks, environmental reports or spill incidents, identified contamination, and non-compliance issues for Lot 21-23 (PID No. 70489349 and PID No. 70502919) located on Galloway Street within the Caledonia Industrial Park in Moncton, NB. A copy of the NBDELG report is provided in Appendix D. The NBDELG response reported the following information:

— There is no record of Ministerial Orders or Remediation Orders related to these PID numbers, using our current search process.

— Records indicate that there are no petroleum storage tanks registered with the Department, under the *Petroleum Product Storage and Handling Regulation*, for these PID numbers.

- There are no records of any remedial activity or contamination for these PID numbers.
- These PID numbers are not registered with the Department as a PCB Storage site.
- There are no records of landfill sites or former dumpsites located near these PID numbers.

4.3.2.2 Adjacent Properties

Service NB operates the Land Gazette database, which acts as a gateway to notify the public of the existence of regulations, restrictions and other related information that may have an impact on land use.

The Land Gazette database was accessed for all adjacent properties. According to the Land Gazette database, information is on file with NBDELG for the adjacent property identified as PID No. 70375779 (Civic No 45 Galloway Street - GFL Liquid East Moncton.) located immediately to the west of the subject sites; therefore, an environmental request was submitted to NBDELG for this property. The NBDELG response is included in Appendix D, and reported the following information:

- No record of Ministerial Orders or Remediation Orders related to the parcel, using our current search process.
- Records indicate that there are petroleum storage tanks registered with the Department, under the *Petroleum Product Storage and Handling Regulation,* associated with the parcel. Registered petroleum storage tanks listed for this parcel is as follows;
  - Two active 85,000L, aboveground storage tank (AST) containing waste oil, installed in 1988.
  - One active 15,890L single wall, steel underground separator installed in 1988.
  - One active 45,460L steel AST containing waste oil, installed in 1991.
  - One active 45,460L single wall, steel AST containing waste oil, installed in 1992.
  - Two active 136,000L single wall, steel AST containing waste oil, installed in 1995.
  - One active 908L single wall, steel AST containing furnace oil, installed in 1998.
  - One active 4,540L single wall, steel AST containing furnace oil, installed in 1988.
  - One active 22,500L single wall, steel underground separator installed in 2002.
  - Two 113,500L single wall, steel AST containing waste oil, installed in 1992 and removed at an unknown date.
- Records indicate that there has been contamination found at the parcel, with the following information provided:
  - A remediation site management file (#6515-3-0893) was opened by NBDELG on April 9, 2003, identifying petroleum contamination on the property. The file status is open. The party responsible is listed as the property owner and the consultant involved is listed as Jacques Whitford Environmental Ltd.
- The subject parcel is not registered with the Department as a PCB Storage site.
- There are no records of landfill sites or former dumpsites located near this PID number.

The operations (receiving, storing and treating waste oil and other liquid wastes), and the open remediation file and historical tank records registered to PID No. 70375779, represents potential environmental concerns that warrants further investigation. A Phase II ESA conducted at the subject property by CBCL in November 2021 revealed soil and groundwater on the western portion of the subject site, adjacent the property boundary with PID No. 70375779, satisfy applicable Atlantic RBCA Tier I criteria. However, an additional round of groundwater monitoring from existing wells is recommended to confirm the subsurface conditions.

5 Site Reconnaissance

Englobe conducted a site visit on March 31, 2022 and visually inspected the site for the presence of potential environmental concerns such as petroleum storage tanks, surface soil staining, hazardous materials, chemicals and waste storage, and potential contamination from adjacent properties. During the visit, access was provided to all areas of the properties, however, snow obscured portions of the site.

5.1 Petroleum Storage Tanks

The properties are vacant and no evidence of ASTs or underground storage tanks (USTs) were observed during the site inspection.

5.2 Asbestos

Asbestos has been used in many areas of building construction. Materials found in buildings constructed or renovated prior to the late-1970s that commonly contain asbestos fibres include flooring (vinyl tiles, sheet flooring, mats under hardwood), wall and ceiling materials (shingles, siding, suspended tiles, plaster, stucco, drywall filler compound), mechanical insulation (pipes, fittings, boilers, gaskets), fireproofing (panels, texture coats) and miscellaneous materials such as wallpaper, paints, adhesives, and vermiculite insulation. Asbestos use in building construction was reduced in the late 1970s due to the hazards associated with inhalation of asbestos fibres.

The subject properties are vacant and have been since at least the 1940s. During the site inspection, there was no evidence of asbestos-containing materials at the subject properties.

5.3 UFFI

Urea formaldehyde foam insulation (UFFI) is a thermal insulation material developed in the 1950s that was pumped into interstitial spaces between the walls of buildings where it hardened to form a solid layer of insulation. During the 1970s, when concerns about energy efficiency led to efforts to improve home insulation in Canada, UFFI was widely used to retrofit existing houses. Most installations occurred between 1977 and its ban in Canada in 1980. The sale and usage of UFFI was banned for health-related reasons as a result of formaldehyde gas, which is released from the UFFI to the building interior.

The subject properties are vacant and have been since at least the 1940s and there was no evidence of UFFI observed at the subject properties during the site inspection.

5.4 PCBs

Polychlorinated biphenyls (PCBs) were commonly used in transformers, circuit breakers, capacitors, switchgears and lamp ballasts as synthetic insulating materials. In addition, they were used in some hydraulic oils, particularly in high temperature environments. By 1979, Canadian regulations had banned the use of PCBs in the manufacturing of these items. However, PCBs may be present in older electrical and hydraulic equipment still in use after the prohibition.

The subject properties are vacant and have been since at least the 1940s. No PCB concerns were identified at the subject properties.

5.5 Lead

Lead is normally associated with old paints, weather flashing, old pipes and lead solder on copper pipes. The concentration of lead in paint has been closely regulated and allowable limits significantly decreased between 1950 and 1976. By 1976, Canadian regulations had restricted the use of lead in interior paints to 0.5% by weight. Consumer paint in Canada and the United States since 1992 is considered virtually lead-free.

The subject properties are vacant and have been since at least the 1940s. During the inspection, there was no evidence of lead-containing materials at the subject properties.

5.6 Ozone-Depleting Substances

Chlorofluorocarbons (CFCs) and other ozone-depleting substances (ODS) are typically used as coolants in air conditioning and refrigeration systems. The main concerns associated with these units are the prevention of coolant leaks and proper disposal of the coolants when the units are decommissioned.

The sites are vacant lots. No CFCs or ODS systems were noted during the site inspection, therefore, ODS are not considered to be a concern for the subject properties.

5.7 Waste and Hazardous Chemical Storage

At the time of the site inspection, the site was partially snow-covered however, some minor debris piles were observed on the site. The debris does not represent a significant environmental concern but will require landfill disposal prior to any site development.

In addition, deceased fauna (a duck) and a minor petroleum sheen was noted in the surface drainage water located near the western property boundaries. It is recommended to investigate the source of petroleum impacts as the area was partially snow-covered at the time of the assessment. It is recommended to re-assess this area visually and potentially collect soil and/or surface water samples if deemed necessary.

5.8 Radon

Radon is a colourless, odourless and radioactive gas that is naturally occurring. It is produced from the breakdown of uranium contained in soil and bedrock, which is slowly released into the surrounding soil. Geologic settings that typically contain more uranium and resulting radon gas are those comprised of granite and shale.

Radon gas typically collects in the lower parts of a building (i.e. basement) as it enters through the foundation of the structure. The entry points may include (but are not limited to), openings in the foundation for services, floor drains, foundation cracks and unsealed joints in the concrete foundation. Thus, the amount of radon gas that enters a building depends on a variety of factors including the actual amount of radon available in the underlying soil (geologic setting) and the construction details of the building. Buildings without conventional foundations are often at greater risk. Since there are many factors that contribute to elevated radon gas concentrations, it is difficult to determine the amount of exposure without completing radon testing.

Radon gas testing was not undertaken as part of this assessment.

5.9 Odours

Minor, occasional petroleum odours were apparent during the site inspection. The suspected source is the GFL Liquid East Moncton facility on the neighbouring property to the west.

5.10 Water and Sewer

The surrounding area is serviced by municipal water and sewer infrastructure provided by the City of Moncton.

5.11 Surface Staining

At the time of the inspection, the site was partially snow covered which limited observations, however, petroleum sheen was noted in the surface drainage water located near the western property boundaries.

5.12 Wetlands and Watercourses

A watercourse was observed at the northern property boundaries between PID No. 70489349 and PID No. 70502919. Any work within 30 m of a watercourse requires a Wetland and Watercourse Alteration (WAWA) permit from NBDELG as per the *Watercourse and Wetland Regulation (Reg 90-80)* of the *Clean Water Act*.

GeoNB mapping also indicates there is a provincially mapped wetland near the north/eastern property boundaries. Any work within 30 m of a mapped or unmapped wetland requires a WAWA permit from NBDELG as per the *Clean Water Act*.

It is recommended that a field delineation be conducted to identify and delineate any potential watercourses and confirm the mapped wetland boundaries during the appropriate delineation season prior to any property development to ensure compliance with the Clean Water Act.

5.13 Potential Sources of Off-Site Contamination

Potential sources of off-site contamination may be migration of petroleum products or other chemicals from accidental leaks or spills on neighboring properties. The subject properties are located in a predominately commercial/industrial land use area and are bounded by:

- Forested land and mapped wetlands to the north;
- Parsons Drive and forested lands and mapped wetlands to the east;
- Galloway Street and several commercial/industrial businesses to the south; and,
- Forested land followed by an industrial business (GFL Liquid East Moncton) to the west.

Based on a review of the available NBDELG reports on file for the adjacent properties and petroleum sheen noted in the surficial drainage water, there is risk of off-site contamination migrating to the subject

properties from the adjacent property to the west (GFL Liquid East Moncton that warrants further investigation.

6 Conclusions

Based on the information gathered and observations made by Englobe during site reconnaissance, the assessment has revealed potential evidence of environmental contamination at the subject properties and a Phase II ESA is recommended to investigate the potential for impacts that may be originating from the neighbouring property to the west (GFL Liquid East Moncton).

Site observations indicate that the existing monitoring wells onsite are suitable for re-use, however, if issues with the wells are identified or if re-use is not desirable to the client, then the new wells could be advanced. In addition, it is recommended that the surface drainage near the western property boundaries be examined for any petroleum sheen as minor impacts were noted during the site inspection.

In addition, some considerations to note with respect to preventative maintenance and to any future renovations or redevelopment are outlined below.

- Complete a wetland and watercourse delineation during the appropriate delineation season as an unmapped watercourse is located on the site and a mapped wetland is located close to the north/eastern property boundaries prior to conducting any site development to ensure compliance with wetland and watercourse regulations.
- Remove and dispose of any debris at a landfill prior to any site development.

7 Report Use and Conditions

This report was prepared for the exclusive use and reliance of Ruedebusch Development & Construction and FedEx Ground Package Systems, Inc., and is based on data and information obtained during a site visit by Englobe on the subject properties; and is based solely upon the condition of the properties on the date of such inspection, supplemented by information obtained and described herein.

We declare that, to the best of our professional knowledge and belief, we are qualified Environmental Professionals within the jurisdiction of New Brunswick, Canada. We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. We have developed and performed the all appropriate inquiries in conformance with local standards and practices.

The evaluation and conclusions contained in this report have been prepared in light of the expertise and experience of Englobe Corp. In evaluating the properties, Englobe has relied in good faith upon representation and information furnished by individuals noted in the report with respect to operations and existing property conditions and the historic use of the properties to the extent that they have not been contradicted by data obtained by other sources. Accordingly, Englobe accepts no responsibility for any deficiency or inaccuracy in this report as a result of omissions, misstatements or misrepresentations of the persons interviewed. In addition, Englobe will not accept liability for loss, injury, claim or damage arising from any use or reliance on this report as a result of misrepresentation or fraudulent information.

Environmental conditions are dynamic in nature and changing circumstances in the environment and in the use of the properties can alter radically the conclusions and information contained herein.

Appendix A
User Questionnaire, Property Maps and Parcel Information Reports

ENGLOBE

Property Name and Location:
Lot 21-23, Moncton, NB (PID No. 70489349 and portion of PID No. 70502919)

Site Address: 1-33 Galloway Street

Phase I Environmental Site Assessment Questionnaire

Site Representative(s): Marc-André Boucher, Business Development Officer

Signature: _____ Date: May 24, 2022

Telephone: 506-857-0700

Property Information:

Current Site Owner: Moncton Industrial Development

Date Current Owner took Ownership of the Property: December 2, 2021 and in the 1970's

List any known previous owners or tenants and dates present:
Ri-Mar Properties Ltd from 2008 to 2021

Property Type: Undeveloped Industrial Use

Size of Property: 22.33 acres

Buildings Present on Site (Y/N): No

If Building(s) present please describe:

1) ___
2) ___
3) ___

Is the site serviced (electricity, water and sewer) (Y/N): Yes

Has there been any previous environmental assessments or reports completed for the site? (including Phase I or II ESAs, wetland delineations, etc)?

Describe and dates completed:
Phase I Environmental Site Assessment, September, 2021
Phase II Environmental Site Assessment, November, 2021

Any known environmental issues found? None

Description:_____

What is the current activity at the Site: None

What were the past uses of the property: None

Are any of the following occupants associated with the subject property: No

science laboratories	dry cleaners
agricultural pesticides/fertilizers	fueling areas
vehicle repairs	wood treating
chemical industries	petrochemical industries

Site Environmental Issues

Do current activities at the site generate odours or noise? No

Description:_____

Are there any air emissions? No

Description:_____

Are there any chemical using activities present? (fertilizers used onsite, etc) No

Description:_____

Are solid wastes other than domestic trash present? No

Description:_____

Has there been evidence of unauthorized dumping on the site previously? No

Description:_____

Are liquid waste streams (excluding sewage) present? No

Description:_____

Are hazardous waste generated? No

Description:_____

Have ASTs/USTs been removed from the property? No

Neighbouring Property Environmental Issues

Are there any odours onsite from neighbouring properties? No

Description:_____

Any known spills/leaks on any neighbouring properties? No

Description:_____

Known neighbouring property activities?

Description: Caledonia Waste Oil Enterprise

Service New Brunswick **Service Nouveau-Brunswick**

Scale/Échelle 1:3441

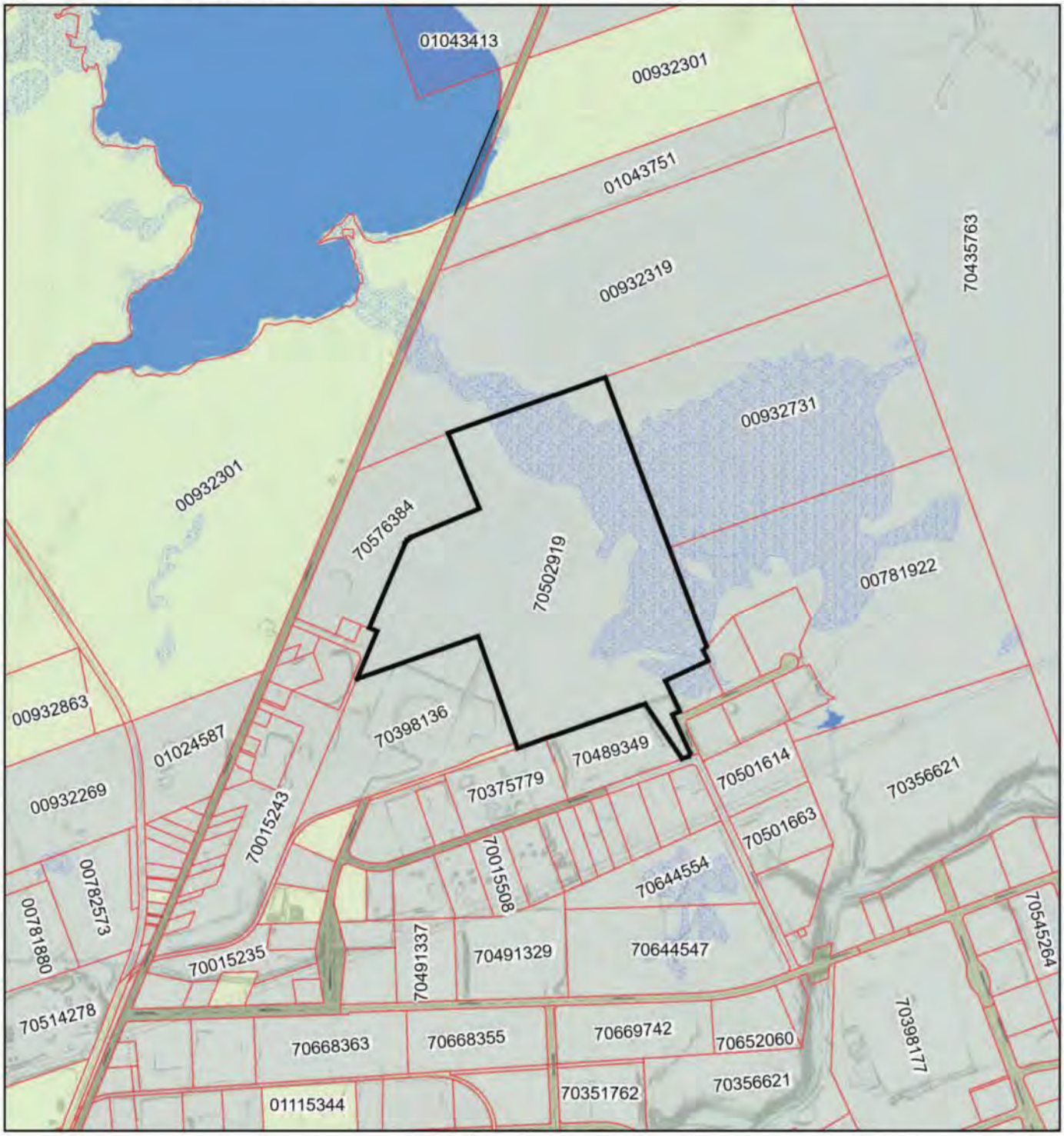
Date: 2022/04/04 13:28:19

0 100.0 200.0 300.0 mètres metres

While this map may not be free from error or omission, care has been taken to ensure the best possible quality. This map is a graphical representation of property boundaries which approximates the size, configuration and location of properties. It is not a survey and is not intended to be used for legal description or to calculate exact dimensions or area.

Même si cette carte n'est peut-être pas libre de toute erreur ou omission, toutes les précautions ont été prises pour en assurer la meilleure qualité possible. Cette carte est une représentation graphique approximative des terrains (limites, dimensions, configuration et emplacement). Elle n'a aucun caractère officiel et ne doit donc pas servir à la rédaction de la description officielle d'un terrain ni au calcul de ses dimensions exactes ou de sa superficie.

Service New Brunswick **Service Nouveau-Brunswick**



Scale/Échelle 1:13765

Date: 2022/04/04 13:29:44

0 250.0 500.0 750.0 mètres metres

While this map may not be free from error or omission, care has been taken to ensure the best possible quality. This map is a graphical representation of property boundaries which approximates the size, configuration and location of properties. It is not a survey and is not intended to be used for legal description or to calculate exact dimensions or area.

Même si cette carte n'est peut-être pas libre de toute erreur ou omission, toutes les précautions ont été prises pour en assurer la meilleure qualité possible. Cette carte est une représentation graphique approximative des terrains (limites, dimensions, configuration et emplacement). Elle n'a aucun caractère officiel et ne doit donc pas servir à la rédaction de la description officielle d'un terrain ni au calcul de ses dimensions exactes ou de sa superficie.

Parcel Information

PID:	70489349	**County:**	Westmorland
Status:	Active	**Active Date/Time:**	2008-06-17 10:33:50
Land Related Description:	Land	**Management Unit:**	NB1401
Area:	4.5	**Area Unit:**	Hectares
Date Last Updated:	2021-12-09 15:31:33	**Harmonization Status:**	Harmonized
Land Titles Status:	Land Titles	**Land Titles Date/Time:**	2008-06-17 08:58:01
Date of Last CRO:	2022-03-23 14:59:03	**Manner of Tenure:**	Not Applicable
Land Gazette Information:	NO		

Description of Tenure:

Public Comments:

Parcel Interest Holders

Owner	Qualifier	Interest Type
MONCTON INDUSTRIAL DEVELOPMENT LIMITED		Owner

Assessment Reference

PAN	PAN Type	Taxing Authority Code	Taxing Authority
1984655		600	CITY OF/CITE DE MONCTON

Parcel Locations

Civic Number	Street Name	Street Type	Street Direction	Place Name
	Galloway	Street		Moncton

County Parish

County	Parish
Westmorland	Moncton

Documents

Number	Registration Date	Book	Page	Code	Description
42073412	2021-12-02			1100	Deed/Transfer
38382637	2018-09-13			3210	Corporate Affairs Change of Name
36608330	2016-12-12			3210	Corporate Affairs Change of Name
30216502	2011-06-16			6110	Discharge of Mortgage
26079393	2008-08-29			1100	Deed/Transfer
19549980	2004-12-01			2200	Easement

Documents (cont.)

Number	Registration Date	Book	Page	Code	Description
17306508	2003-10-24			2200	Easement
587214	1993-11-25	2155	117	104	Mortgage

Plans

Number	Suffix	Registation Date	Code	Description	Lot Information	Orientation
25697435		2008-06-17	9050	Subdivision & Amalgamations	Lot 08-23	Provincial Grid
18389388		2004-05-25	9000	Administration		Provincial Grid
17208035		2003-10-08	9050	Subdivision & Amalgamations		Provincial Grid
17204414		2003-10-07	9050	Subdivision & Amalgamations		Provincial Grid
11159101		2000-07-04	9050	Subdivision & Amalgamations		Provincial Grid
200874		1995-08-25	9050	Subdivision & Amalgamations		Provincial Grid
200194		1994-07-04	9050	Subdivision & Amalgamations		Provincial Grid
11207		1977-09-12	9040	Retracement & Plan or Return of Survey		Provincial Grid
11117		1977-07-21	9050	Subdivision & Amalgamations		Provincial Grid
11070		1977-06-23	9050	Subdivision & Amalgamations		Provincial Grid
10224		1976-02-24	9050	Subdivision & Amalgamations		Provincial Grid

Parcel Relations

Related PID	Type Of Relation	Lot Information
70015466	Parent	Lot 77-47
70356621	Parent	Lot REM

Parcel Information

PID:	70502919	**County:**	Westmorland
Status:	Active	**Active Date/Time:**	2009-01-30 08:57:41
Land Related Description:	Land	**Management Unit:**	NB1401
Area:	48.17	**Area Unit:**	Hectares
Date Last Updated:	2021-12-14 11:26:41	**Harmonization Status:**	Harmonized
Land Titles Status:	Land Titles	**Land Titles Date/Time:**	2009-01-21 16:05:23
Date of Last CRO:	2022-03-23 14:59:23	**Manner of Tenure:**	Not Applicable
Land Gazette Information:	NO		

Description of Tenure:

Public Comments:

Parcel Interest Holders

Owner	Qualifier	Interest Type
Moncton Industrial Developments Limited		Owner

Assessment Reference

PAN	PAN Type	Taxing Authority Code	Taxing Authority
6602965		600	CITY OF/CITE DE MONCTON

Parcel Locations

Civic Number	Street Name	Street Type	Street Direction	Place Name
	2	Highway		Moncton

County Parish

County	Parish
Westmorland	Moncton

Documents

Number	Registration Date	Book	Page	Code	Description
42100967	2021-12-08			6110	Discharge of Mortgage
19549980	2004-12-01			2200	Easement
17306508	2003-10-24			2200	Easement
587214	1993-11-25	2155	117	104	Mortgage

Plans

Number	Suffix	Registation Date	Code	Description	Lot Information	Orientation

Date/Time: 2022-04-04 01:29:12

Plans

Number	Suffix	Registation Date	Code	Description	Lot Information	Orientation
37887099		2018-03-29	9050	Subdivision & Amalgamations	Lot	Provincial Grid
32927452		2013-07-25	9050	Subdivision & Amalgamations	Lot	Provincial Grid
26745456		2009-01-21	9050	Subdivision & Amalgamations		Provincial Grid
18389388		2004-05-25	9000	Administration		Provincial Grid
17208035		2003-10-08	9050	Subdivision & Amalgamations		Provincial Grid
17204414		2003-10-07	9050	Subdivision & Amalgamations		Provincial Grid
200874		1995-08-25	9050	Subdivision & Amalgamations		Provincial Grid
200194		1994-07-04	9050	Subdivision & Amalgamations		Provincial Grid
11207		1977-09-12	9040	Retracement & Plan or Return of Survey		Provincial Grid
11070		1977-06-23	9050	Subdivision & Amalgamations		Provincial Grid
10224		1976-02-24	9050	Subdivision & Amalgamations		Provincial Grid

Parcel Relations

Related PID	Type Of Relation	Lot Information
70356621	Parent	Lot REM
70576384	Infant	Lot 13-100
70636600	Infant	Lot 18-1
70636618	Infant	Lot 18-2
70636659	Infant	Lot 18-6
70636667	Infant	Public Street (Parsons [

Appendix B
Site Photographs

ENGLOBE

Photo 1: General view (taken facing north) of the subject property PID No. 70489349, Galloway Street, Moncton, NB (March 31, 2022).

Photo 2: General view (taken facing south) in center of property near the western portion of the subject property PID No. 70489349, Galloway Street, Moncton, NB (March 31, 2022).

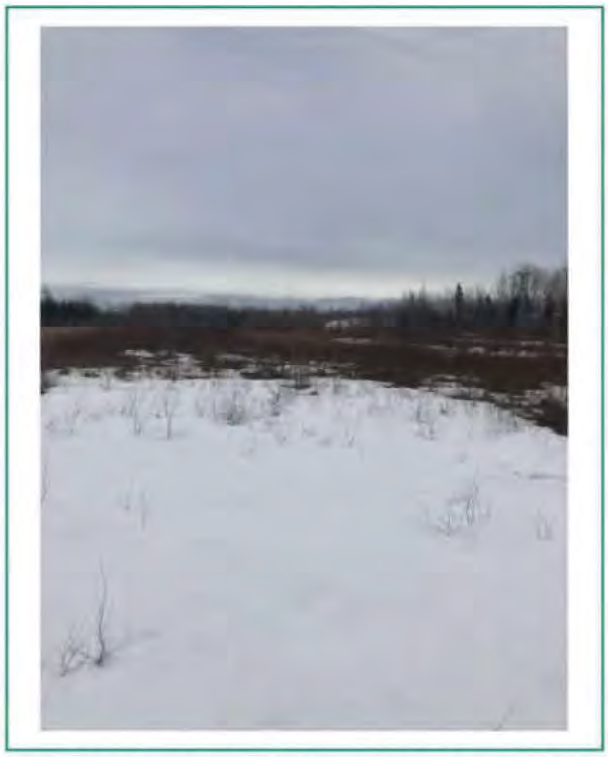


Photo 3: General view (taken facing east) on the western portion of the subject property PID No. 70489349, Galloway Street, Moncton, NB (March 31, 2022).

Photo 4: One of the monitoring wells located on the subject property PID No. 70489349 near the western property boundary, Galloway Street, Moncton, NB (March 31, 2022).

Photo 5: General view (taken facing north) of surface drainage near the west property boundary on PID No. 70489349, Galloway Street, Moncton, NB (March 31, 2022).

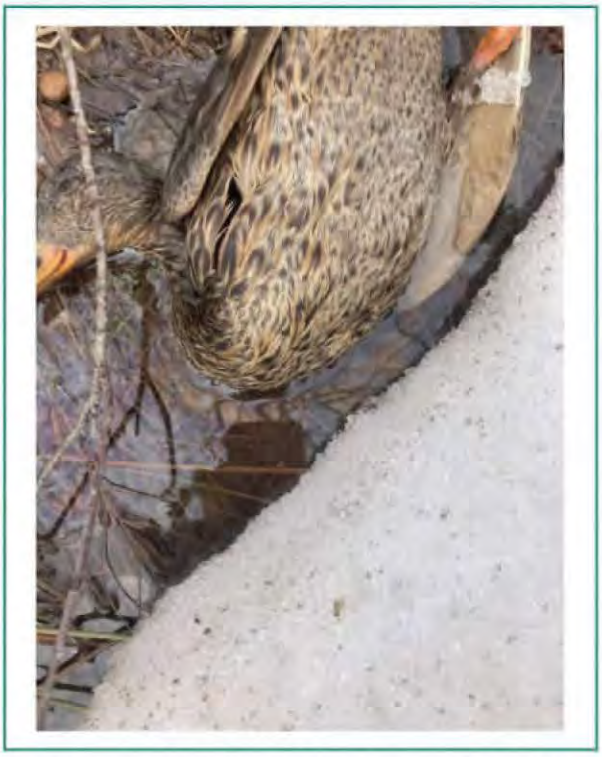


Photo 6: Dead fauna and petroleum sheen located within surface drainage near the west property boundary on PID No. 70489349, Galloway Street, Moncton, NB (March 31, 2022).

Photo 7: General view of the forested area located on PID No. 70502919, Galloway Street, Moncton, NB (March 31, 2022).

Photo 8: General view of the watercourse near the northern property boundary of PID No. 70489349 and PID No. 70502919, Galloway Street, Moncton, NB (March 31, 2022).

Photo 9: General view of subject property (taken facing southeast) on the eastern portion of the subject property PID No. 70489349, Galloway Street, Moncton, NB (March 31, 2022).

Photo 10: General view of property (taken facing north) located near center portion of the subject property PID No. 70489349, Galloway Street, Moncton, NB (March 31, 2022).

Photo 11: View of some misc. debris observed on the subject property PID No. 70489349, Galloway Street, Moncton, NB (March 31, 2022).

Photo 12: General view of forested area to the west of PID No. 70489349, Galloway Street, Moncton, NB (March 31, 2022).

Photo 13: General view of forested area to the north of 70502919, Galloway Street, Moncton, NB (March 31, 2022).

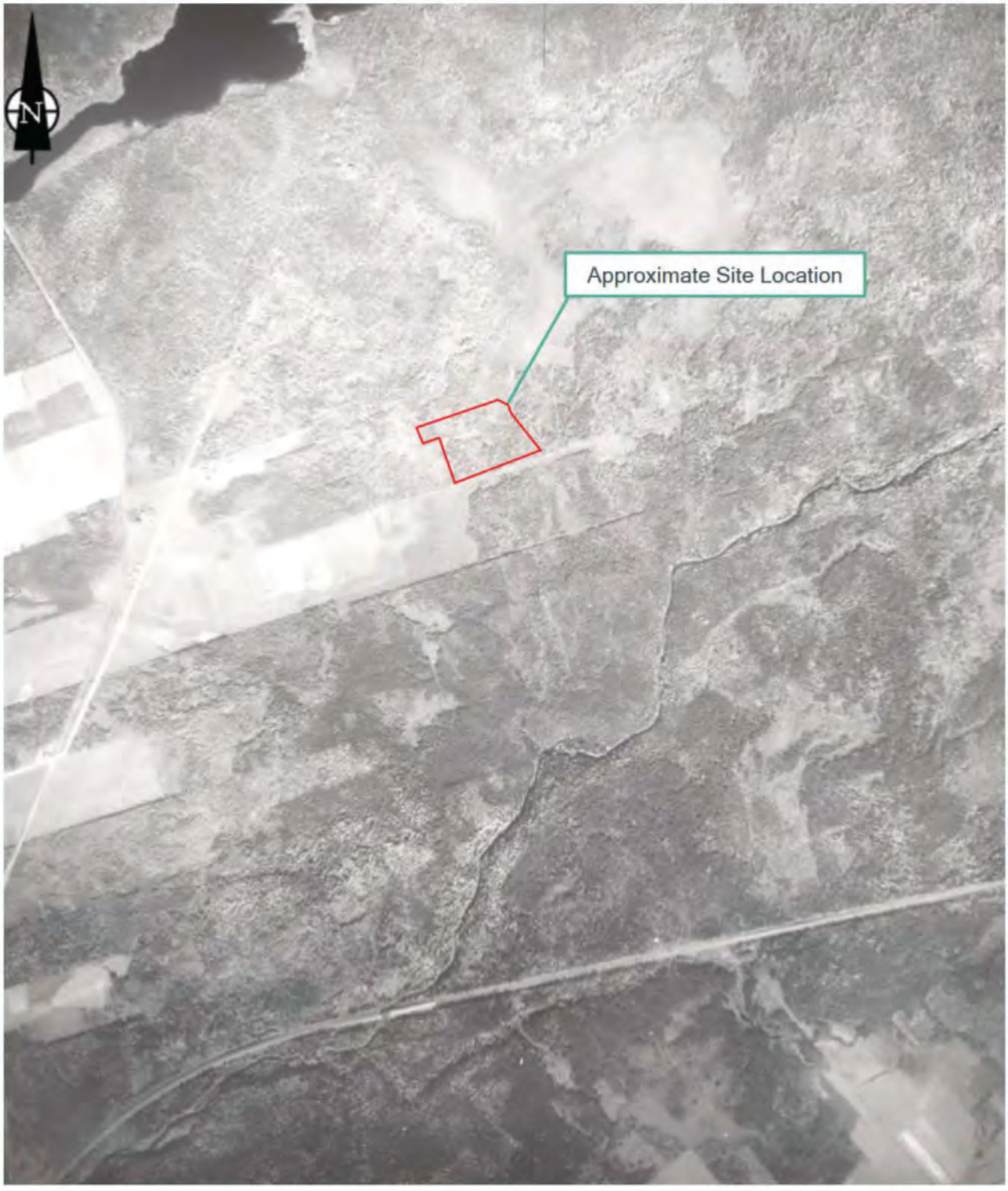
Photo 14: View of Parsons Drive to the east of PID No. 70489349, Galloway Street, Moncton, NB (March 31, 2022).

Photo 15: View of one of the commercial businesses (RPM) located south of PID No. 70489349, across Galloway Street, Moncton, NB (March 31, 2022).

Appendix C
Aerial Photographs

ENGLOBE

ENGLOBE	Project No. 2200406 Date: June 2022 Scale: Unknown	1944 Aerial Photograph Phase I Environmental Site Assessment PID No. 70489349 and a portion of PID No. 70502919	Plate C-1



eNGLOBe	Project No. 2200406 Date: June 2022 Scale: Unknown	1953 Aerial Photograph Phase I Environmental Site Assessment PID No. 70489349 and a portion of PID No. 70502919	Plate C-2

ENGLOBE	Project No. 2200406 Date: June 2022 Scale: Unknown	1963 Aerial Photograph Phase I Environmental Site Assessment PID No. 70489349 and a portion of PID No. 70502919	Plate C-3

ENGLOBE	Project No. 2200406 Date: June 2022 Scale: Unknown	1976 Aerial Photograph Phase I Environmental Site Assessment No. 70489349 and a portion of PID No. 70502919	Plate C-4

ENGLOBE	Project No. 2200406 Date: June 2022 Scale: Unknown	1982 Aerial Photograph Phase I Environmental Site Assessment PID No. 70489349 and a portion of PID No. 70502919	Plate C-5

eNGLOBe	Project No. 2200406 Date: June 2022 Scale: 1:12,500	2001 Aerial Photograph Phase I Environmental Site Assessment PID No. 70489349 and a portion of PID No. 70502919	Plate C-6

ENGLOBE	Project No. 2200406 Date: June 2022 Scale: Unknown	2011 Aerial Photograph Phase I Environmental Site Assessment PID No. 70489349 and a portion of PID No. 70502919	Plate C-7

ENGLOBE	Project No. 2200406 Date: June 2022 Scale: Not to scale	2017 Aerial Photograph Phase I Environmental Site Assessment PID No. 70489349 and a portion of PID No. 70502919	Plate C-8

Appendix D
NBDELG Response

ENGLOBE

New Nouveau Brunswick
CANADA

March 15, 2022
File No.: 100-05-R3

Englobe Corp.
1077 St George Blvd.
Moncton, NB E1E 4C9
Attention: Taylor McGregor

RE: PID#: 70502919, 70489349 & 70375779

In response to your request for property-based environmental information regarding the above noted properties, please be advised that a search of related departmental electronic databases has been conducted *with the information provided*, and the following information was found.

There is no record of Ministerial Orders or Remediation Orders related to these PID numbers, using our current search process.

Petroleum storage tank information related to **PID# 70375779** is attached. With respect to the remaining PID numbers, our records indicate that there are no petroleum storage tanks registered with the Department, under the Petroleum Product Storage and Handling Regulation.

Our records indicate that there has been contamination found at **45 Galloway St., Moncton, Caledonia Waste Oil Enterprises Ltd. (PID# 70375779)**. See attached information report.

These PID numbers are not registered with the Department as a PCB Storage site.

We have no records of landfill sites or former dumpsites located near these PID numbers.

The absence of departmental records in this search does not necessarily indicate that the sites have not been subject to environmental incidents. The information is accurate in that it provides a factual reflection of what is contained in departmental databases. The files themselves may or may not be complete.

As an example, in the case of underground petroleum storage tanks, the files accurately reflect all those that were registered with the program; there may be underground storage tanks that were not registered and of which the Department has no knowledge.

Likewise, there may be incidents of spills of which the Department was not informed or which pre-date Departmental records. "Remediation Site Management System" was established in the early 2000's and does not contain a complete history of past spills or remediation efforts. Furthermore, if the properties have been recently altered, the PID#'s provided may not correspond with those contained in departmental files and thus on the databases.

Any persons intending to purchase or occupy the property should make their own independent determination of the environmental condition of the property and the extent of responsibility and liability, if any, that may arise from taking ownership or occupancy.

Authorizations Branch

Enclosures: 2

/lr

Petroleum Storage
(PID 70375779)

PID #: 70375779 Site #: 6002 Address: GFL ENVIRONMENTAL INC
45 GALLOWAY STREET
MONCTON

Tank Information

Current Status	Active
Date Out of Service	
Installation Date	1988
Tank Size	85000 L
Location	Above Ground
Constructed Of	Steel
Substance Stored	Waste Oil

Current Status	Active
Date Out of Service	
Installation Date	1988
Tank Size	85000 L
Location	Above Ground
Constructed Of	Steel
Substance Stored	Waste Oil

Current Status	Active
Date Out of Service	
Installation Date	1988
Tank Size	15890 L
Location	Under Ground
Constructed Of	Single Wall Steel
Substance Stored	Separator

Current Status	Active
Date Out of Service	
Installation Date	1991
Tank Size	45460 L
Location	Above Ground
Constructed Of	Steel
Substance Stored	Waste Oil

Current Status	Removed
Date Out of Service	
Installation Date	1992
Tank Size	113500 L
Location	Above Ground
Constructed Of	Single Wall Steel
Substance Stored	Waste Oil

Current Status	Removed
Date Out of Service	
Installation Date	1992
Tank Size	113500 L
Location	Above Ground
Constructed Of	Single Wall Steel
Substance Stored	Waste Oil

Current Status	Active
Date Out of Service	
Installation Date	1992
Tank Size	45400 L
Location	Above Ground
Constructed Of	Single Wall Steel
Substance Stored	Waste Oil

Current Status	Active
Date Out of Service	
Installation Date	1995
Tank Size	136000 L
Location	Above Ground
Constructed Of	Single Wall Steel
Substance Stored	Waste Oil

Current Status	Active
Date Out of Service	
Installation Date	1995
Tank Size	136000 L
Location	Above Ground
Constructed Of	Single Wall Steel
Substance Stored	Waste Oil

Current Status	Active
Date Out of Service	
Installation Date	1988
Tank Size	908 L
Location	Above Ground
Constructed Of	Single Wall Steel
Substance Stored	Furnace Oil

Current Status	Active
Date Out of Service	
Installation Date	1988
Tank Size	4540 L
Location	Above Ground
Constructed Of	Single Wall Steel
Substance Stored	Furnace Oil

Current Status	Active
Date Out of Service	
Installation Date	2002
Tank Size	22500 L
Location	Under Ground
Constructed Of	Single Wall Steel
Substance Stored	Separator

Remediation Management
(PID 70375779)

FILE	**6515-3-0893**
PID	70375779
SITENAME	Caledonia Waste Oil Enterprises Ltd.
CIVIC ADDRESS	45 Galloway St., Moncton
FILE OPENED	4/9/2003
FILE STATUS	Open
CONTAMINATION TYPE	Petroleum
PARTY RESPONSIBLE	Property Owner
CONSULTANT	Jacques Whitford Environment Ltd
ORDERS ISSUED	No
RESULT TYPE	Source PID

englobecorp.com

Appendix F Traffic Impact Study

Distribution Facility Traffic Study

Moncton, New Brunswick

Ruedebusch Development & Construction
Traffic Impact Study

June 15, 2022
02200406.000

Ruedebusch Development & Construction

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Revisions and publications log

REVISION No.	DATE	DESCRIPTION
0A	May 27, 2022	Preliminary version published for comments
0B	June 15, 2022	Version for review by the City

Summary

Ruedebusch Development & Construction is planning to develop a property on Galloway Street within the Caledonia Industrial Park in Moncton, NB into a distribution facility. The site plan has not been finalized at the time of writing but is intended to include a 9,287 square metre building (356 square metre office, 8931 square metre warehouse) with accommodation for vehicle and tractor-trailer movements and parking. If approval is granted by the City to proceed with the development, construction is estimated to be complete in 2023. Impacts of this development were analyzed for a horizon year of 2028, 5 years beyond full buildout.

TRAFFIC VOLUMES

Traffic volumes were provided by the City of Moncton for the Harrisville Blvd. @ TCH EB Ramps, Harrisville Blvd. @ MacNaughton Ave., and Elmwood Dr. @ Caledonia Rd. intersections. Our team collected AM and PM peak hour turning movement counts at the Harrisville Blvd. @ Trans-Canada Highway (TCH) WB Ramps and Harrisville Blvd. @ Frenette Ave. intersections on March 16, 2022.

Construction of the proposed development is expected to be complete in 2023, so the horizon year for this analysis was 2028. The future background traffic volumes in 2028 were estimated by applying a 2.0% annual growth rate to the 2022 volumes and adding traffic volumes provided by the City for known nearby developments. The distribution operator provided trip generation rates for the site, subdivided by vehicle type (cars, vans, and trailers). The proposed development would generate 148 trips (71 in / 77 out) during the AM Peak period and 95 trips (52 in / 43 out) during the PM Peak period at full buildout. The development volumes were added to the background volumes to estimate the 2028 traffic conditions with the development in place.

LOS RESULTS

The Study Team completed LOS analyses for the existing 2022 conditions, the 2028 background conditions, and the projected 2028 conditions with the proposed development.

2022 Existing Conditions

The analysis revealed that all of the intersections operate at a good to excellent LOS (LOS A to C) overall, with few movements with capacity or delay issues. Notable movements include the **Harrisville Blvd. @ TCH WB Ramps** westbound left turn lane operating at LOS F during both periods (albeit at very low traffic volumes) and the **Elmwood Drive @ Caledonia Road** westbound left turn lane operating at LOS F during the PM peak with a v/c ratio of 1.03.

2028 Background Conditions

Signal timings for the three signalized intersections were optimized for the increased traffic volumes, as required. Most of the intersections still operate fairly well under the increased background volumes, with a few exceptions.

The **Harrisville Blvd. @ TCH WB Ramps** intersection operates at a LOS F during both periods due to the increase in westbound left turning traffic (due to the other background development) and increased conflicts between southbound thru and northbound left turn volumes in the PM peak.

The **Harrisville Blvd. @ TCH EB Ramps** intersection will operate at LOS D during the AM peak, with three movements having v/c ratios above 0.90 (eastbound thru/right, northbound thru/right, southbound left).The northbound thru/right and southbound left movements will operate at LOS E during the AM peak.

The **Elmwood Drive @ Caledonia Road** intersection will operate at LOS D during the PM peak, with four movements operating with a v/c ratio above 0.90 (eastbound thru/right, westbound left, westbound right, northbound thru). The northbound thru/right and westbound left movements will operate at LOS E.

2027 Projected Conditions (With Development)

Generally, the addition of the development traffic increased delays slightly over the 2028 background conditions, with a few movements that were already near or over capacity in under the background traffic exhibiting comparably more variation. Overall, the projected development traffic does not have a significant impact on the operation of the network.

RECOMMENDED IMPROVEMENTS

As noted during the LOS analysis, the intersections of **Harrisville Blvd. @ TCH EB Ramps** and **Elmwood Drive @ Caledonia Road** will require signal timing improvements in order to achieve reasonable levels of service for the 2028 background conditions. Further improvements at these intersections may be merited to rectify specific capacity issues created by the background traffic growth, with some options to address background conditions discussed.

The intersection of **Harrisville Blvd. @ TCH WB Ramps** will require some form of traffic control upgrade in order to support the 2028 background conditions. The TAC Signal Warrant analysis was used to identify that traffic signals will be warranted in 2028 based on the background volumes. The intersection can operate well with traffic signals and the existing lane configuration, but queues may spillback to the upstream intersections on Harrisville Blvd. during the PM Peak period. A single-lane roundabout may also be viable, though installing a roundabout under these conditions will also come with challenges (geometric, long combination vehicles, etc.). The City may wish to conduct a more detailed study of the design options for this intersection to support the background traffic growth.

ADDITIONAL CONSIDERATIONS

The truck route to/from the site will be through the Harrisville Blvd. corridor, and the project will provide legal, safe, and physical access for ingress and egress for traffic movements. The province allows a Type A or Type B tractor pulling two 28-foot trailers (doubles) to access the site but does not allow for triples under current long combination vehicle guidelines.

The proposed site plan provides greater parking supply than required by City of Moncton bylaws (254 spaces planned; 53 spaces required). Further, the plan includes more barrier-free parking spaces (8) than required for a parking lot with 201-300 spaces (5) under Provincial regulation.

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1 Introduction

1.1 Background

Ruedebusch Development & Construction is planning to develop a property on Galloway Street within the Caledonia Industrial Parc in Moncton, NB into a distribution facility. The site plan (Appendix A) includes a 9,287 square metre building (356 square metre office, 8931 square metre warehouse) with accommodation for vehicle and tractor-trailer movements and parking.

Englobe Corp. was hired by Ruedebusch Development & Construction to complete the preliminary due diligence engineering and detailed engineering required for the development; this scope of work includes the Traffic Impact Study (TIS), which is detailed in this report. Through discussions with the facility operator and the City of Moncton, the scope of work for this TIS includes:

- Operational analysis at the intersections of the Harrisville Blvd. intersections with the TCH EB/WB ramps, McNaughton Ave., and Frenette Ave., and the Elmwood Dr. @ Caledonia Rd. / Trans-Canada WB Ramps intersection; and
- Turning movement analysis at the intersections on the route between the proposed facility and the Harrisville Blvd. @ TCH ramps (EB and WB) for WB-21, 28’ double, and 28’ triple trailer combinations.

The Study Area is shown below in Figure 1.

Figure 1: Study Area

1.2 Study Tasks

The main objective of this TIS was to estimate how much additional traffic the development would create and determine what impact, if any, the development traffic would have on the adjacent streets and intersections. The following activities were undertaken as part of this TIS:

- Englobe staff visited the study area to document the character of the roadway and access location, and to collect AM and PM traffic volumes at the Harrisville Blvd. @ Trans-Canada Highway (TCH) WB Ramps and Harrisville Blvd. @ Frenette Ave. intersections;
- Existing information was collected and reviewed, including a copy of the proposed development site plan, information on other developments in the area, and traffic data and signal timings for the Harrisville Blvd. @ TCH EB Ramps, Harrisville Blvd. @ MacNaughton Ave., and Elmwood Dr. @ Caledonia Rd. intersections (supplied by the City of Moncton);
- Future 2028 background volumes (5-year horizon from 2023 buildout) were estimated by applying a 2.0% growth rate;
- Future traffic generated by the proposed development were provided by the distribution operator and added to the 2028 background volumes to determine the traffic conditions with the development in place;
- LOS analyses were completed for the 2022 existing conditions, 2028 background conditions, and the 2028 future conditions with development;
- Recommendations were developed for improvements to the study area to support the background traffic growth;
- The truck route to/from the development was reviewed for the safe and efficient movement of trucks; and
- The methodology, findings, and recommendations of the TIS were documented in this report.

1.3 Study Methodology

The TIS was completed in accordance with the City of Moncton's 2022 (DRAFT) Traffic Impact Study Guidelines.

Traffic conditions were modelled using Synchro 11, which is a traffic analysis software package that uses the Highway Capacity Manual and Intersection Capacity Utilization procedures.

The study was conducted for a horizon year 5 years past the anticipated buildout of the development.

The intersection performance was evaluated mainly in terms of the level of service (LOS), which is a common performance measurement of an intersection. The LOS is determined based on vehicle delay and is expressed on a scale of A through F, where LOS A represents very short delays and LOS F represents very long delays. A LOS D is often considered acceptable in urban locations; however, some jurisdictions will accept a LOS E. The LOS Criteria for signalized intersections, stop-controlled intersections, and roundabouts are shown in Table 1.

Table 1: Level of Service Definitions

LOS	LOS Description	Control Delay (Seconds Per Vehicle)	
		Signalized	Stop Controlled / Roundabout
A	Very low delay; most vehicles do not stop (**Excellent**)	less than 10.0	less than 10.0
B	Higher delay; more vehicles stop (**Very Good**)	between 10.0 and 20.0	between 10.0 and 15.0
C	Higher level of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping (**Good**)	between 20.0 and 35.0	between 15.0 and 25.0
D	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; many vehicles stop (**Satisfactory**)	between 35.0 and 55.0	between 25.0 and 35.0
E	Vehicles must often wait through more than one red light; considered by many agencies to be the **Limit of Acceptable Delay**	between 55.0 and 80.0	between 35.0 and 50.0
F	This level is considered to be unacceptable to most drivers; occurs when arrival flow rates exceed the capacity of the intersection (**Unacceptable**)	greater than 80.0	greater than 50.0

2 Information Gathering

2.1 Existing Traffic Counts

The Study Team collected AM and PM peak hour turning movement counts at the Harrisville Blvd. @ Trans-Canada Highway (TCH) WB Ramps and Harrisville Blvd. @ Frenette Ave. intersections on March 16, 2022. Traffic counts and signal timings for the remaining intersections (Harrisville Blvd. @ TCH EB Ramps, Harrisville Blvd. @ MacNaughton Ave., and Elmwood Dr. @ Caledonia Rd.) were provided by the City of Moncton. The traffic counts collected by our team are provided in Appendix B.

2.2 Existing Streets and Intersections

Harrisville Boulevard is a collector roadway that connects the Caledonia Industrial Park to the TCH and Moncton/Dieppe. Harrisville Blvd. has a varied cross section through the study area; it is predominantly a 4-lane divided roadway but has a 2-lane undivided cross section near the intersection with Frenette Ave. and to the south of the intersection with the TCH WB Ramps. Within the study area, Harrisville Blvd. has curb and gutter, and no pedestrian or bicycle facilities.

The **Trans-Canada Highway** (TCH / Provincial Route 2) is an arterial freeway that, broadly speaking, connects the Moncton area to the rest of Canada. Within the study area the TCH has controlled access ramps that connect the freeway to Harrisville Blvd. and Elmwood Dr.

MacNaughton Avenue / Caledonia Road is an industrial collector roadway that spans the Caledonia Industrial Park, connecting Elmwood Dr. to Harrisville Blvd, and provides access to numerous industrial lots. The roadway has a 2-lane cross section, curb and gutter, and bicycle lanes on both sides of the roadway.

Frenette Avenue is an industrial collector roadway that spans the north end of the Caledonia Industrial Park, providing access to numerous industrial properties and local roads. The roadway has a 2-lane cross section with curb and gutter. There are no pedestrian or bicycle facilities along Frenette Ave.

Elmwood Drive (Provincial Route 115) is a provincial collector highway that functions as an urban arterial within the study area, connecting communities to the north of Moncton into the downtown core. Elmwood Dr. has a 4-lane cross section through the study area, with added turning lanes at intersections, and curb and gutter. There is sidewalk along the entire west side of the roadway through the study area, and on the east side only to the north of the intersection with Caledonia Rd.

The **Harrisville Blvd. @ TCH EB Ramps** intersection is a signalized 4-leg intersection with no pedestrian facilities. The northbound approach has a shared thru/right turn lane, the southbound approach has separate thru and left turn lanes, and the eastbound approach is flared to allow separate queuing of left and right turning traffic. There is no westbound traffic into or out of the intersection due to the configuration of the TCH interchange with Harrisville Blvd.

The **Harrisville Blvd. @ TCH WB Ramps** intersection is a 4-leg intersection with minor road stop control on the ramps. The northbound and southbound approaches have separate thru and turning lanes (northbound left turn, southbound right turn). The westbound approach is flared to allow separate queuing of right and left turning traffic. There is no eastbound traffic into or out of the intersection due to the configuration of the TCH interchange with Harrisville Blvd. There are no pedestrian facilities at this intersection.

The **Harrisville Blvd. @ MacNaughton Ave.** intersection is a signalized 4-leg intersection with pedestrian crosswalks and signal heads across the west and north legs. The northbound approach has a left turn lane, thru lane, and shared thru / right turn lane; the southbound approach has a shared left turn / thru lane and shared thru / right turn lane; and the eastbound and westbound approaches both have a left turn lane and shared thru / right turn lane.

The **Harrisville Blvd. @ Frenette Ave.** intersection is a 3-leg intersection with minor road stop control on Harrisville Blvd. All approaches to the intersection have a single shared lane for all movements. There are no pedestrian facilities and the intersection.

The **Elmwood Dr. @ Caledonia Rd. / TCH WB Ramps** intersection is a signalized 4-leg intersection with pedestrian crosswalks and signal heads across the west and north legs. The northbound and southbound approaches both have a left turn lane, two thru lanes, and a channelized right turn lane. The westbound approach has a left turn lane and shared thru / right turn lane with turn channelization just before the intersection. The eastbound approach has a single shared lane with right turn channelization just before the intersection.

2.3 Planned Future Development

The City provided a TIS for a planned development on the southeast corner of the Harrisville Blvd. @ TCH interchange for inclusion in the background traffic for this study. Other potential future development is accounted for through applying a background growth rate of 2.0% per year.

3 Existing Traffic Conditions

3.1 Existing (2022) Traffic Volumes

Within the Harrisville Blvd. corridor, our team had unfactored 2022 traffic counts for all intersections except for Harrisville Blvd. @ MacNaughton Ave. (2017). 2022 volumes for the Harrisville Blvd. @ MacNaughton Ave. intersection were estimated by balancing the traffic volumes at this intersection with the 2022 counts from the TCH ramp intersections. The volumes collected at Harrisville Blvd. and Frenette Ave. were not adjusted.

A 2.0% linear growth rate was applied to the 2021 factored traffic volumes provided by the City for the intersection of Elmwood Dr. @ Caledonia Rd. / TCH WB Ramps to determine the baseline 2022 traffic volumes for this intersection. No additional adjustment was made to this traffic count.

The combined 2022 baseline volumes are shown below in Figure 2.

Figure 2: 2022 Existing Traffic Volumes

3.2 Existing (2022) LOS Analysis

A level of service (LOS) analysis was completed for the existing 2022 traffic conditions. The analysis revealed that all of the intersections operate at a good to excellent LOS (LOS A to C) overall, with few movements with capacity or delay issues. Notable movements include the **Harrisville Blvd. @ TCH WB Ramps** westbound left turn lane operating at LOS F during both periods (albeit at very low traffic volumes) and the **Elmwood Drive @ Caledonia Road** westbound left turn lane operating at LOS F during the PM peak with a v/c ratio of 1.03.

The LOS results for the 2022 existing conditions are summarized in Table 2 with detailed LOS results in Appendix C.

Table 2: 2022 Existing Conditions LOS Results

Intersection			Overall LOS // Delay (sec/veh)	Movement LOS // Average Delay (sec/veh) // [Volume to Capacity Ratio (v/c)] // 95th Percentile Queue (m)												
				Eastbound			Westbound			Northbound			Southbound		
Main Street @ Minor Street	Traffic Control	Peak Period		L	T	R	L	T	R	L	T	R	L	T	R
Harrisville Blvd. @ Frenette Avenue	STOP	AM	LOS A 4.8	-	Free Flow [0.07] <1	Shared	Shared	A 3.0 [0.03] <1	-	B 10.3 [0.17] 5	-	Shared	-	-	-
		PM	LOS A 5.4	-	Free Flow [0.09] <1	Shared	Shared	A 6.8 [0.12] 3	-	B 12.1 [0.14] 4	-	Shared	-	-	-
Harrisville Blvd. @ McNaughton Avenue		AM	LOS B 17.6	C 24.7 [0.08] 8	B 12.0 [0.24] 9	Shared	D 47.0 [0.78] 76	B 18.9 [0.26] 24	Shared	B 10.5 [0.32] 37	A 6.3 [0.26] 27	Shared	Shared	B 18.3 [0.16] 17	Shared
		PM	LOS B 16.5	C 21.8 [0.03] 5	A 6.5 [0.53] <1	Shared	D 54.2 [0.73] 47	B 17.3 [0.06] 7	Shared	B 11.1 [0.21] 17	A 6.3 [0.14] 14	Shared	Shared	C 20.9 [0.41] 50	Shared
Harrisville Blvd. @ TCH WB Ramps	STOP	AM	LOS A 5.5	-	-	-	**F 75.5 [0.07] 2**	Shared	C 20.0 [0.55] 26	B 10.2 [0.35] 13	Free Flow [0.36] <1	Shared	Shared	Free Flow [0.20] <1	Free Flow [0.10] <1
		PM	LOS A 8.1	-	-	-	**F 237.5 [0.36] 8**	Shared	B 10.3 [0.18] 5	D 27.4 [0.75] 53	Free Flow [0.12] <1	Shared	Shared	Free Flow [0.38] <1	Free Flow [0.27] <1
Harrisville Blvd. @ TCH EB Ramps		AM	LOS C 20.6	Shared	D 43.0 [0.67] 83	A 9.0 [0.67] <1	-	-	-	-	C 27.8 [0.80] 130	Shared	B 10.9 [0.53] 15	A 6.3 [0.15] 16	-
		PM	LOS B 16.3	Shared	C 32.2 [0.44] 46	A 7.9 [0.56] 20	-	-	-	-	C 26.3 [0.74] 108	Shared	A 9.5 [0.49] 19	A 8.2 [0.39] 37	-
Elmwood Drive @ Caledonia Road / TCH WB Ramps		AM	LOS B 15.3	C 21.7 [0.42] 37	A 1.4 [0.30] <1	Shared	B 19.9 [0.31] 26	C 34.2 [0.37] 26	A 9.8 [0.58] 11	B 11.2 [0.30] 15	C 21.4 [0.36] 39	A 6.2 [0.68] <1	B 14.5 [0.54] 24	C 24.1 [0.61] 75	A 4.4 [0.31] 12
		PM	LOS C 33.7	C 25.9 [0.45] 46	B 17.8 [0.62] 44	Shared	**F 84.4 [1.03] 89**	D 45.0 [0.49] 56	C 29.6 [0.82] 66	C 34.7 [0.76] 53	D 38.5 [0.86] 210	A 9.1 [0.26] 18	B 18.5 [0.35] 17	C 32.6 [0.70] 129	A 4.7 [0.47] 14

4 Future Background Traffic Conditions

4.1 Background (2028) Traffic Volumes

A 2.0% annual linear growth factor was used to inflate the 2022 existing traffic volumes to the anticipated 2028 background traffic volumes without the new development. The development volumes for nearby projects provided by the City were also included. The 2028 background traffic volumes are shown in Figure 3.

Figure 3: 2028 Background Traffic Volumes

4.2 Background (2028) LOS Analysis

A LOS analysis was completed for the background 2028 traffic conditions. Signal timings for the three signalized intersections were optimized for the increased traffic volumes, as required. Most of the intersections still operate fairly well under the increased background volumes, with a few exceptions.

The **Harrisville Blvd. @ TCH WB Ramps** intersection operates at a LOS F during both periods due to the increase in westbound left turning traffic (due to the other background development) and increased conflicts between southbound thru and northbound left turn volumes in the PM peak.

The **Harrisville Blvd. @ TCH EB Ramps** intersection will operate at LOS D during the AM peak, with three movements having v/c ratios above 0.90 (eastbound thru/right, northbound thru/right, southbound left).The northbound thru/right and southbound left movements will operate at LOS E during the AM peak.

The **Elmwood Drive @ Caledonia Road** intersection will operate at LOS D during the PM peak, with four movements operating with a v/c ratio above 0.90 (eastbound thru/right, westbound left, westbound right, northbound thru). The northbound thru/right and westbound left movements will operate at LOS E.

The LOS results for the 2028 background conditions are summarized in Table 3. Detailed Synchro analysis outputs are included in Appendix C.

Table 3: 2028 Background Conditions LOS Results

Intersection			Overall LOS // Delay (sec/veh)	Movement LOS // Average Delay (sec/veh) // [Volume to Capacity Ratio (v/c)] // 95th Percentile Queue (m)											
				Eastbound			Westbound			Northbound			Southbound		
Main Street @ Minor Street	Traffic Control	Peak Period		L	T	R	L	T	R	L	T	R	L	T	R
Harrisville Blvd. @ Frenette Avenue	STOP	AM	LOS A 4.9	-	Free Flow [0.08] <1	Shared	Shared	A 3.0 [0.03] <1	-	B 10.6 [0.20] 6	-	Shared	-	-	-
		PM	LOS A 5.6	-	Free Flow [0.10] <1	Shared	Shared	A 6.9 [0.14] 4	-	B 12.9 [0.17] 5	-	Shared	-	-	-
Harrisville Blvd. @ McNaughton Avenue		AM	LOS B 19.2	C 24.2 [0.08] 8	B 12.3 [0.24] 10	Shared	D 49.5 [0.82] 89	B 19.0 [0.26] 28	Shared	B 12.4 [0.38] 42	A 7.8 [0.30] 33	Shared	Shared	C 20.4 [0.18] 19	Shared
		PM	LOS B 18.7	C 21.8 [0.02] 5	A 6.7 [0.54] 2	Shared	D 51.0 [0.71] 58	B 16.7 [0.06] 8	Shared	B 13.5 [0.30] 18	A 7.3 [0.17] 15	Shared	Shared	C 26.5 [0.53] 58	Shared
Harrisville Blvd. @ TCH WB Ramps	STOP	AM	LOS F 1170.7	-	-	-	F Error [10.69] Error	Shared	D 31.5 [0.72] 45	B 11.7 [0.45] 19	Free Flow [0.41] <1	Shared	Shared	Free Flow [0.23] <1	Free Flow [0.11] <1
		PM	LOS F Error	-	-	-	F Error [Error] Error	Shared	B 10.7 [0.21] 6	F 99.4 [1.10] 142	Free Flow [0.14] <1	Shared	Shared	Free Flow [0.43] <1	Free Flow [0.30] <1
Harrisville Blvd. @ TCH EB Ramps		AM	LOS D 53.4	D 46.7 [0.66] 75	D 50.4 [0.97] 148	Shared	D 45.9 [0.26] 11	-	A 7.7 [0.27] <1	-	E 66.0 [1.01] 271	Shared	E 77.7 [0.99] 69	A 8.1 [0.17] 24	-
		PM	LOS B 18.6	D 37.7 [0.51] 40	B 11.0 [0.65] 35	Shared	D 50.6 [0.45] 22	-	A 8.3 [0.48] <1	-	C 28.5 [0.79] 131	Shared	B 17.7 [0.69] 28	A 8.3 [0.42] 41	-
Elmwood Drive @ Caledonia Road / TCH WB Ramps		AM	LOS B 17.1	C 23.0 [0.48] 42	A 1.8 [0.35] <1	Shared	C 20.9 [0.37] 29	C 35.0 [0.41] 28	A 9.8 [0.62] 12	B 13.1 [0.40] 17	C 21.9 [0.39] 45	A 6.6 [0.72] <1	B 17.0 [0.62] 28	C 28.8 [0.75] 88	A 4.7 [0.36] 12
		PM	LOS D 40.8	D 49.7 [0.77] 59	E 55.5 [0.93] 92	Shared	E 66.4 [0.96] 111	D 42.3 [0.44] 62	D 46.9 [0.90] 120	D 46.9 [0.85] 64	D 46.4 [0.94] 222	A 7.9 [0.28] 18	C 22.6 [0.45] 16	D 35.8 [0.75] 143	A 4.4 [0.50] 13

5 Future Traffic Conditions with Development

Traffic generation for the proposed distribution facility was estimated and assigned to the background traffic volumes to determine the 2028 total traffic volumes with full buildout of the development in place. The methodology and assumptions applied for the development traffic are discussed in this section.

5.1 Traffic Generation

The distribution operator provided an estimate of the daily passenger vehicle, van, and trailer traffic that will flow to and from their facility, subdivided into 30-minute intervals (Appendix D). The data corresponding to the AM and PM peak hours for the road network were identified and are summarized in Table 4. This data represents a highly reliable trip generation resource based on planned shift patterns and shipping logistics.

Table 4: Traffic Generation for the Proposed Development

Vehicle Type	AM Peak Hour			PM Peak Hour			Daily
	In	Out	Total	In	Out	Total	Total
Cars	71	12	83	0	43	43	652
Vans	0	65	65	12	0	13	343
Trailers	0	0	0	40	0	40	89
Total	**71**	**77**	**148**	**52**	**43**	**95**	**1,073**

5.2 Traffic Assignment

Traffic assignment to/from the proposed development was separately for each class of vehicle travelling to/from the site. It was assumed that:

- Car trips would follow the general pattern of background traffic entering/exiting the Caledonia Industrial Park area;
- Van trips would be distributed based on the fastest access routes to/from potential drop-off and pickup destinations; and
- Trailer trips would be to/from the Trans Canada Highway ramps on Harrisville Blvd., evenly split between eastbound and westbound.

Figure 4 illustrates how the development traffic was added to the study area.

Figure 4: Projected Development Traffic

5.3 Projected (2028) Traffic Volumes

The development traffic was added to the 2028 background volumes to create the projected (2028) traffic volumes illustrated in Figure 5.

Figure 5: 2028 Projected Traffic Volumes

5.4 Projected (2028) LOS Analysis

A LOS analysis was completed for the projected 2028 traffic conditions with the development in place. Generally, the addition of the development traffic increased delays slightly over the 2028 background conditions, with a few movements that were already near or over capacity in under the background traffic exhibiting comparably more variation. Overall, the projected development traffic does not have a significant impact on the operation of the network.

The LOS results for the total future 2027 conditions are summarized in Table 5. Detailed Synchro analysis outputs are included in Appendix C.

Table 5: 2028 Projected Conditions LOS Results

Intersection			Overall LOS // Delay (sec/veh)	Movement LOS // Average Delay (sec/veh) // [Volume to Capacity Ratio (v/c)] // 95th Percentile Queue (m)												
				Eastbound			Westbound			Northbound			Southbound		
Main Street @ Minor Street	Traffic Control	Peak Period		L	T	R	L	T	R	L	T	R	L	T	R
Harrisville Blvd. @ Frenette Avenue	STOP	AM	LOS A 5.3	-	Free Flow [0.12] <1	Shared	Shared	A 3.1 [0.04] <1	-	B 11.8 [0.28] 9	-	Shared	-	-	-
		PM	LOS A 6.6	-	Free Flow [0.13] <1	Shared	Shared	A 7.0 [0.15] 4	-	C 15.5 [0.30] 10	-	Shared	-	-	-
Harrisville Blvd. @ McNaughton Avenue		AM	LOS B 19.6	C 24.2 [0.08] 8	B 12.3 [0.24] 10	Shared	D 49.5 [0.82] 89	B 19.0 [0.26] 28	Shared	B 12.6 [0.39] 42	A 8.9 [0.32] 39	Shared	Shared	C 21.5 [0.25] 25	Shared
		PM	LOS B 19.0	C 21.8 [0.02] 5	A 7.3 [0.54] 4	Shared	D 51.0 [0.71] 58	B 16.7 [0.06] 8	Shared	B 13.6 [0.31] 18	A 8.1 [0.19] 18	Shared	Shared	C 27.0 [0.56] 60	Shared
Harrisville Blvd. @ TCH WB Ramps	STOP	AM	LOS F 1113.9	-	-	-	F Error [8.00] Error	Shared	E 37.4 [0.78] 54	B 12.6 [0.48] 22	Free Flow [0.43] <1	Shared	Shared	Free Flow [0.25] <1	Free Flow [0.13] <1
		PM	LOS F Error	-	-	-	F Error [Error] Error	Shared	B 11.2 [0.25] 8	F 118.0 [1.15] 156	Free Flow [0.16] <1	Shared	Shared	Free Flow [0.44] <1	Free Flow [0.31] <1
Harrisville Blvd. @ TCH EB Ramps		AM	LOS E 55.5	D 52.2 [0.77] 76	D 53.9 [0.99] 137	Shared	D 42.6 [0.24] 10	-	A 8.1 [0.29] <1	-	E 68.2 [1.03] 258	Shared	E 78.4 [1.01] 68	A 7.0 [0.18] 22	-
		PM	LOS B 19.4	D 40.3 [0.59] 45	B 11.0 [0.65] 35	Shared	D 51.4 [0.46] 22	-	A 8.3 [0.48] <1	-	C 28.8 [0.80] 134	Shared	B 19.9 [0.72] 31	A 8.4 [0.43] 42	-
Elmwood Drive @ Caledonia Road / TCH WB Ramps		AM	LOS B 17.2	C 23.0 [0.48] 42	A 1.8 [0.35] <1	Shared	C 21.6 [0.41] 32	C 34.9 [0.41] 28	A 9.8 [0.62] 12	B 13.2 [0.40] 17	C 22.0 [0.39] 45	A 6.9 [0.74] <1	B 18.3 [0.65] 30	C 28.8 [0.75] 88	A 4.7 [0.36] 12
		PM	LOS D 41.9	D 49.4 [0.76] 59	E 56.9 [0.94] 94	Shared	E 76.0 [1.00] 119	D 42.2 [0.43] 62	D 48.7 [0.91] 124	D 47.0 [0.85] 64	D 46.6 [0.94] 222	A 7.9 [0.29] 18	C 23.3 [0.46] 17	D 35.9 [0.75] 143	A 4.4 [0.50] 13

6 Recommended Improvements

6.1 Signal Warrant Analysis

One of the elements identified by the City of Moncton was assessing the need for traffic signals at the **Harrisville Blvd. @ TCH WB Ramps** intersection. The LOS analysis above clearly indicated that the left turn movements during peak hours at the intersection break down under the background volumes. Confirmatory analysis was conducted using the Transportation Association of Canada's (TAC) Traffic Signal Warrant Analysis procedure.

The TAC procedure evaluates the need for traffic signals based on a summation of the total intersection conflicts over a 6-hour period that is then adjusted by several traffic composition, demographic, and local factors. The output of the procedure is a numerical score that provides a threshold for identifying the need for traffic signals (scores above 100 points generally merit signalization) and a rough prioritization for signalization between multiple intersections (higher scores generally indicate greater benefit from installing traffic signals).

The analysis for this study was conducted over a 6-hour period (7am-9am, 11am-1pm, 4pm-6pm) using the traffic data collected by our team at the intersection, the background development information provided by the City, and the traffic generation for the development. Analyses were completed for the 2022 existing conditions, 2028 background conditions, and 2028 projected conditions, with results as indicated in Table 6 and detailed in Appendix E. These results, when combined with the LOS results discussed previously, clearly indicate that traffic signals, or a comparable traffic control improvement, should be installed at the **Harrisville Blvd. @ TCH WB Ramps** to support the 2028 background conditions.

Table 6: TAC Signal Warrant Results

Traffic Conditions	TAC Warrant Score
2022 Existing	71
2028 Background	137
2028 Development	152

6.2 Intersection Improvements

As was noted in Section 4.2, the intersections of **Harrisville Blvd. @ TCH EB Ramps** and **Elmwood Drive @ Caledonia Road** will require signal timing improvements in order to achieve reasonable levels of service for the 2028 background conditions. Even with improved signal timings these intersections will have movements that are near or over capacity, which may merit a more in-depth study of alternatives for these intersections. Additionally, as discussed in the previous section, the intersection of **Harrisville Blvd. @ TCH WB Ramps** will require some form of traffic control upgrade in order to support the 2028 background conditions.

6.2.1 Harrisville Blvd. @ TCH WB Ramps

LOS analyses were conducted for this intersection being signalized under the 2028 background (Table 7) and development (Table 8) conditions (detailed results in Appendix F). The most significant challenge with implementing traffic signals is the conflict between the northbound left turn and southbound thru volumes in the PM peak. The 95th percentile queues for both movements are approaching spillback to their upstream intersections. Alternatively, the viability of a roundabout was assessed using the Region of Waterloo's Roundabout Traffic Flow Sheet, which uses the input traffic volumes to estimate the number of entry and exit lanes required based on entry and circulating volumes (see Appendix F). A single-lane roundabout, with a southbound right-turn bypass, could likely manage the traffic volumes, but a roundabout would be challenging to construct that would also support the truck/long combination vehicle traffic in the area and for the proposed development, as well as the elevation of the existing intersection compared to the surrounding land. We recommend that the City of Moncton undertake a more detailed study of intersection design options for the **Harrisville Blvd. @ TCH WB Ramps** intersection.

6.2.2 Harrisville Blvd. @ TCH EB Ramps

The primary conflict at the **Harrisville Blvd. @ TCH EB Ramps** intersection is between the northbound thru and southbound left turn movements during the AM peak period. To provide a reasonable LOS at this intersection the City would either have to:

Option A. Add an additional southbound left turn lane, make that movement protected, and add a northbound right turn lane to return some capacity to the northbound thru movement; or

Option B. Add an additional northbound thru lane.

Adding an additional northbound thru lane (**Option B**) will require either significant reconfiguration or widening of the structure over the TCH just to the north of the intersection, but this option would not require either of the turn lanes from **Option A** to be added and provides the most capacity for future growth. **Option A** would come just short of achieving the City's desired LOS for one of the northbound thru or southbound left turn movements, meaning that there would be little remaining capacity for future development. The LOS results for both options are summarized in Table 7 (background conditions) and Table 8 (with development).

6.2.3 Elmwood Drive @ Caledonia Road

The primary traffic volume conflict at the **Elmwood Drive @ Caledonia Road** intersection is between the westbound left turn and northbound thru volumes during the PM peak period, which conflict in terms of overall signal timing utilization. In order to provide the City's desired LOS at this intersection an additional northbound thru lane and additional westbound left turn lane (with protected operation) would be required. These additions are commensurate with the high traffic volumes on each movement. The LOS results for these improvements are summarized in Table 7 (background conditions) and Table 8 (with development).

Table 7: 2028 Background Conditions with Upgrades LOS Results

Intersection			Overall LOS // Delay (sec/veh)	Movement LOS // Average Delay (sec/veh) // [Volume to Capacity Ratio (v/c)] // 95th Percentile Queue (m)												
				Eastbound			Westbound			Northbound			Southbound		
Main Street @ Minor Street	Traffic Control	Peak Period		L	T	R	L	T	R	L	T	R	L	T	R
Harrisville Blvd. @ TCH WB Ramps		AM	LOS B 15.8	-	-	-	C 34.2 [0.70] 13	-	A 8.8 [0.56] 5	B 15.8 [0.75] 33	B 11.8 [0.64] 68	-	-	C 21.7 [0.61] 59	A 3.8 [0.28] 7
		PM	LOS C 33.8	-	-	-	D 49.3 [0.54] 10	-	B 11.5 [0.48] 4	D 55.0 [0.95] 164	A 3.9 [0.18] 20	-	-	D 50.2 [0.92] 146	A 5.7 [0.55] <1
Harrisville Blvd. @ TCH EB Ramps (Option A)		AM	LOS C 29.8	D 41.7 [0.58] 83	D 35.9 [0.16] 28	A 8.2 [0.67] <1	D 50.7 [0.14] 12	-	B 14.5 [0.46] <1	-	D 35.4 [0.85] 179	A 2.0 [0.13] <1	E 66.1 [0.84] 46	A 8.0 [0.17] 22	-
		PM	LOS C 23.4	C 28.3 [0.36] 32	C 26.1 [0.06] 11	A 8.1 [0.56] 24	D 42.9 [0.30] 17	-	B 13.8 [0.64] <1	-	C 34.3 [0.82] 145	A 0.1 [0.03] <1	D 44.9 [0.66] 36	B 11.5 [0.46] 56	-
Harrisville Blvd. @ TCH EB Ramps (Option B)		AM	LOS C 24.1	C 32.0 [0.47] 74	C 29.2 [0.13] 26	A 6.5 [0.62] <1	D 47.6 [0.13] 12	-	B 13.6 [0.44] <1	-	C 34.1 [0.73] 112	Shared	C 30.3 [0.78] 43	B 10.8 [0.20] 27	-
		PM	LOS B 16.8	C 22.8 [0.33] 29	C 21.4 [0.06] 10	A 7.0 [0.53] 22	D 36.9 [0.28] 16	-	B 12.7 [0.62] <1	-	C 24.9 [0.58] 63	Shared	B 14.9 [0.61] 33	B 13.0 [0.50] 56	-
Elmwood Drive @ Caledonia Road / TCH WB Ramps		AM	LOS B 17.4	C 23.0 [0.48] 42	A 3.3 [0.40] 4	Shared	C 34.4 [0.34] 21	C 35.0 [0.41] 28	A 9.8 [0.62] 12	B 13.1 [0.40] 17	C 20.3 [0.27] 29	A 6.6 [0.72] <1	B 16.7 [0.61] 28	C 28.8 [0.75] 88	A 4.7 [0.36] 12
		PM	LOS C 32.8	D 36.8 [0.64] 55	C 33.2 [0.80] 66	Shared	D 52.8 [0.72] 57	D 39.5 [0.45] 58	D 39.2 [0.88] 94	D 46.3 [0.82] 73	C 29.0 [0.64] 126	A 4.6 [0.27] 10	B 18.7 [0.38] 18	D 40.3 [0.82] 159	A 5.1 [0.52] 14

Table 8: 2028 Projected Conditions with Upgrades LOS Results

Intersection			Overall LOS // Delay (sec/veh)	Movement LOS // Average Delay (sec/veh) // [Volume to Capacity Ratio (v/c)] // 95th Percentile Queue (m)											
				Eastbound			Westbound			Northbound			Southbound		
Main Street @ Minor Street	Traffic Control	Peak Period		L	T	R	L	T	R	L	T	R	L	T	R
Harrisville Blvd. @ TCH WB Ramps		AM	LOS B 16.9	-	-	-	D 35.9 [0.71] 14	-	B 11.6 [0.61] 9	B 18.3 [0.78] 33	B 12.1 [0.66] 73	-	-	C 22.5 [0.66] 65	A 3.6 [0.31] 7
		PM	LOS C 34.7	-	-	-	E 56.0 [0.57] 12	-	B 12.5 [0.53] 3	D 54.5 [0.94] 178	A 3.8 [0.19] 22	-	-	D 53.4 [0.92] 158	A 6.9 [0.57] 4
Harrisville Blvd. @ TCH EB Ramps (Option A)		AM	LOS C 31.9	D 43.8 [0.62] 87	D 36.7 [0.16] 28	A 8.4 [0.68] <1	D 51.4 [0.14] 12	-	B 14.7 [0.47] <1	-	D 35.6 [0.86] 187	A 2.0 [0.12] <1	E 76.3 [0.91] 52	A 8.0 [0.19] 25	-
		PM	LOS C 24.1	C 29.4 [0.42] 37	C 26.2 [0.06] 11	A 8.8 [0.57] 26	D 43.1 [0.30] 17	-	B 13.9 [0.64] <1	-	C 34.8 [0.83] 152	A 0.1 [0.03] <1	D 46.1 [0.68] 37	B 11.7 [0.47] 58	-
Harrisville Blvd. @ TCH EB Ramps (Option B)		AM	LOS C 25.4	C 34.2 [0.50] 79	C 30.6 [0.13] 26	A 6.7 [0.63] <1	D 49.1 [0.13] 12	-	B 13.9 [0.45] <1	-	D 35.3 [0.75] 116	Shared	C 33.9 [0.81] 50	B 10.7 [0.21] 30	-
		PM	LOS B 17.2	C 23.7 [0.38] 33	C 21.6 [0.06] 10	A 7.6 [0.54] 24	D 37.2 [0.28] 16	-	B 12.7 [0.62] <1	-	C 25.1 [0.59] 64	Shared	B 15.4 [0.63] 34	B 13.1 [0.51] 57	-
Elmwood Drive @ Caledonia Road / TCH WB Ramps		AM	LOS B 17.6	C 23.0 [0.48] 42	A 3.6 [0.41] 5	Shared	C 34.9 [0.38] 23	C 34.9 [0.41] 28	A 9.8 [0.62] 12	B 13.2 [0.40] 17	C 20.4 [0.27] 29	A 6.9 [0.74] <1	B 17.9 [0.64] 30	C 28.8 [0.75] 88	A 4.7 [0.36] 12
		PM	LOS C 33.8	D 36.7 [0.64] 55	C 33.6 [0.80] 67	Shared	D 53.5 [0.74] 59	D 39.2 [0.44] 58	D 40.1 [0.88] 96	D 49.9 [0.84] 74	C 31.2 [0.69] 126	A 4.7 [0.29] 10	C 20.1 [0.41] 18	D 40.5 [0.82] 159	A 5.1 [0.52] 14

7 Additional Considerations

7.1 Truck Access

7.1.1 Truck Classifications

Our team corresponded with the New Brunswick Department of Transportation (NBDTI) to determine the types of truck/trailer combinations that are allowed to access the site. It was confirmed that a Type A or Type B tractor pulling two 28-foot trailers (doubles) are allowed as the Caledonia Industrial Park is an approved location for Long Combination Vehicles (LCVs). Vehicle combinations with two 40' trailer, or one 40' trailer and one 53' trailer, are also permitted.

NBDTI does not currently allow triples under their LCV guidelines. The email correspondence with NBDTI and their LCV guidelines are attached in Appendix G.

7.1.2 Truck Route

The designated truck route to/from the proposed facility on Galloway St. travels along Parsons Dr., Frenette Ave., and Harrisville Blvd. to reach the TCH interchange ramps with Harrisville Blvd., as illustrated in Figure 6. There are no height or weight restrictions along the corridor, and the LOS analyses detailed in the previous sections highlighted that the intersections along the truck route will continue to operate well once improvements are made to the **Harrisville Blvd. @ TCH WB Ramps** intersection and with signal timing adjustments at the **Harrisville Blvd. @ TCH EB Ramps** intersection. Both improvements will be required based on background traffic growth alone, as the anticipated development traffic does not significantly impact the operation of the corridor.

Figure 6: Development Truck Route (yellow)

Turning movements at each of the intersections along this corridor (**Harrisville Blvd. @ TCH EB Ramps, Harrisville Blvd. @ TCH WB Ramps, Harrisville Blvd. @ Frenette Ave., Frenette Ave. @ Parsons Dr.,** and **Parsons Dr. @ Galloway St**.) were evaluated for compatibility with a WB-21 semi-trailer, an ATD-180 A-train double, and a WB-33 triple trailer combination. Turning movement diagrams for each of these vehicles at each intersection are provided in Appendix H. Overall, there are no turning movement issues with these vehicles at any intersection along the truck route.

Based on our review of the above, it is our opinion that the proposed project will provide legal, safe, and physical access for ingress and egress for traffic movements.

7.2 Parking

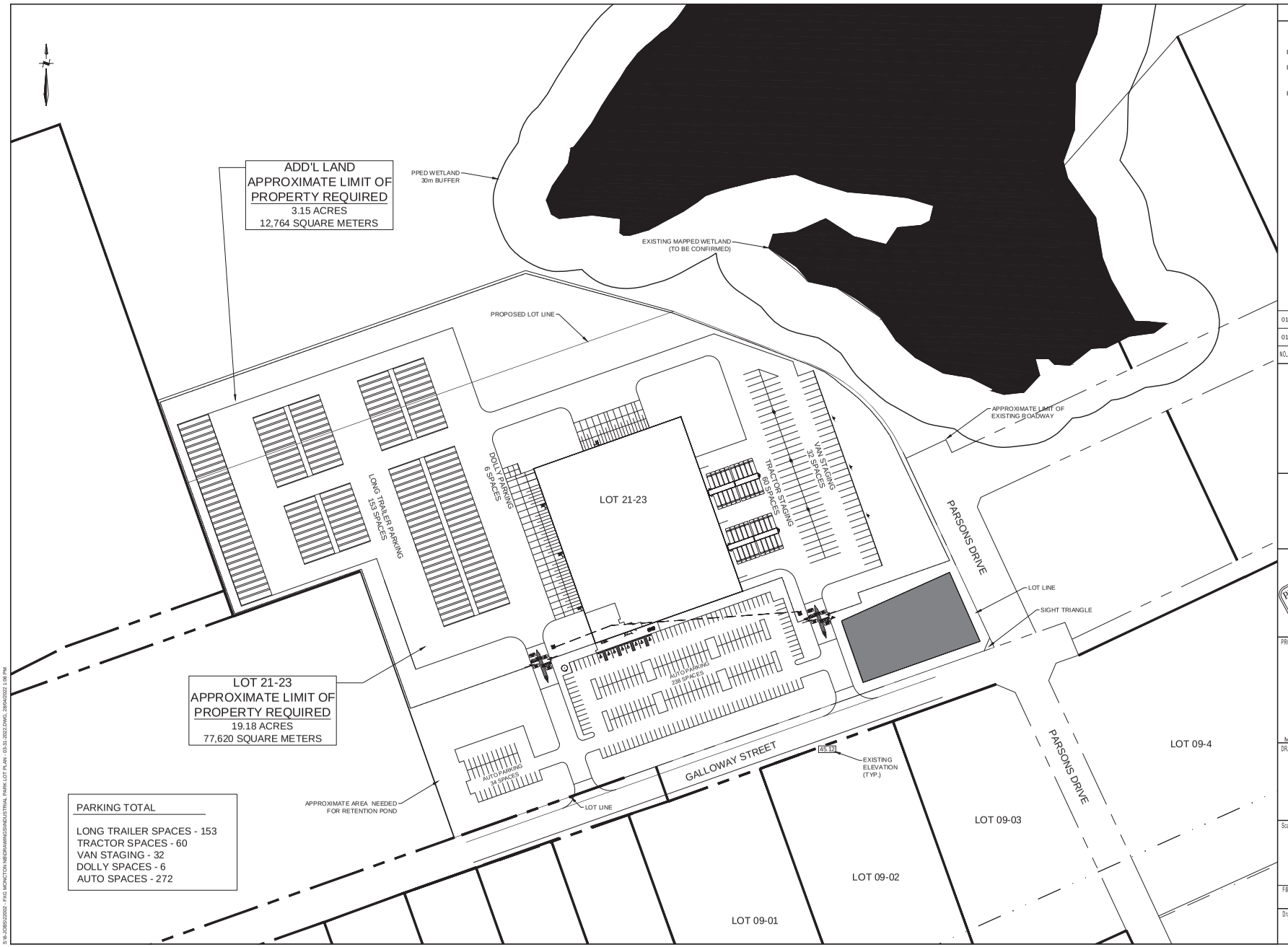
The proposed site plan (Appendix A) shows 254 parking spaces in front of the building for workers at the facility, including 8 accessible parking spaces (approx. 3% of total). The City of Moncton's requirements for parking availability (Bylaw Z-222, Schedule D), compared to the planned parking for the site, are summarized in Table 9. As clearly indicated, the proposed site plan has more available parking supply than required under City bylaws.

Table 9: Parking Requirement and Supply

Area	Requirement	Gross Floor Area	Spaces Required	Spaces Planned
Office	1 per 50 m^2	356 m^2	8	-
Warehouse	1 per 200 m^2	8931 m^2	45	-
Totals			**53**	**254**

The City's requirements for barrier-free parking spaces defer to Provincial regulation. As per NB Reg 2021-3, under the Building Code Administration Act, a parking lot with 201 to 300 spaces shall have 5 designated stalls for persons with disabilities (Table 3.8.2.5). As the proposed site plan shows 8 such spaces, the proposed site plan provides more barrier-free parking spaces than required under Provincial regulation.

Appendix A
Site Plan



NOTES

LEGEND

EXISTING PROPERTY LINES

EXISTING R.O.W.

EXISTING MAPPED WETLAND

NO.	DATE	REVISIONS	BY	APPR.
01	JAN 25/21	LAYOUT REVISIONS	SH	SH
01	JAN 20/21	ISSUED FOR REVIEW	SH	SH

PRELIMINARY ONLY
DATE PLOTTED: Apr 13, 2022
NOT TO BE USED FOR CONSTRUCTION

PROJECT TITLE

LOT OPTIONS

MONCTON N.B.

DRAWING TITLE

LOT 21-23 SITE OPTION

Scale	Drawn By	Design By
10m 0 20m (1:1000 FULL SCALE)	SH	SH
	Checked By	Cadd Check
	SH	
	Sheet 4 of 4	

File Name
INDUSTRIAL PARK LOT PLAN - 03-31-2022.DWG

Drawing No.
15297-1P-C2004

S:\6-JOBS\22002 - FXG MONCTON NB\DRAWINGS\INDUSTRIAL PARK LOT PLAN - 03-31-2022.DWG, 28/04/2022 1:06 PM

Appendix B
Traffic Counts

Englobe Corp Moncton (NB)
1234 Place

Omaha, Alabama, United States 12345
506-857-2777 andrew.northmore@englobecorp.com

Count Name: Harrisville @ Frenette
Site Code:
Start Date: 03-16-2022

Turning Movement Data

Start Time	Frenette Westbound				Harrisville Northbound				Frenette Eastbound				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
7:00 AM	15	11	0	26	14	14	0	28	19	3	0	22	76
7:15 AM	18	9	0	27	15	19	0	34	20	6	0	26	87
7:30 AM	7	8	0	15	12	20	0	32	19	10	0	29	76
7:45 AM	10	5	0	15	6	14	0	20	10	10	0	20	55
Hourly Total	50	33	0	83	47	67	0	114	68	29	0	97	294
8:00 AM	11	9	0	20	10	13	1	24	5	5	0	10	54
8:15 AM	13	8	0	21	9	14	0	23	10	4	0	14	58
8:30 AM	11	9	0	20	3	18	0	21	15	8	0	23	64
8:45 AM	12	9	0	21	8	12	0	20	15	4	0	19	60
Hourly Total	47	35	0	82	30	57	1	88	45	21	0	66	236
9:00 AM	16	7	0	23	7	10	0	17	16	5	0	21	61
9:15 AM	13	4	0	17	14	5	0	19	16	8	0	24	60
9:30 AM	18	12	0	30	8	10	0	18	8	3	0	11	59
9:45 AM	21	15	0	36	13	16	0	29	12	7	0	19	84
Hourly Total	68	38	0	106	42	41	0	83	52	23	0	75	264
10:00 AM	20	11	0	31	7	12	0	19	14	5	0	19	69
10:15 AM	13	8	0	21	6	12	0	18	9	7	2	18	57
10:30 AM	10	9	0	19	8	12	0	20	17	11	0	28	67
10:45 AM	16	9	0	25	9	17	0	26	20	8	0	28	79
Hourly Total	59	37	0	96	30	53	0	83	60	31	2	93	272
11:00 AM	7	18	0	25	10	13	0	23	21	6	0	27	75
11:15 AM	5	9	0	14	13	18	0	31	19	6	0	25	70
11:30 AM	4	5	0	9	7	24	0	31	9	10	0	19	59
11:45 AM	6	15	0	21	8	13	0	21	19	9	0	28	70
Hourly Total	22	47	0	69	38	68	0	106	68	31	0	99	274
12:00 PM	24	16	0	40	9	17	0	26	15	8	0	23	89
12:15 PM	16	7	0	23	7	11	0	18	14	4	0	18	59
12:30 PM	21	8	0	29	8	16	0	24	14	11	0	25	78
12:45 PM	15	6	0	21	8	13	0	21	10	4	0	14	56
Hourly Total	76	37	0	113	32	57	0	89	53	27	0	80	282
1:00 PM	7	9	0	16	7	7	0	14	8	7	0	15	45
1:15 PM	4	3	0	7	7	11	1	19	9	9	0	18	44
1:30 PM	6	11	0	17	9	14	0	23	18	2	0	20	60
1:45 PM	4	10	0	14	8	12	0	20	12	8	1	21	55
Hourly Total	21	33	0	54	31	44	1	76	47	26	1	74	204
2:00 PM	14	16	0	30	4	16	0	20	14	7	0	21	71
2:15 PM	5	9	0	14	9	16	0	25	16	8	1	25	64
2:30 PM	6	25	0	31	10	10	0	20	10	5	0	15	66
2:45 PM	10	13	0	23	6	18	0	24	15	3	0	18	65

Hourly Total	35	63	0	98	29	60	0	89	55	23	1	79	266
3:00 PM	8	19	0	27	5	14	2	21	16	4	1	21	69
3:15 PM	4	5	0	9	6	10	0	16	11	6	0	17	42
3:30 PM	5	29	0	34	8	9	0	17	20	3	0	23	74
3:45 PM	6	14	0	20	4	13	0	17	14	6	0	20	57
Hourly Total	23	67	0	90	23	46	2	71	61	19	1	81	242
4:00 PM	8	44	0	52	5	11	1	17	33	4	2	39	108
4:15 PM	2	10	0	12	2	6	0	8	19	2	0	21	41
4:30 PM	6	10	0	16	4	14	0	18	9	1	0	10	44
4:45 PM	3	5	0	8	7	8	0	15	10	3	0	13	36
Hourly Total	19	69	0	88	18	39	1	58	71	10	2	83	229
5:00 PM	9	3	0	12	3	9	0	12	12	2	1	15	39
5:15 PM	6	4	0	10	4	9	0	13	9	3	0	12	35
5:30 PM	3	0	0	3	12	7	0	19	5	5	0	10	32
5:45 PM	7	8	0	15	15	6	0	21	12	3	1	16	52
Hourly Total	25	15	0	40	34	31	0	65	38	13	2	53	158
6:00 PM	10	5	0	15	5	9	0	14	8	4	0	12	41
6:15 PM	5	4	0	9	3	3	1	7	11	1	0	12	28
6:30 PM	3	2	0	5	0	5	0	5	9	0	0	9	19
6:45 PM	5	1	0	6	3	5	0	8	8	1	0	9	23
Hourly Total	23	12	0	35	11	22	1	34	36	6	0	42	111
Grand Total	468	486	0	954	365	585	6	956	654	259	9	922	2832
Approach %	49.1	50.9	0.0	-	38.2	61.2	0.6	-	70.9	28.1	1.0	-	-
Total %	16.5	17.2	0.0	33.7	12.9	20.7	0.2	33.8	23.1	9.1	0.3	32.6	-
Lights	321	342	0	663	263	413	6	682	439	185	9	633	1978
% Lights	68.6	70.4	-	69.5	72.1	70.6	100.0	71.3	67.1	71.4	100.0	68.7	69.8
Other Vehicles	147	144	0	291	102	172	0	274	215	74	0	289	854
% Other Vehicles	31.4	29.6	-	30.5	27.9	29.4	0.0	28.7	32.9	28.6	0.0	31.3	30.2

Englobe Corp Moncton (NB)
1234 Place

Omaha, Alabama, United States 12345
506-857-2777 andrew.northmore@englobecorp.com

Count Name: Harrisville @ Route 2 WB
Site Code:
Start Date: 03-16-2022

Turning Movement Data

Start Time	Harrisville Southbound				Route 2 Westbound				Harrisville Northbound				Int. Total
	Right	Thru	U-Turn	App. Total	Right	Thru	Left	App. Total	Thru	Left	U-Turn	App. Total	
7:00 AM	39	67	0	106	52	0	0	52	113	43	0	156	314
7:15 AM	24	59	0	83	33	0	0	33	101	83	0	184	300
7:30 AM	29	50	0	79	26	0	0	26	88	65	1	154	259
7:45 AM	30	53	0	83	18	0	1	19	74	86	0	160	262
Hourly Total	122	229	0	351	129	0	1	130	376	277	1	654	1135
8:00 AM	19	59	0	78	13	0	1	14	65	58	0	123	215
8:15 AM	18	44	0	62	20	0	1	21	60	48	0	108	191
8:30 AM	19	49	0	68	26	1	0	27	51	46	0	97	192
8:45 AM	24	46	0	70	18	0	0	18	65	45	1	111	199
Hourly Total	80	198	0	278	77	1	2	80	241	197	1	439	797
9:00 AM	25	53	0	78	24	0	1	25	58	48	0	106	209
9:15 AM	18	52	0	70	19	1	1	21	51	47	0	98	189
9:30 AM	24	62	0	86	21	0	0	21	44	50	0	94	201
9:45 AM	29	51	0	80	21	0	0	21	60	57	0	117	218
Hourly Total	96	218	0	314	85	1	2	88	213	202	0	415	817
10:00 AM	33	58	0	91	17	0	1	18	41	47	0	88	197
10:15 AM	31	56	0	87	27	0	0	27	67	53	0	120	234
10:30 AM	33	78	0	111	19	0	0	19	66	52	0	118	248
10:45 AM	33	55	0	88	21	1	2	24	64	59	0	123	235
Hourly Total	130	247	0	377	84	1	3	88	238	211	0	449	914
11:00 AM	37	103	0	140	20	0	1	21	61	58	0	119	280
11:15 AM	29	69	0	98	20	1	2	23	76	60	0	136	257
11:30 AM	34	57	0	91	26	0	0	26	82	64	0	146	263
11:45 AM	36	55	0	91	22	0	0	22	86	61	0	147	260
Hourly Total	136	284	0	420	88	1	3	92	305	243	0	548	1060
12:00 PM	35	68	0	103	16	0	1	17	63	55	0	118	238
12:15 PM	31	63	1	95	26	0	0	26	77	49	0	126	247
12:30 PM	28	50	0	78	32	0	1	33	60	43	0	103	214
12:45 PM	27	49	0	76	24	0	1	25	72	50	0	122	223
Hourly Total	121	230	1	352	98	0	3	101	272	197	0	469	922
1:00 PM	27	65	0	92	22	0	1	23	77	65	0	142	257
1:15 PM	39	63	0	102	26	0	0	26	67	51	0	118	246
1:30 PM	29	63	0	92	26	0	1	27	70	52	0	122	241
1:45 PM	31	64	0	95	29	0	2	31	83	67	0	150	276
Hourly Total	126	255	0	381	103	0	4	107	297	235	0	532	1020
2:00 PM	37	86	0	123	26	0	2	28	77	65	0	142	293
2:15 PM	28	54	0	82	35	0	2	37	76	74	0	150	269
2:30 PM	79	87	0	166	27	0	0	27	59	69	0	128	321
2:45 PM	35	99	0	134	32	0	0	32	73	63	0	136	302

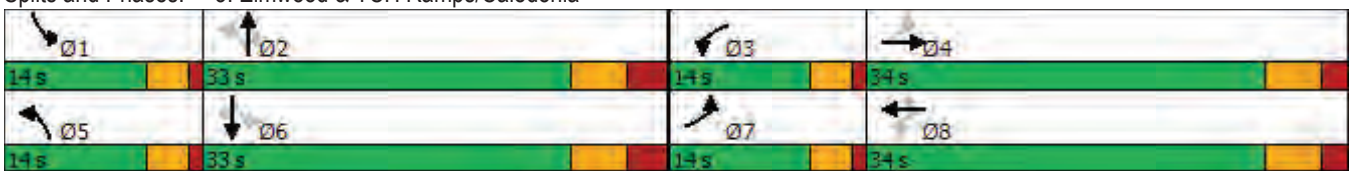
Hourly Total	179	326	0	505	120	0	4	124	285	271	0	556	1185
3:00 PM	58	108	0	166	23	0	1	24	52	70	0	122	312
3:15 PM	41	71	0	112	21	0	1	22	47	85	0	132	266
3:30 PM	81	157	0	238	25	0	0	25	49	88	0	137	400
3:45 PM	40	95	0	135	37	1	0	38	52	109	0	161	334
Hourly Total	220	431	0	651	106	1	2	109	200	352	0	552	1312
4:00 PM	115	148	0	263	14	0	0	14	53	102	0	155	432
4:15 PM	45	84	0	129	18	1	2	21	49	108	0	157	307
4:30 PM	30	61	0	91	18	0	1	19	52	90	0	142	252
4:45 PM	25	46	0	71	10	0	1	11	41	91	0	132	214
Hourly Total	215	339	0	554	60	1	4	65	195	391	0	586	1205
5:00 PM	18	37	0	55	13	0	1	14	26	71	0	97	166
5:15 PM	8	42	1	51	12	0	2	14	37	67	0	104	169
5:30 PM	10	41	0	51	14	0	0	14	33	54	0	87	152
5:45 PM	17	29	0	46	17	1	1	19	44	55	0	99	164
Hourly Total	53	149	1	203	56	1	4	61	140	247	0	387	651
6:00 PM	10	26	0	36	9	0	0	9	41	44	0	85	130
6:15 PM	11	32	0	43	15	0	0	15	29	38	0	67	125
6:30 PM	12	30	0	42	12	0	2	14	40	44	0	84	140
6:45 PM	11	21	0	32	9	0	0	9	27	42	0	69	110
Hourly Total	44	109	0	153	45	0	2	47	137	168	0	305	505
Grand Total	1522	3015	2	4539	1051	7	34	1092	2899	2991	2	5892	11523
Approach %	33.5	66.4	0.0	-	96.2	0.6	3.1	-	49.2	50.8	0.0	-	-
Total %	13.2	26.2	0.0	39.4	9.1	0.1	0.3	9.5	25.2	26.0	0.0	51.1	-
Lights	1172	2300	2	3474	613	7	30	650	2246	2770	2	5018	9142
% Lights	77.0	76.3	100.0	76.5	58.3	100.0	88.2	59.5	77.5	92.6	100.0	85.2	79.3
Other Vehicles	350	715	0	1065	438	0	4	442	653	221	0	874	2381
% Other Vehicles	23.0	23.7	0.0	23.5	41.7	0.0	11.8	40.5	22.5	7.4	0.0	14.8	20.7

Appendix C
Detailed Synchro Results

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	175	0	119	83	211	92	364	421	170	673	184
Future Volume (vph)	175	0	119	83	211	92	364	421	170	673	184
Lane Group Flow (vph)	190	170	129	101	271	124	404	638	298	774	222
Turn Type	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8		5	2		1	6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	3	8	8	5	2	2	1	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	20.0	20.0	10.0	20.0	20.0
Minimum Split (s)	14.0	16.0	14.0	34.0	34.0	14.0	27.0	27.0	14.0	30.0	30.0
Total Split (s)	14.0	34.0	14.0	34.0	34.0	14.0	33.0	33.0	14.0	33.0	33.0
Total Split (%)	14.7%	35.8%	14.7%	35.8%	35.8%	14.7%	34.7%	34.7%	14.7%	34.7%	34.7%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	23.5	11.4	23.5	11.4	11.4	37.8	24.8	24.8	38.7	27.8	27.8
Actuated g/C Ratio	0.30	0.15	0.30	0.15	0.15	0.49	0.32	0.32	0.50	0.36	0.36
v/c Ratio	0.42	0.30	0.31	0.37	0.58	0.30	0.36	0.68	0.54	0.61	0.31
Control Delay	21.7	1.4	19.9	34.2	9.8	11.2	21.4	6.2	14.5	24.1	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.7	1.4	19.9	34.2	9.8	11.2	21.4	6.2	14.5	24.1	4.4
LOS	C	A	B	C	A	B	C	A	B	C	A
Approach Delay		12.1		17.3			12.0			18.5	
Approach LOS		B		B			B			B	
Queue Length 50th (m)	21.3	0.0	13.9	14.5	0.0	8.4	24.2	0.0	22.6	52.6	0.0
Queue Length 95th (m)	37.0	0.0	26.2	25.7	11.4	14.8	39.0	0.0	24.2	74.7	11.5
Internal Link Dist (m)		159.7		135.1			77.3			127.3	
Turn Bay Length (m)	45.0				20.0	75.0		75.0	85.0		100.0
Base Capacity (vph)	453	822	422	676	747	418	1193	956	555	1273	711
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.21	0.31	0.15	0.36	0.30	0.34	0.67	0.54	0.61	0.31

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 77.3	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 15.3	Intersection LOS: B
Intersection Capacity Utilization 62.5%	ICU Level of Service B
Analysis Period (min) 15	

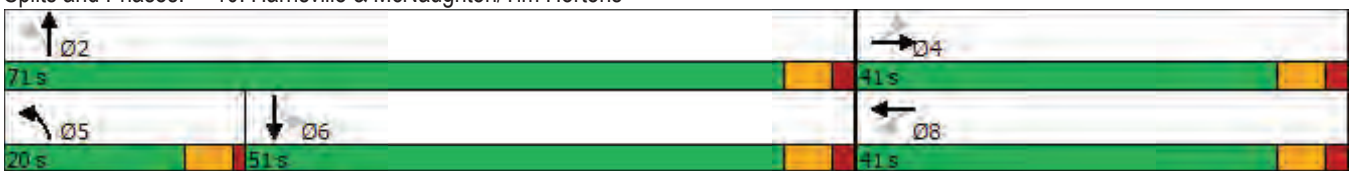
Splits and Phases: 3: Elmwood & TCH Ramps/Caledonia



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	19	27	239	58	206	303	3	118
Future Volume (vph)	19	27	239	58	206	303	3	118
Lane Group Flow (vph)	28	121	266	128	231	529	0	203
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	16.0	16.0	16.0	16.0	10.0	36.0	36.0	36.0
Minimum Split (s)	32.0	32.0	24.0	24.0	15.0	42.0	42.0	42.0
Total Split (s)	41.0	41.0	41.0	41.0	20.0	71.0	51.0	51.0
Total Split (%)	36.6%	36.6%	36.6%	36.6%	17.9%	63.4%	45.5%	45.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.0	6.0		6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Min	Min	Min
Act Effct Green (s)	24.6	24.6	24.6	24.6	55.4	54.4		36.3
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.61	0.60		0.40
v/c Ratio	0.08	0.24	0.78	0.26	0.32	0.26		0.16
Control Delay	24.7	12.0	47.0	18.9	10.5	6.3		18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	24.7	12.0	47.0	18.9	10.5	6.3		18.3
LOS	C	B	D	B	B	A		B
Approach Delay		14.4		37.9		7.6		18.3
Approach LOS		B		D		A		B
Queue Length 50th (m)	3.9	6.3	45.6	12.5	17.4	13.2		11.4
Queue Length 95th (m)	7.9	8.7	75.7	24.3	37.0	27.3		16.8
Internal Link Dist (m)		134.8		52.4		151.0		195.6
Turn Bay Length (m)					65.0			
Base Capacity (vph)	487	701	490	696	745	2458		1624
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.06	0.17	0.54	0.18	0.31	0.22		0.13

Intersection Summary			
Cycle Length: 112			
Actuated Cycle Length: 91.1			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 17.6		Intersection LOS: B	
Intersection Capacity Utilization 94.9%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 10: Harrisville & McNaughton/Tim Hortons

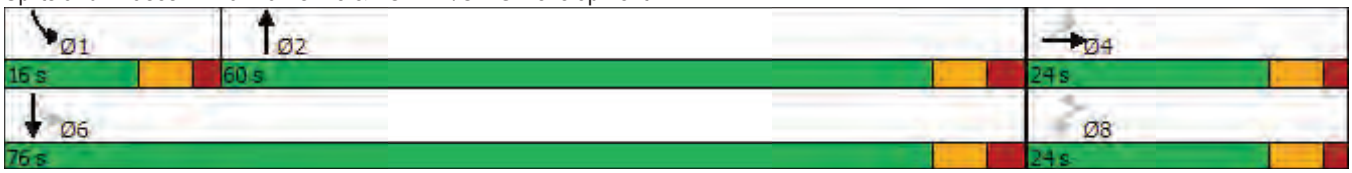


Lane Group	EBL	EBT	NBT	SBL	SBT	Ø8
Lane Configurations						
Traffic Volume (vph)	199	0	609	142	147	
Future Volume (vph)	199	0	609	142	147	
Lane Group Flow (vph)	243	471	645	206	181	
Turn Type	Perm	NA	NA	pm+pt	NA	
Protected Phases		4	2	1	6	8
Permitted Phases	4			6		
Detector Phase	4	4	2	1	6	
Switch Phase						
Minimum Initial (s)	14.0	14.0	20.0	10.0	20.0	5.0
Minimum Split (s)	24.0	24.0	27.0	16.0	27.0	24.0
Total Split (s)	24.0	24.0	60.0	16.0	76.0	24.0
Total Split (%)	24.0%	24.0%	60.0%	16.0%	76.0%	24%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	3.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	7.0	6.0	7.0	
Lead/Lag			Lag	Lead		
Lead-Lag Optimize?			Yes	Yes		
Recall Mode	None	None	Min	None	Min	None
Act Effct Green (s)	16.8	16.8	35.9	53.2	52.2	
Actuated g/C Ratio	0.20	0.20	0.44	0.65	0.63	
v/c Ratio	0.67	0.50	0.80	0.53	0.15	
Control Delay	43.0	1.9	27.8	10.9	6.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	43.0	1.9	27.8	10.9	6.3	
LOS	D	A	C	B	A	
Approach Delay		15.9	27.8		8.8	
Approach LOS		B	C		A	
Queue Length 50th (m)	36.8	0.0	90.1	12.4	11.2	
Queue Length 95th (m)	#68.1	0.0	129.9	14.9	16.4	
Internal Link Dist (m)		52.6	54.0		202.4	
Turn Bay Length (m)						
Base Capacity (vph)	394	960	1222	386	1575	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.62	0.49	0.53	0.53	0.11	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 82.3	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 18.7	Intersection LOS: B
Intersection Capacity Utilization 75.6%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 16: Harrisville & TCH EB/CIDG Development



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	29	68	33	50	67	47
Future Volume (Veh/h)	29	68	33	50	67	47
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.72	0.85	0.75	0.69	0.84	0.78
Hourly flow rate (vph)	40	80	44	72	80	60
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			120		240	80
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			120		240	80
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		89	94
cM capacity (veh/h)			1468		726	980

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	120	116	140
Volume Left	0	44	80
Volume Right	80	0	60
cSH	1700	1468	817
Volume to Capacity	0.07	0.03	0.17
Queue Length 95th (m)	0.0	0.7	4.9
Control Delay (s)	0.0	3.0	10.3
Lane LOS		A	B
Approach Delay (s)	0.0	3.0	10.3
Approach LOS			B

Intersection Summary			
Average Delay		4.8	
Intersection Capacity Utilization		24.4%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	1	0	176	296	512	0	0	288	131
Future Volume (Veh/h)	0	0	0	1	0	176	296	512	0	0	288	131
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.25	0.92	0.62	0.81	0.83	0.92	0.25	0.85	0.78
Hourly flow rate (vph)	0	0	0	4	0	284	365	617	0	0	339	168
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								226			175	
pX, platoon unblocked	0.84	0.84	0.94	0.84	0.84	0.81	0.94			0.81		
vC, conflicting volume	1970	1686	339	1686	1854	617	507			617		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1908	1570	269	1570	1770	412	447			412		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	93	100	45	65			100		
cM capacity (veh/h)	14	61	726	55	46	519	1050			931		

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	4	284	365	617	339	168
Volume Left	4	0	365	0	0	0
Volume Right	0	284	0	0	0	168
cSH	55	519	1050	1700	1700	1700
Volume to Capacity	0.07	0.55	0.35	0.36	0.20	0.10
Queue Length 95th (m)	1.8	26.1	12.6	0.0	0.0	0.0
Control Delay (s)	75.5	20.0	10.2	0.0	0.0	0.0
Lane LOS	F	C	B			
Approach Delay (s)	20.7		3.8		0.0	
Approach LOS	C					

Intersection Summary				
Average Delay	5.5			
Intersection Capacity Utilization	44.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	176	0	284	149	362	185	1182	147	65	871	325
Future Volume (vph)	176	0	284	149	362	185	1182	147	65	871	325
Lane Group Flow (vph)	210	294	359	169	421	226	1231	186	86	917	392
Turn Type	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8		5	2		1	6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	3	8	8	5	2	2	1	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	20.0	20.0	10.0	20.0	20.0
Minimum Split (s)	14.0	16.0	14.0	34.0	34.0	14.0	27.0	27.0	14.0	30.0	30.0
Total Split (s)	23.0	39.0	18.0	34.0	34.0	14.0	49.0	49.0	14.0	49.0	49.0
Total Split (%)	19.2%	32.5%	15.0%	28.3%	28.3%	11.7%	40.8%	40.8%	11.7%	40.8%	40.8%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	38.2	20.9	35.8	19.5	19.5	53.8	43.1	43.1	52.8	39.6	39.6
Actuated g/C Ratio	0.36	0.20	0.34	0.18	0.18	0.51	0.41	0.41	0.50	0.37	0.37
v/c Ratio	0.45	0.62	1.03	0.49	0.82	0.76	0.86	0.26	0.35	0.70	0.47
Control Delay	25.9	17.8	84.4	45.0	29.6	34.7	38.5	9.1	18.5	32.6	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	17.8	84.4	45.0	29.6	34.7	38.5	9.1	18.5	32.6	4.7
LOS	C	B	F	D	C	C	D	A	B	C	A
Approach Delay		21.2		53.0			34.7			23.9	
Approach LOS		C		D			C			C	
Queue Length 50th (m)	32.3	16.8	~62.5	34.6	33.4	25.4	134.8	6.9	8.9	88.4	0.0
Queue Length 95th (m)	46.3	44.0	#89.0	55.7	66.2	#52.8	#209.7	18.4	17.0	129.3	13.7
Internal Link Dist (m)		159.7		135.1			77.3			127.3	
Turn Bay Length (m)	45.0				20.0	75.0		75.0	85.0		100.0
Base Capacity (vph)	518	640	350	498	621	297	1436	723	243	1421	870
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.46	1.03	0.34	0.68	0.76	0.86	0.26	0.35	0.65	0.45

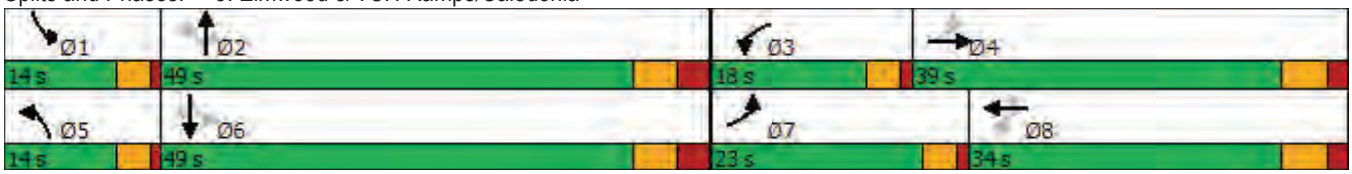
Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 106.2	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.03	
Intersection Signal Delay: 33.7	Intersection LOS: C
Intersection Capacity Utilization 86.1%	ICU Level of Service E
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite.	

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Elmwood & TCH Ramps/Caledonia

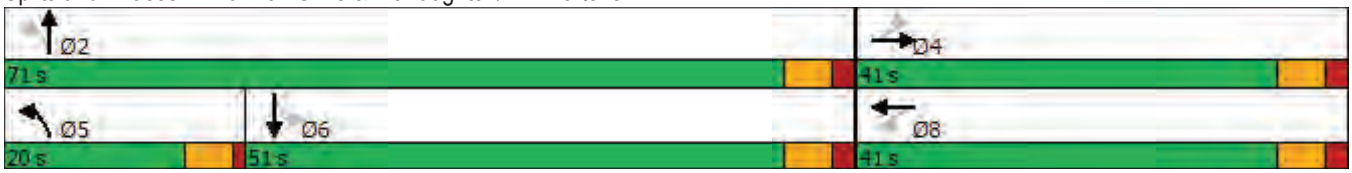


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	9	17	115	16	87	137	1	392
Future Volume (vph)	9	17	115	16	87	137	1	392
Lane Group Flow (vph)	11	392	122	34	107	264	0	576
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	16.0	16.0	16.0	16.0	10.0	36.0	36.0	36.0
Minimum Split (s)	32.0	32.0	24.0	24.0	15.0	42.0	42.0	42.0
Total Split (s)	41.0	41.0	41.0	41.0	20.0	71.0	51.0	51.0
Total Split (%)	36.6%	36.6%	36.6%	36.6%	17.9%	63.4%	45.5%	45.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.0	6.0		6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Min	Min	Min
Act Effct Green (s)	26.1	26.1	26.1	26.1	49.8	48.8		36.9
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.57	0.56		0.42
v/c Ratio	0.03	0.53	0.73	0.06	0.21	0.14		0.41
Control Delay	21.8	6.5	54.2	17.3	11.1	6.3		20.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	21.8	6.5	54.2	17.3	11.1	6.3		20.9
LOS	C	A	D	B	B	A		C
Approach Delay		6.9		46.1		7.7		20.9
Approach LOS		A		D		A		C
Queue Length 50th (m)	1.4	3.5	19.8	3.1	8.1	6.3		38.4
Queue Length 95th (m)	5.0	0.7	#47.3	7.1	16.6	13.6		50.1
Internal Link Dist (m)		134.8		52.4		151.0		195.6
Turn Bay Length (m)					65.0			
Base Capacity (vph)	563	874	231	739	561	2556		1767
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.02	0.45	0.53	0.05	0.19	0.10		0.33

Intersection Summary	
Cycle Length: 112	
Actuated Cycle Length: 87.2	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 16.5	Intersection LOS: B
Intersection Capacity Utilization 111.2%	ICU Level of Service H
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

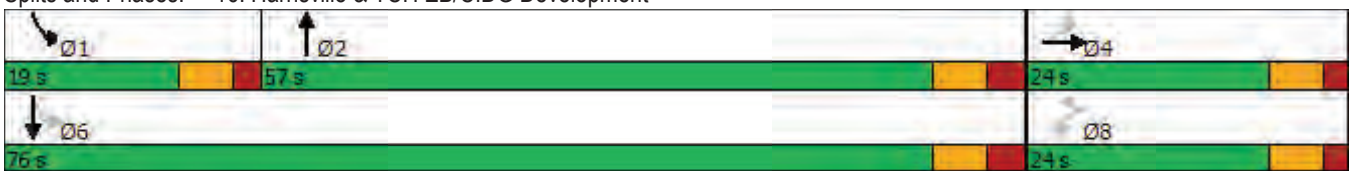
Splits and Phases: 10: Harrisville & McNaughton/Tim Hortons



Lane Group	EBL	EBT	NBT	SBL	SBT	Ø8
Lane Configurations						
Traffic Volume (vph)	107	0	501	174	328	
Future Volume (vph)	107	0	501	174	328	
Lane Group Flow (vph)	160	330	534	223	449	
Turn Type	Perm	NA	NA	pm+pt	NA	
Protected Phases		4	2	1	6	8
Permitted Phases	4			6		
Detector Phase	4	4	2	1	6	
Switch Phase						
Minimum Initial (s)	14.0	14.0	20.0	10.0	20.0	5.0
Minimum Split (s)	20.0	20.0	27.0	16.0	27.0	24.0
Total Split (s)	24.0	24.0	57.0	19.0	76.0	24.0
Total Split (%)	24.0%	24.0%	57.0%	19.0%	76.0%	24%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	3.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	7.0	6.0	7.0	
Lead/Lag			Lag	Lead		
Lead-Lag Optimize?			Yes	Yes		
Recall Mode	None	None	Min	None	Min	None
Act Effct Green (s)	15.3	15.3	28.7	46.6	45.6	
Actuated g/C Ratio	0.21	0.21	0.39	0.63	0.62	
v/c Ratio	0.44	0.47	0.74	0.49	0.39	
Control Delay	32.2	2.3	26.3	9.5	8.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	32.2	2.3	26.3	9.5	8.2	
LOS	C	A	C	A	A	
Approach Delay		12.1	26.3		8.6	
Approach LOS		B	C		A	
Queue Length 50th (m)	19.6	0.0	61.5	11.4	27.6	
Queue Length 95th (m)	32.7	0.0	107.6	18.8	36.8	
Internal Link Dist (m)		52.6	54.0		202.4	
Turn Bay Length (m)						
Base Capacity (vph)	437	746	1280	504	1716	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.37	0.44	0.42	0.44	0.26	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 74.1	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 15.2	Intersection LOS: B
Intersection Capacity Utilization 69.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 16: Harrisville & TCH EB/CIDG Development



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	19	78	92	23	43	23
Future Volume (Veh/h)	19	78	92	23	43	23
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.59	0.52	0.72	0.83	0.72
Hourly flow rate (vph)	24	132	177	32	52	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			156		476	90
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			156		476	90
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			88		89	97
cM capacity (veh/h)			1424		480	968

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	156	209	84
Volume Left	0	177	52
Volume Right	132	0	32
cSH	1700	1424	594
Volume to Capacity	0.09	0.12	0.14
Queue Length 95th (m)	0.0	3.4	3.9
Control Delay (s)	0.0	6.8	12.1
Lane LOS		A	B
Approach Delay (s)	0.0	6.8	12.1
Approach LOS			B

Intersection Summary			
Average Delay		5.4	
Intersection Capacity Utilization		23.4%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	2	0	94	407	203	0	0	500	281
Future Volume (Veh/h)	0	0	0	2	0	94	407	203	0	0	500	281
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.25	0.50	0.64	0.93	0.96	0.92	0.92	0.77	0.61
Hourly flow rate (vph)	0	0	0	8	0	147	438	211	0	0	649	461
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								226			175	
pX, platoon unblocked	0.89	0.89	0.89	0.89	0.89		0.89					
vC, conflicting volume	1883	1736	649	1736	2197	211	1110			211		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1931	1765	543	1765	2284	211	1061			211		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	64	100	82	25			100		
cM capacity (veh/h)	14	19	480	22	9	829	583			1360		

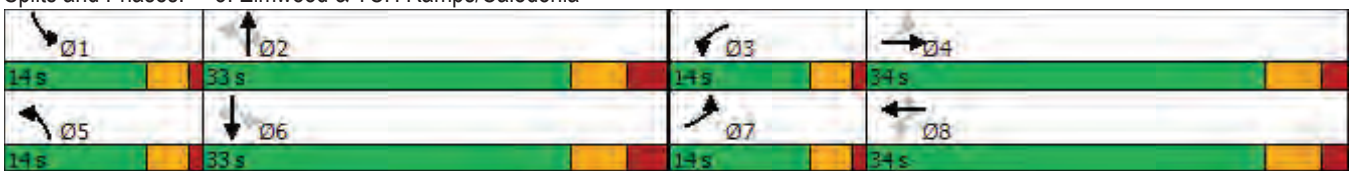
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	8	147	438	211	649	461
Volume Left	8	0	438	0	0	0
Volume Right	0	147	0	0	0	461
cSH	22	829	583	1700	1700	1700
Volume to Capacity	0.36	0.18	0.75	0.12	0.38	0.27
Queue Length 95th (m)	8.4	5.1	53.0	0.0	0.0	0.0
Control Delay (s)	237.5	10.3	27.4	0.0	0.0	0.0
Lane LOS	F	B	D			
Approach Delay (s)	22.0		18.5		0.0	
Approach LOS	C					

Intersection Summary				
Average Delay	8.1			
Intersection Capacity Utilization	62.2%	ICU Level of Service	B	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	198	0	135	94	239	104	411	476	192	761	208
Future Volume (vph)	198	0	135	94	239	104	411	476	192	761	208
Lane Group Flow (vph)	215	192	147	115	306	141	457	721	337	875	251
Turn Type	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8		5	2		1	6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	3	8	8	5	2	2	1	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	20.0	20.0	10.0	20.0	20.0
Minimum Split (s)	14.0	16.0	14.0	34.0	34.0	14.0	27.0	27.0	14.0	30.0	30.0
Total Split (s)	14.0	34.0	14.0	34.0	34.0	14.0	33.0	33.0	14.0	33.0	33.0
Total Split (%)	14.7%	35.8%	14.7%	35.8%	35.8%	14.7%	34.7%	34.7%	14.7%	34.7%	34.7%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	23.8	11.8	23.8	11.8	11.8	39.0	26.0	26.0	39.0	26.0	26.0
Actuated g/C Ratio	0.30	0.15	0.30	0.15	0.15	0.49	0.33	0.33	0.49	0.33	0.33
v/c Ratio	0.48	0.35	0.37	0.41	0.62	0.40	0.39	0.72	0.62	0.75	0.36
Control Delay	23.0	1.8	20.9	35.0	9.8	13.1	21.9	6.6	17.0	28.8	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	1.8	20.9	35.0	9.8	13.1	21.9	6.6	17.0	28.8	4.7
LOS	C	A	C	C	A	B	C	A	B	C	A
Approach Delay		13.0		17.8			12.6			21.9	
Approach LOS		B		B			B			C	
Queue Length 50th (m)	24.5	0.0	16.1	16.6	0.0	9.9	28.2	0.0	26.9	62.5	0.0
Queue Length 95th (m)	41.7	0.0	29.1	28.5	11.6	17.0	44.7	0.0	27.9	87.8	12.1
Internal Link Dist (m)		159.7		135.1			77.3			127.3	
Turn Bay Length (m)	45.0				20.0	75.0		75.0	85.0		100.0
Base Capacity (vph)	447	798	397	662	759	351	1167	1005	544	1167	690
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.24	0.37	0.17	0.40	0.40	0.39	0.72	0.62	0.75	0.36

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 78.9	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 17.1	Intersection LOS: B
Intersection Capacity Utilization 66.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: Elmwood & TCH Ramps/Caledonia

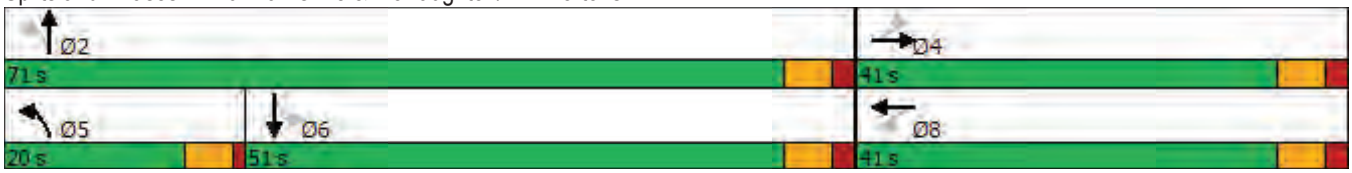


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	21	30	273	65	232	342	3	134
Future Volume (vph)	21	30	273	65	232	342	3	134
Lane Group Flow (vph)	30	136	303	143	261	598	0	229
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	16.0	16.0	16.0	16.0	10.0	36.0	36.0	36.0
Minimum Split (s)	32.0	32.0	24.0	24.0	15.0	42.0	42.0	42.0
Total Split (s)	41.0	41.0	41.0	41.0	20.0	71.0	51.0	51.0
Total Split (%)	36.6%	36.6%	36.6%	36.6%	17.9%	63.4%	45.5%	45.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.0	6.0		6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Min	Min	Min
Act Effct Green (s)	28.3	28.3	28.3	28.3	55.9	54.9		36.3
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.59	0.58		0.38
v/c Ratio	0.08	0.24	0.82	0.26	0.38	0.30		0.18
Control Delay	24.2	12.3	49.5	19.0	12.4	7.8		20.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	24.2	12.3	49.5	19.0	12.4	7.8		20.4
LOS	C	B	D	B	B	A		C
Approach Delay		14.5		39.8		9.2		20.4
Approach LOS		B		D		A		C
Queue Length 50th (m)	4.2	8.0	55.2	15.1	23.9	19.3		15.0
Queue Length 95th (m)	8.2	9.9	#89.1	27.5	41.9	32.7		18.8
Internal Link Dist (m)		134.8		52.4		151.0		195.6
Turn Bay Length (m)					65.0			
Base Capacity (vph)	459	674	462	667	707	2354		1549
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.07	0.20	0.66	0.21	0.37	0.25		0.15

Intersection Summary	
Cycle Length: 112	
Actuated Cycle Length: 95.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 19.2	Intersection LOS: B
Intersection Capacity Utilization 96.8%	ICU Level of Service F
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 10: Harrisville & McNaughton/Tim Hortons



Lane Group	EBL	EBT	WBL	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	222	66	17	31	683	234	165
Future Volume (vph)	222	66	17	31	683	234	165
Lane Group Flow (vph)	271	599	18	124	817	339	204
Turn Type	Perm	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases		4			2	1	6
Permitted Phases	4		8	8		6	
Detector Phase	4	4	8	8	2	1	6
Switch Phase							
Minimum Initial (s)	14.0	14.0	10.0	10.0	20.0	10.0	20.0
Minimum Split (s)	24.0	24.0	16.0	16.0	27.0	16.0	27.0
Total Split (s)	32.0	32.0	32.0	32.0	55.0	23.0	78.0
Total Split (%)	29.1%	29.1%	29.1%	29.1%	50.0%	20.9%	70.9%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	7.0	6.0	7.0
Lead/Lag					Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	
Recall Mode	None	None	None	None	Min	None	Min
Act Effct Green (s)	25.5	25.5	25.5	25.5	48.0	72.0	71.0
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.44	0.66	0.65
v/c Ratio	0.66	0.97	0.26	0.27	1.01	0.99	0.17
Control Delay	46.7	50.4	45.9	7.7	66.0	77.7	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.7	50.4	45.9	7.7	66.0	77.7	8.1
LOS	D	D	D	A	E	E	A
Approach Delay		49.3			66.0		51.6
Approach LOS		D			E		D
Queue Length 50th (m)	55.4	71.9	3.3	0.0	~187.3	60.2	16.8
Queue Length 95th (m)	75.3	#147.5	11.0	0.0	#271.4	#68.9	23.6
Internal Link Dist (m)		52.6			54.0		202.4
Turn Bay Length (m)							
Base Capacity (vph)	420	622	69	470	807	343	1207
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.96	0.26	0.26	1.01	0.99	0.17

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 109.5	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 53.4	Intersection LOS: D
Intersection Capacity Utilization 92.6%	ICU Level of Service F
Analysis Period (min) 15	

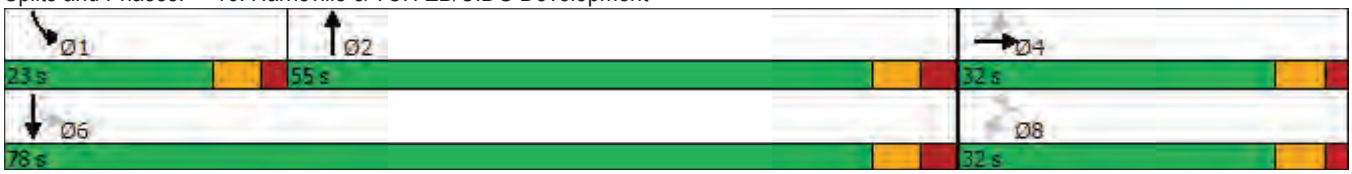
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 16: Harrisville & TCH EB/CIDG Development



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	32	76	37	56	75	53
Future Volume (Veh/h)	32	76	37	56	75	53
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.72	0.85	0.75	0.69	0.84	0.78
Hourly flow rate (vph)	44	89	49	81	89	68
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			133		268	88
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			133		268	88
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		87	93
cM capacity (veh/h)			1452		697	970

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	133	130	157
Volume Left	0	49	89
Volume Right	89	0	68
cSH	1700	1452	794
Volume to Capacity	0.08	0.03	0.20
Queue Length 95th (m)	0.0	0.8	5.9
Control Delay (s)	0.0	3.0	10.6
Lane LOS		A	B
Approach Delay (s)	0.0	3.0	10.6
Approach LOS			B

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	25.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	67	0	197	358	578	0	0	332	146
Future Volume (Veh/h)	0	0	0	67	0	197	358	578	0	0	332	146
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.25	0.92	0.62	0.81	0.83	0.92	0.25	0.85	0.78
Hourly flow rate (vph)	0	0	0	268	0	318	442	696	0	0	391	187
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								226			175	
pX, platoon unblocked	0.86	0.86	0.90	0.86	0.86	0.81	0.90			0.81		
vC, conflicting volume	2289	1971	391	1971	2158	696	578			696		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2160	1791	271	1791	2008	511	478			511		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	0	100	30	55			100		
cM capacity (veh/h)	6	38	693	35	28	457	978			857		

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	268	318	442	696	391	187
Volume Left	268	0	442	0	0	0
Volume Right	0	318	0	0	0	187
cSH	35	457	978	1700	1700	1700
Volume to Capacity	7.67	0.70	0.45	0.41	0.23	0.11
Queue Length 95th (m)	Err	42.1	19.1	0.0	0.0	0.0
Control Delay (s)	Err	28.9	11.7	0.0	0.0	0.0
Lane LOS	F	D	B			
Approach Delay (s)	4588.6		4.5		0.0	
Approach LOS	F					

Intersection Summary				
Average Delay	1170.3			
Intersection Capacity Utilization	51.0%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	199	0	321	169	409	209	1337	167	73	985	368
Future Volume (vph)	199	0	321	169	409	209	1337	167	73	985	368
Lane Group Flow (vph)	237	332	406	192	476	255	1393	211	96	1037	443
Turn Type	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8		5	2		1	6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	3	8	8	5	2	2	1	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	20.0	20.0	10.0	20.0	20.0
Minimum Split (s)	14.0	16.0	14.0	34.0	34.0	14.0	27.0	27.0	14.0	30.0	30.0
Total Split (s)	14.0	21.0	28.0	35.0	35.0	18.0	57.0	57.0	14.0	53.0	53.0
Total Split (%)	11.7%	17.5%	23.3%	29.2%	29.2%	15.0%	47.5%	47.5%	11.7%	44.2%	44.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	26.2	14.2	44.2	28.2	28.2	66.5	50.0	50.0	59.5	46.5	46.5
Actuated g/C Ratio	0.22	0.12	0.37	0.24	0.24	0.56	0.42	0.42	0.50	0.39	0.39
v/c Ratio	0.77	0.93	0.96	0.44	0.90	0.85	0.94	0.28	0.45	0.75	0.50
Control Delay	49.7	55.5	66.4	42.3	46.9	46.9	46.4	7.9	22.6	35.8	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	55.5	66.4	42.3	46.9	46.9	46.4	7.9	22.6	35.8	4.4
LOS	D	E	E	D	D	D	D	A	C	D	A
Approach Delay		53.0		53.5			42.1			26.2	
Approach LOS		D		D			D			C	
Queue Length 50th (m)	42.0	36.0	80.8	40.4	70.2	35.2	172.1	8.4	10.6	116.6	0.0
Queue Length 95th (m)	#59.1	#92.1	#111.3	62.1	#120.0	#63.5	#222.2	17.8	16.2	143.3	13.1
Internal Link Dist (m)		159.7		135.1			77.3			127.3	
Turn Bay Length (m)	45.0				20.0	75.0		75.0	85.0		100.0
Base Capacity (vph)	309	366	425	453	537	307	1484	753	214	1381	888
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.91	0.96	0.42	0.89	0.83	0.94	0.28	0.45	0.75	0.50

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 119.2	
Natural Cycle: 105	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 40.8	Intersection LOS: D
Intersection Capacity Utilization 94.0%	ICU Level of Service F
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

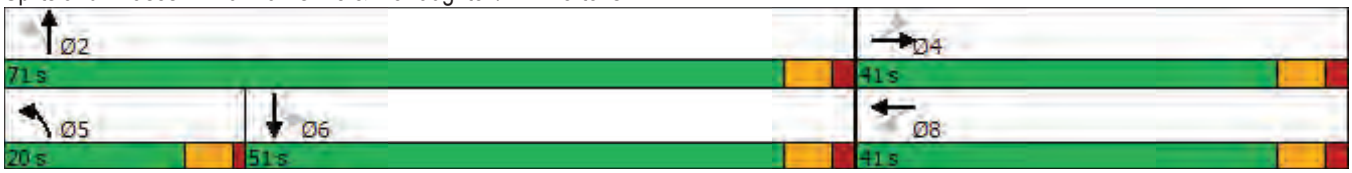
Splits and Phases: 3: Elmwood & TCH Ramps/Caledonia

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	10	19	129	18	99	157	1	441
Future Volume (vph)	10	19	129	18	99	157	1	441
Lane Group Flow (vph)	12	442	137	38	122	302	0	646
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	16.0	16.0	16.0	16.0	10.0	36.0	36.0	36.0
Minimum Split (s)	32.0	32.0	24.0	24.0	15.0	42.0	42.0	42.0
Total Split (s)	41.0	41.0	41.0	41.0	20.0	71.0	51.0	51.0
Total Split (%)	36.6%	36.6%	36.6%	36.6%	17.9%	63.4%	45.5%	45.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.0	6.0		6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Min	Min	Min
Act Effct Green (s)	35.0	35.0	35.0	35.0	53.0	52.0		36.0
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.54	0.53		0.36
v/c Ratio	0.02	0.54	0.71	0.06	0.30	0.17		0.53
Control Delay	21.8	6.7	51.0	16.7	13.5	7.3		26.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	21.8	6.7	51.0	16.7	13.5	7.3		26.5
LOS	C	A	D	B	B	A		C
Approach Delay		7.1		43.6		9.1		26.5
Approach LOS		A		D		A		C
Queue Length 50th (m)	1.5	6.5	23.2	3.4	11.7	9.1		51.6
Queue Length 95th (m)	5.3	2.2	#57.8	7.6	18.5	15.2		57.5
Internal Link Dist (m)		134.8		52.4		151.0		195.6
Turn Bay Length (m)					65.0			
Base Capacity (vph)	482	820	192	635	462	2225		1519
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.02	0.54	0.71	0.06	0.26	0.14		0.43

Intersection Summary	
Cycle Length: 112	
Actuated Cycle Length: 99	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 18.7	Intersection LOS: B
Intersection Capacity Utilization 113.4%	ICU Level of Service H
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 10: Harrisville & McNaughton/Tim Hortons

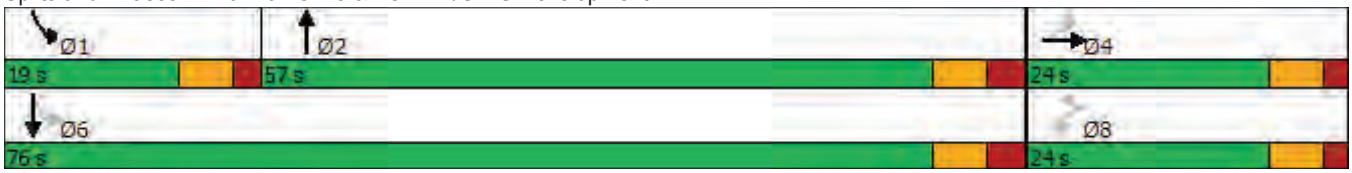


Lane Group	EBL	EBT	WBL	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	120	28	38	60	561	227	367
Future Volume (vph)	120	28	38	60	561	227	367
Lane Group Flow (vph)	179	399	41	240	619	291	503
Turn Type	Perm	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases		4			2	1	6
Permitted Phases	4		8	8		6	
Detector Phase	4	4	8	8	2	1	6
Switch Phase							
Minimum Initial (s)	14.0	14.0	5.0	5.0	20.0	10.0	20.0
Minimum Split (s)	20.0	20.0	24.0	24.0	27.0	16.0	27.0
Total Split (s)	24.0	24.0	24.0	24.0	57.0	19.0	76.0
Total Split (%)	24.0%	24.0%	24.0%	24.0%	57.0%	19.0%	76.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	7.0	6.0	7.0
Lead/Lag					Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	
Recall Mode	None	None	None	None	Min	None	Min
Act Effct Green (s)	16.0	16.0	16.0	16.0	33.9	52.6	51.6
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.42	0.65	0.64
v/c Ratio	0.51	0.65	0.45	0.48	0.79	0.69	0.42
Control Delay	37.7	11.0	50.6	8.3	28.5	17.7	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.7	11.0	50.6	8.3	28.5	17.7	8.3
LOS	D	B	D	A	C	B	A
Approach Delay		19.3			28.5		11.8
Approach LOS		B			C		B
Queue Length 50th (m)	25.9	4.0	5.9	0.0	80.9	16.4	34.1
Queue Length 95th (m)	39.8	35.0	#22.2	0.0	131.0	28.0	41.1
Internal Link Dist (m)		52.6			54.0		202.4
Turn Bay Length (m)							
Base Capacity (vph)	404	651	106	546	1177	453	1602
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.61	0.39	0.44	0.53	0.64	0.31

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 80.9	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 18.6	Intersection LOS: B
Intersection Capacity Utilization 87.1%	ICU Level of Service E
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 16: Harrisville & TCH EB/CIDG Development



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	21	87	103	26	48	26
Future Volume (Veh/h)	21	87	103	26	48	26
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.59	0.52	0.72	0.83	0.72
Hourly flow rate (vph)	27	147	198	36	58	36
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			174		532	100
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			174		532	100
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			86		87	96
cM capacity (veh/h)			1403		436	955

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	174	234	94
Volume Left	0	198	58
Volume Right	147	0	36
cSH	1700	1403	551
Volume to Capacity	0.10	0.14	0.17
Queue Length 95th (m)	0.0	3.9	4.9
Control Delay (s)	0.0	6.9	12.9
Lane LOS		A	B
Approach Delay (s)	0.0	6.9	12.9
Approach LOS			B

Intersection Summary			
Average Delay		5.6	
Intersection Capacity Utilization		24.7%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	30	0	105	507	234	0	0	564	315
Future Volume (Veh/h)	0	0	0	30	0	105	507	234	0	0	564	315
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.25	0.50	0.64	0.93	0.96	0.92	0.92	0.77	0.61
Hourly flow rate (vph)	0	0	0	120	0	164	545	244	0	0	732	516
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								226			175	
pX, platoon unblocked	0.85	0.85	0.85	0.85	0.85		0.85					
vC, conflicting volume	2230	2066	732	2066	2582	244	1248			244		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2354	2162	601	2162	2766	244	1205			244		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	100	0	0	79	0			100		
cM capacity (veh/h)	0	0	427	0	0	795	495			1322		

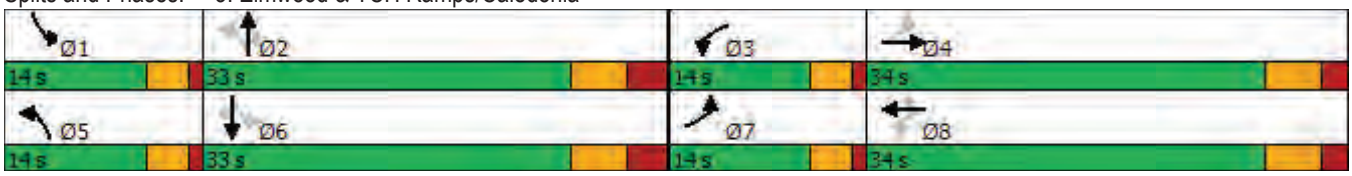
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	120	164	545	244	732	516
Volume Left	120	0	545	0	0	0
Volume Right	0	164	0	0	0	516
cSH	0	795	495	1700	1700	1700
Volume to Capacity	Err	0.21	1.10	0.14	0.43	0.30
Queue Length 95th (m)	Err	6.2	142.3	0.0	0.0	0.0
Control Delay (s)	Err	10.7	99.4	0.0	0.0	0.0
Lane LOS	F	B	F			
Approach Delay (s)	Err		68.7		0.0	
Approach LOS	F					

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	71.1%	ICU Level of Service	C	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	198	0	151	94	244	104	411	498	203	761	208
Future Volume (vph)	198	0	151	94	244	104	411	498	203	761	208
Lane Group Flow (vph)	215	192	164	115	313	141	457	755	356	875	251
Turn Type	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8		5	2		1	6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	3	8	8	5	2	2	1	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	20.0	20.0	10.0	20.0	20.0
Minimum Split (s)	14.0	16.0	14.0	34.0	34.0	14.0	27.0	27.0	14.0	30.0	30.0
Total Split (s)	14.0	34.0	14.0	34.0	34.0	14.0	33.0	33.0	14.0	33.0	33.0
Total Split (%)	14.7%	35.8%	14.7%	35.8%	35.8%	14.7%	34.7%	34.7%	14.7%	34.7%	34.7%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	23.9	11.9	23.9	11.9	11.9	39.0	26.0	26.0	39.0	26.0	26.0
Actuated g/C Ratio	0.30	0.15	0.30	0.15	0.15	0.49	0.33	0.33	0.49	0.33	0.33
v/c Ratio	0.48	0.35	0.41	0.41	0.62	0.40	0.39	0.74	0.65	0.75	0.36
Control Delay	23.0	1.8	21.6	34.9	9.8	13.2	22.0	6.9	18.3	28.8	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	1.8	21.6	34.9	9.8	13.2	22.0	6.9	18.3	28.8	4.7
LOS	C	A	C	C	A	B	C	A	B	C	A
Approach Delay		13.0		18.0			12.6			22.2	
Approach LOS		B		B			B			C	
Queue Length 50th (m)	24.5	0.0	18.1	16.6	0.0	9.9	28.2	0.0	28.8	62.5	0.0
Queue Length 95th (m)	41.7	0.0	32.3	28.5	11.6	17.1	44.8	0.0	29.5	88.0	12.1
Internal Link Dist (m)		159.7		135.1			77.3			127.3	
Turn Bay Length (m)	45.0				20.0	75.0		75.0	85.0		100.0
Base Capacity (vph)	448	792	397	661	763	351	1167	1028	544	1167	690
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.24	0.41	0.17	0.41	0.40	0.39	0.73	0.65	0.75	0.36

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 78.9	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 17.2	Intersection LOS: B
Intersection Capacity Utilization 67.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: Elmwood & TCH Ramps/Caledonia

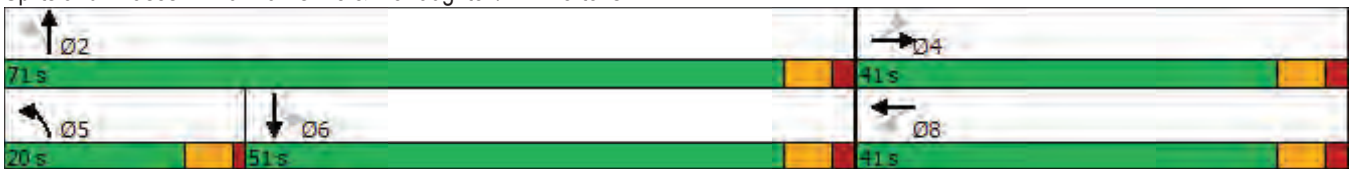


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	21	30	273	65	232	381	3	190
Future Volume (vph)	21	30	273	65	232	381	3	190
Lane Group Flow (vph)	30	136	303	143	261	640	0	310
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	16.0	16.0	16.0	16.0	10.0	36.0	36.0	36.0
Minimum Split (s)	32.0	32.0	24.0	24.0	15.0	42.0	42.0	42.0
Total Split (s)	41.0	41.0	41.0	41.0	20.0	71.0	51.0	51.0
Total Split (%)	36.6%	36.6%	36.6%	36.6%	17.9%	63.4%	45.5%	45.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.0	6.0		6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Min	Min	Min
Act Effct Green (s)	28.3	28.3	28.3	28.3	55.9	54.9		36.3
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.59	0.58		0.38
v/c Ratio	0.08	0.24	0.82	0.26	0.39	0.32		0.25
Control Delay	24.2	12.3	49.5	19.0	12.6	8.9		21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	24.2	12.3	49.5	19.0	12.6	8.9		21.5
LOS	C	B	D	B	B	A		C
Approach Delay		14.5		39.8		9.9		21.5
Approach LOS		B		D		A		C
Queue Length 50th (m)	4.2	8.0	55.2	15.1	23.9	23.9		21.5
Queue Length 95th (m)	8.2	9.9	#89.1	27.5	41.9	38.9		25.4
Internal Link Dist (m)		134.8		52.4		151.0		195.6
Turn Bay Length (m)					65.0			
Base Capacity (vph)	459	674	462	667	675	2352		1563
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.07	0.20	0.66	0.21	0.39	0.27		0.20

Intersection Summary	
Cycle Length: 112	
Actuated Cycle Length: 95.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 19.6	Intersection LOS: B
Intersection Capacity Utilization 96.8%	ICU Level of Service F
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 10: Harrisville & McNaughton/Tim Hortons



Lane Group	EBL	EBT	WBL	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	233	66	17	31	700	249	183
Future Volume (vph)	233	66	17	31	700	249	183
Lane Group Flow (vph)	284	599	18	124	835	361	226
Turn Type	Perm	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases		4			2	1	6
Permitted Phases	4		8	8		6	
Detector Phase	4	4	8	8	2	1	6
Switch Phase							
Minimum Initial (s)	14.0	14.0	5.0	5.0	20.0	10.0	20.0
Minimum Split (s)	24.0	24.0	24.0	24.0	27.0	16.0	27.0
Total Split (s)	27.0	27.0	27.0	27.0	51.0	22.0	73.0
Total Split (%)	27.0%	27.0%	27.0%	27.0%	51.0%	22.0%	73.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	7.0	6.0	7.0
Lead/Lag					Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	
Recall Mode	None	None	None	None	Min	None	Min
Act Effct Green (s)	21.0	21.0	21.0	21.0	44.0	67.0	66.0
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.44	0.67	0.66
v/c Ratio	0.77	0.99	0.24	0.29	1.03	1.01	0.18
Control Delay	52.2	53.9	42.6	8.1	68.2	78.4	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.2	53.9	42.6	8.1	68.2	78.4	7.0
LOS	D	D	D	A	E	E	A
Approach Delay		53.4			68.2		50.9
Approach LOS		D			E		D
Queue Length 50th (m)	54.9	61.2	3.1	0.0	~182.3	~57.9	16.0
Queue Length 95th (m)	75.7	#137.1	10.3	0.0	#257.7	#68.4	22.5
Internal Link Dist (m)		52.6			54.0		202.4
Turn Bay Length (m)							
Base Capacity (vph)	371	603	74	430	811	359	1229
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.99	0.24	0.29	1.03	1.01	0.18

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.03	
Intersection Signal Delay: 55.5	Intersection LOS: E
Intersection Capacity Utilization 94.4%	ICU Level of Service F
Analysis Period (min) 15	

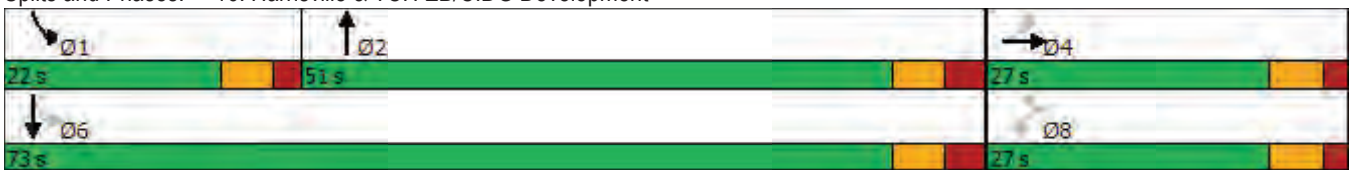
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 16: Harrisville & TCH EB/CIDG Development



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	32	132	37	56	114	53
Future Volume (Veh/h)	32	132	37	56	114	53
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.72	0.85	0.75	0.69	0.84	0.78
Hourly flow rate (vph)	44	155	49	81	136	68
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			199		300	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			199		300	122
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		80	93
cM capacity (veh/h)			1373		666	930

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	199	130	204
Volume Left	0	49	136
Volume Right	155	0	68
cSH	1700	1373	736
Volume to Capacity	0.12	0.04	0.28
Queue Length 95th (m)	0.0	0.9	9.1
Control Delay (s)	0.0	3.1	11.8
Lane LOS		A	B
Approach Delay (s)	0.0	3.1	11.8
Approach LOS			B

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	67	0	208	358	607	0	0	366	168
Future Volume (Veh/h)	0	0	0	67	0	208	358	607	0	0	366	168
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.25	0.92	0.62	0.81	0.83	0.92	0.25	0.85	0.78
Hourly flow rate (vph)	0	0	0	268	0	335	442	731	0	0	431	215
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								226			175	
pX, platoon unblocked	0.75	0.75	0.89	0.75	0.75	0.69	0.89			0.69		
vC, conflicting volume	2381	2046	431	2046	2261	731	646			731		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2334	1885	292	1885	2173	384	535			384		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	0	100	27	52			100		
cM capacity (veh/h)	3	27	661	25	18	457	914			809		

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	268	335	442	731	431	215
Volume Left	268	0	442	0	0	0
Volume Right	0	335	0	0	0	215
cSH	25	457	914	1700	1700	1700
Volume to Capacity	10.76	0.73	0.48	0.43	0.25	0.13
Queue Length 95th (m)	Err	47.4	21.5	0.0	0.0	0.0
Control Delay (s)	Err	31.5	12.6	0.0	0.0	0.0
Lane LOS	F	D	B			
Approach Delay (s)	4461.5		4.7		0.0	
Approach LOS	F					

Intersection Summary				
Average Delay	1113.1			
Intersection Capacity Utilization	52.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	199	0	334	169	415	209	1337	175	75	985	368
Future Volume (vph)	199	0	334	169	415	209	1337	175	75	985	368
Lane Group Flow (vph)	237	332	423	192	483	255	1393	222	99	1037	443
Turn Type	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8		5	2		1	6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	3	8	8	5	2	2	1	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	20.0	20.0	10.0	20.0	20.0
Minimum Split (s)	14.0	16.0	14.0	34.0	34.0	14.0	27.0	27.0	14.0	30.0	30.0
Total Split (s)	14.0	21.0	28.0	35.0	35.0	18.0	57.0	57.0	14.0	53.0	53.0
Total Split (%)	11.7%	17.5%	23.3%	29.2%	29.2%	15.0%	47.5%	47.5%	11.7%	44.2%	44.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	26.3	14.3	44.3	28.3	28.3	66.5	50.0	50.0	59.5	46.5	46.5
Actuated g/C Ratio	0.22	0.12	0.37	0.24	0.24	0.56	0.42	0.42	0.50	0.39	0.39
v/c Ratio	0.76	0.94	1.00	0.43	0.91	0.85	0.94	0.29	0.46	0.75	0.50
Control Delay	49.4	56.9	76.0	42.2	48.7	47.0	46.6	7.9	23.3	35.9	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.4	56.9	76.0	42.2	48.7	47.0	46.6	7.9	23.3	35.9	4.4
LOS	D	E	E	D	D	D	D	A	C	D	A
Approach Delay		53.8		58.1			42.1			26.3	
Approach LOS		D		E			D			C	
Queue Length 50th (m)	42.0	36.9	86.1	40.4	72.6	35.2	172.1	8.9	11.0	116.6	0.0
Queue Length 95th (m)	#59.1	#93.5	#119.3	62.1	#123.7	#63.5	#222.2	18.3	17.2	143.3	13.1
Internal Link Dist (m)		159.7		135.1			77.3			127.3	
Turn Bay Length (m)	45.0				20.0	75.0		75.0	85.0		100.0
Base Capacity (vph)	310	363	425	453	537	307	1483	757	214	1380	888
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.91	1.00	0.42	0.90	0.83	0.94	0.29	0.46	0.75	0.50

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 119.3	
Natural Cycle: 105	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 41.9	Intersection LOS: D
Intersection Capacity Utilization 94.7%	ICU Level of Service F
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

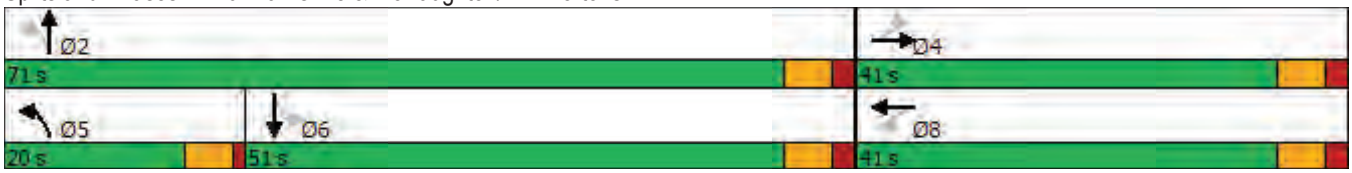
Splits and Phases: 3: Elmwood & TCH Ramps/Caledonia

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	10	19	129	18	99	199	1	464
Future Volume (vph)	10	19	129	18	99	199	1	464
Lane Group Flow (vph)	12	442	137	38	122	351	0	677
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	16.0	16.0	16.0	16.0	10.0	36.0	36.0	36.0
Minimum Split (s)	32.0	32.0	24.0	24.0	15.0	42.0	42.0	42.0
Total Split (s)	41.0	41.0	41.0	41.0	20.0	71.0	51.0	51.0
Total Split (%)	36.6%	36.6%	36.6%	36.6%	17.9%	63.4%	45.5%	45.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.0	6.0		6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Min	Min	Min
Act Effct Green (s)	35.0	35.0	35.0	35.0	53.0	52.0		36.0
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.54	0.53		0.36
v/c Ratio	0.02	0.54	0.71	0.06	0.31	0.19		0.56
Control Delay	21.8	7.3	51.0	16.7	13.6	8.1		27.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	21.8	7.3	51.0	16.7	13.6	8.1		27.0
LOS	C	A	D	B	B	A		C
Approach Delay		7.6		43.6		9.5		27.0
Approach LOS		A		D		A		C
Queue Length 50th (m)	1.5	8.2	23.2	3.4	11.7	11.7		54.7
Queue Length 95th (m)	5.3	3.8	#57.8	7.6	18.5	18.3		60.5
Internal Link Dist (m)		134.8		52.4		151.0		195.6
Turn Bay Length (m)					65.0			
Base Capacity (vph)	482	812	192	635	450	2246		1520
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.02	0.54	0.71	0.06	0.27	0.16		0.45

Intersection Summary	
Cycle Length: 112	
Actuated Cycle Length: 99	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 19.0	Intersection LOS: B
Intersection Capacity Utilization 113.4%	ICU Level of Service H
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 10: Harrisville & McNaughton/Tim Hortons

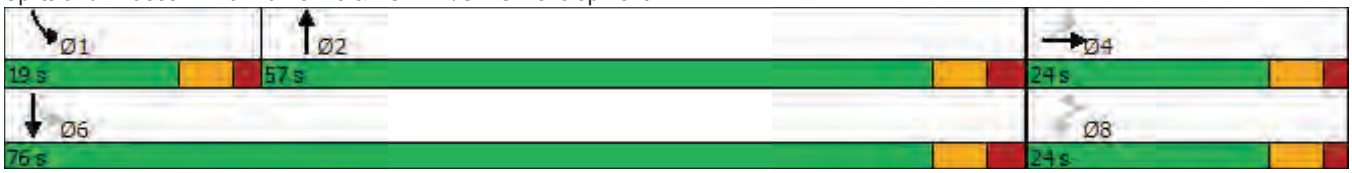


Lane Group	EBL	EBT	WBL	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	138	28	38	60	571	233	376
Future Volume (vph)	138	28	38	60	571	233	376
Lane Group Flow (vph)	206	399	41	240	629	299	515
Turn Type	Perm	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases		4			2	1	6
Permitted Phases	4		8	8		6	
Detector Phase	4	4	8	8	2	1	6
Switch Phase							
Minimum Initial (s)	14.0	14.0	5.0	5.0	20.0	10.0	20.0
Minimum Split (s)	20.0	20.0	24.0	24.0	27.0	16.0	27.0
Total Split (s)	24.0	24.0	24.0	24.0	57.0	19.0	76.0
Total Split (%)	24.0%	24.0%	24.0%	24.0%	57.0%	19.0%	76.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	7.0	6.0	7.0
Lead/Lag					Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	
Recall Mode	None	None	None	None	Min	None	Min
Act Effct Green (s)	16.2	16.2	16.2	16.2	34.9	53.6	52.6
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.43	0.65	0.64
v/c Ratio	0.59	0.65	0.46	0.48	0.80	0.72	0.43
Control Delay	40.3	11.0	51.4	8.3	28.8	19.9	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.3	11.0	51.4	8.3	28.8	19.9	8.4
LOS	D	B	D	A	C	B	A
Approach Delay		21.0			28.8		12.6
Approach LOS		C			C		B
Queue Length 50th (m)	31.1	4.1	6.0	0.0	86.6	18.1	37.4
Queue Length 95th (m)	45.3	35.0	#22.5	0.0	133.9	31.3	42.2
Internal Link Dist (m)		52.6			54.0		202.4
Turn Bay Length (m)							
Base Capacity (vph)	397	646	103	541	1156	446	1583
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.62	0.40	0.44	0.54	0.67	0.33

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 82.1	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 19.4	Intersection LOS: B
Intersection Capacity Utilization 88.0%	ICU Level of Service E
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 16: Harrisville & TCH EB/CIDG Development



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	21	111	103	26	91	26
Future Volume (Veh/h)	21	111	103	26	91	26
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.59	0.52	0.72	0.83	0.72
Hourly flow rate (vph)	27	188	198	36	110	36
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			215		553	121
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			215		553	121
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			85		74	96
cM capacity (veh/h)			1355		422	930

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	215	234	146
Volume Left	0	198	110
Volume Right	188	0	36
cSH	1700	1355	488
Volume to Capacity	0.13	0.15	0.30
Queue Length 95th (m)	0.0	4.1	10.0
Control Delay (s)	0.0	7.0	15.5
Lane LOS		A	C
Approach Delay (s)	0.0	7.0	15.5
Approach LOS			C

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	31.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	30	0	120	507	262	0	0	579	323
Future Volume (Veh/h)	0	0	0	30	0	120	507	262	0	0	579	323
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.25	0.50	0.64	0.93	0.96	0.92	0.92	0.77	0.61
Hourly flow rate (vph)	0	0	0	120	0	188	545	273	0	0	752	530
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								226			175	
pX, platoon unblocked	0.84	0.84	0.84	0.84	0.84		0.84					
vC, conflicting volume	2303	2115	752	2115	2645	273	1282			273		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2451	2228	614	2228	2856	273	1242			273		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	100	0	0	75	0			100		
cM capacity (veh/h)	0	0	415	0	0	766	473			1290		

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	120	188	545	273	752	530
Volume Left	120	0	545	0	0	0
Volume Right	0	188	0	0	0	530
cSH	0	766	473	1700	1700	1700
Volume to Capacity	Err	0.25	1.15	0.16	0.44	0.31
Queue Length 95th (m)	Err	7.7	155.6	0.0	0.0	0.0
Control Delay (s)	Err	11.2	118.0	0.0	0.0	0.0
Lane LOS	F	B	F			
Approach Delay (s)	Err		78.6		0.0	
Approach LOS	F					

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	71.9%	ICU Level of Service	C	
Analysis Period (min)	15			

Appendix D
Operator Trip Generation

	Autos				Trailers				Vans				Total		
	In	Out	Total	Net	In	Out	Total		In	Out	Total		In	Out	Total
00:00	57	0	57	100	0	0	0		0	0	0		57	0	57
00:30	12	0	12	112	0	0	0		0	0	0		12	0	12
01:00	2	0	2	114	0	0	0		0	0	0		2	0	2
01:30	2	0	2	116	0	0	0		0	0	0		2	0	2
02:00	0	0	0	116	0	0	0		0	0	0		0	0	0
02:30	0	0	0	116	0	0	0		0	0	0		0	0	0
03:00	0	0	0	116	0	0	0		0	0	0		0	0	0
03:30	2	0	2	118	0	0	0		0	0	0		2	0	2
04:00	1	0	1	119	0	0	0		0	2	2		1	2	3
04:30	1	0	1	120	0	0	0		0	0	0		1	0	1
05:00	8	0	8	128	0	0	0		0	0	0		8	0	8
05:30	15	0	15	143	0	6	6		0	7	7		15	13	29
06:00	27	0	27	170	0	0	0		0	13	14		27	13	40
06:30	20	48	68	142	0	0	0		0	25	25		20	73	92
07:00	27	59	86	110	0	0	0		0	16	16		27	75	102
07:30	48	12	60	146	0	0	0		0	22	23		48	34	82
08:00	24	0	24	170	0	0	0		0	43	43		24	43	66
08:30	15	0	15	185	0	0	0		0	22	22		15	22	37
09:00	3	0	3	188	6	0	6		0	13	14		10	13	23
09:30	2	0	2	190	0	6	6		0	2	3		2	9	10
10:00	1	0	1	191	0	0	0		0	1	1		1	1	2
10:30	1	2	3	190	0	0	0		2	0	3		3	2	6
11:00	0	2	2	188	0	0	0		0	0	0		0	2	2
11:30	0	3	3	185	0	0	0		1	0	1		1	3	4
12:00	0	4	4	181	0	0	0		4	0	4		4	4	8
12:30	0	2	2	179	0	0	0		2	0	3		2	2	5
13:00	0	5	5	174	0	0	0		5	0	5		5	5	9
13:30	3	4	7	173	0	0	0		4	0	4		7	4	11
14:00	2	13	15	162	0	0	0		10	1	11		12	14	26
14:30	0	15	15	147	0	0	0		12	0	12		12	15	26
15:00	0	22	22	125	0	0	0		21	0	21		21	22	43
15:30	0	24	24	101	0	0	0		23	0	24		23	24	48
16:00	0	27	27	74	6	0	6		26	0	26		32	27	59
16:30	0	16	16	58	6	0	6		14	0	14		20	16	36
17:00	0	25	25	33	6	0	6		22	0	23		29	25	54
17:30	2	14	16	21	6	0	6		10	0	11		18	14	33
18:00	2	7	9	16	6	0	6		5	0	5		13	7	20
18:30	0	8	8	8	6	0	6		4	0	4		10	8	18
19:00	0	5	5	3	0	0	0		2	0	2		2	5	6
19:30	0	3	3	0	0	0	0		0	0	0		0	3	3
20:00	0	0	0	0	0	0	0		0	0	0		0	0	0
20:30	0	0	0	0	0	0	0		0	0	0		0	0	0
21:00	0	0	0	0	0	0	0		0	0	0		0	0	0
21:30	0	0	0	0	0	0	0		0	0	0		0	0	0
22:00	0	0	0	0	0	6	6		0	0	0		0	6	6
22:30	2	0	2	2	0	6	6		0	0	0		2	6	8
23:00	2	2	4	2	0	6	6		0	0	0		2	8	10
23:30	46	5	51	43	0	13	13		0	0	0		46	18	64
	326	326	652		45	45	89		166	166	343		537	537	1,073

Appendix E
TAC Signal Warrant Results

Moncton - Traffic Signal & Pedestrian Signal Head Warrant Analysis

Main Street (name)	Harrisville	Direction (EW or NS)	NS	Road Authority:	Moncton
Side Street (name)	TCH WB	Direction (EW or NS)	EW	City:	Moncton
Quadrant / Int #		Comments	2022 Existing	Analysis Date:	2022 May 13, Fri
	CHECK SHEET			Count Date:	2022 Mar 26, Sat
for Warrant Calculation Results, please hit 'Page Down'				Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	RT Channelization (y/n)	UpStream Signal (m)	# of Thru Lanes	LT Phase Type	RTOR Allowed (y/n)	Actuated Thru Phase
Harrisville	NB	1		1				n	160	1	pm+pt	y	n
Harrisville	SB			1			1	n	230	1		y	n
TCH WB	WB				1			n	5,000	1	prot	y	y
TCH WB	EB									0			
Are the TCH WB WB right turns significantly impeded by through movements? (y/n)							n						

Saturation Flow Rates (if not default) (vphpl)		Default Saturation Flow Rates (vphpl)
Left Turn		1,650
Through		1,800
Right Turn		1,500

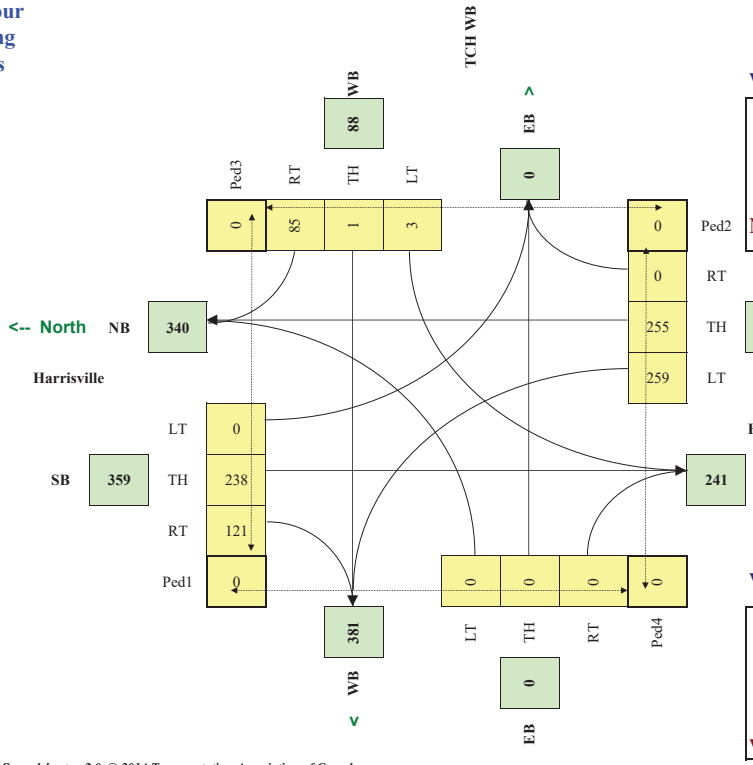
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	119,785
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Harrisville	NS	50	17.0%	n	0.0
TCH WB	EW		30.0%	n	0.0

Set Peak Hours

Traffic Input		NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
		LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
7:00 - 8:00		277	376	0	0	229	122	1	0	129	0	0	0	0	0	0	0
		197	241	0	0	198	80	2	1	77	0	0	0	0	0	0	0
		243	305	0	0	284	136	3	1	88	0	0	0	0	0	0	0
		197	272	0	0	230	121	3	0	98	0	0	0	0	0	0	0
		391	195	0	0	339	215	4	1	60	0	0	0	0	0	0	0
		247	140	0	0	149	53	4	1	56	0	0	0	0	0	0	0
Total (6-hour peak)		1,552	1,529	0	0	1,429	727	17	4	508	0	0	0	0	0	0	0
Average (6-hour peak)		259	255	0	0	238	121	3	1	85	0	0	0	0	0	0	0
														Actual Pedestrian Crossing Distance (m)			

Average 6-hour Peak Turning Movements



$W_{SIG} = [C_{bt}(X_{v\text{-}v}) / K_1 + (F (X_{v\text{-}p}) L) / K_2] \times C_i$

W =	71	71	0
		Veh	*Ped*

NOT Warranted

RESET SHEET

$W_{PED} = [F ((Xped_m)d_m/K_2) + (Xped_s)d_s/K_3)]$

W = 0

Warranted - Complex Intersection

Moncton - Traffic Signal & Pedestrian Signal Head Warrant Analysis

Main Street (name)	Harrisville	Direction (EW or NS)	NS	Road Authority:	Moncton
Side Street (name)	TCH WB	Direction (EW or NS)	EW	City:	Moncton
Quadrant / Int #		Comments	2028 Background	Analysis Date:	2022 May 13, Fri
	CHECK SHEET			Count Date:	2022 Mar 26, Sat
for Warrant Calculation Results, please hit 'Page Down'				Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	RT Channelization (y/n)	UpStream Signal (m)	# of Thru Lanes	LT Phase Type	RTOR Allowed (y/n)	Actuated Thru Phase
Harrisville	NB	1		1				n	160	1	pm+pt	y	n
Harrisville	SB			1			1	n	230	1		y	n
TCH WB	WB				1			n	5,000	1	prot	y	y
TCH WB	EB									0			
Are the TCH WB WB right turns significantly impeded by through movements? (y/n)							n						

Saturation Flow Rates (if not default) (vphpl)		Default Saturation Flow Rates (vphpl)
Left Turn		1,650
Through		1,800
Right Turn		1,500

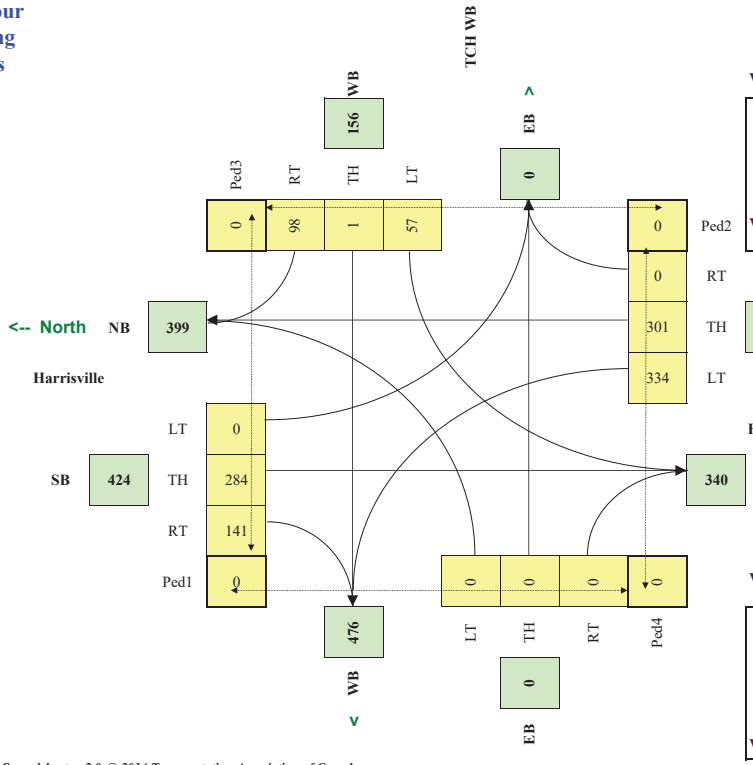
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	119,785
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Harrisville	NS	50	17.0%	n	0.0
TCH WB	EW		30.0%	n	0.0

Set Peak Hours

Traffic Input		NB			SB			WB			EB			Ped1	Ped2	Ped3	Ped4
		LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	NS W Side	NS E Side	EW N Side	EW S Side
7:00 - 8:00		347.32	440.16	0	0	274.64	141.52	67.16	0	149.64	0	0	0	0	0	0	0
		254.52	283.56	0	0	238.68	92.8	68.32	1.16	89.32	0	0	0	0	0	0	0
		307.88	357.8	0	0	338.44	157.76	69.48	1.16	102.08	0	0	0	0	0	0	0
		254.52	319.52	0	0	275.8	140.36	69.48	0	113.68	0	0	0	0	0	0	0
		504.56	233.2	0	0	397.24	249.4	32.64	1.16	69.6	0	0	0	0	0	0	0
		337.52	169.4	0	0	176.84	61.48	32.64	1.16	64.96	0	0	0	0	0	0	0
Total (6-hour peak)		2,006	1,804	0	0	1,702	843	340	5	589	0	0	0	0	0	0	0
Average (6-hour peak)		334	301	0	0	284	141	57	1	98	0	0	0	0	0	0	0
														Actual Pedestrian Crossing Distance (m)			

Average 6-hour Peak Turning Movements



$W_{SIG} = [C_{bt}(X_{v-v}) / K_1 + (F (X_{v-p}) L) / K_2] \times C_i$

W =	137	137	0
		Veh	*Ped*

Warranted

RESET SHEET

$W_{PED} = [F ((Xped_m)d_m/K_2) + (Xped_s)d_s/K_3)]$

W = 0

Warranted - Complex Intersection

Moncton - Traffic Signal & Pedestrian Signal Head Warrant Analysis

Main Street (name)	Harrisville	Direction (EW or NS)	NS
Side Street (name)	TCH WB	Direction (EW or NS)	EW
Quadrant / Int #		Comments	2527 Background

CHECK SHEET

for Warrant Calculation Results, please hit 'Page Down'

Road Authority:	Moncton
City:	Moncton
Analysis Date:	2522 May 13, Fri
Count Date:	2522 Mar 26, Sat
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	RT Channelization (y/n)	UpStream Signal (m)	# of Thru Lanes	LT Phase Type	RTOR Allowed (y/n)	Actuated Thru Phase
Harrisville	NB	1		1				n	160	1	pm+pt	y	n
Harrisville	SB			1			1	n	230	1		y	n
TCH WB	WB				1			n	5,000	1	prot	y	y
TCH WB	EB									0			
Are the TCH WB WB right turns significantly impeded by through movements? (y/n)							n						

Saturation Flow Rates (if not default) (vphpl)		Default Saturation Flow Rates (vphpl)
Left Turn		1,650
Through		1,800
Right Turn		1,500

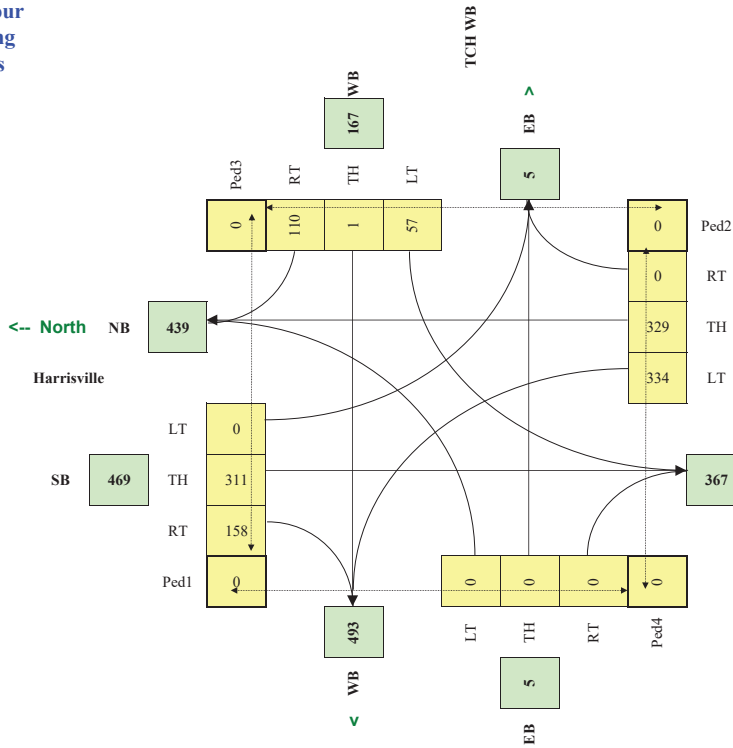
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	119,785
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Harrisville	NS	50	17.0%	n	0.0
TCH WB	EW		30.0%	n	0.0

Set Peak Hours

Traffic Input		NB			SB			WB			EB			Ped1	Ped2	Ped3	Ped4
		LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	NS W Side	NS E Side	EW N Side	EW S Side
0:55 - 7:55		347.32	469.16	0	0	308.64	162.52	67.16	0	160.64	0	0	0	0	0	0	0
		254.52	312.56	0	0	272.68	113.8	68.32	1.16	100.32	0	0	0	0	0	0	0
		307.88	386.8	0	0	372.44	178.76	69.48	1.16	113.08	0	0	0	0	0	0	0
		254.52	348.52	0	0	309.8	161.36	69.48	0	124.68	0	0	0	0	0	0	0
		504.56	261.2	0	0	412.24	258.4	32.64	1.16	83.6	0	0	0	0	0	0	0
		337.52	197.4	0	0	191.84	70.48	32.64	1.16	78.96	0	0	0	0	0	0	0
Total (6-hour peak)		2,556	1,906	5	5	1,767	948	345	8	661	5	5	5	5	5	5	5
Average (6-hour peak)		334	329	5	5	311	187	80	1	115	5	5	5	5	5	5	5
														Actual Pedestrian Crossing Distance (m)			

Average 6-hour Peak Turning Movements



$W_{SIG} = [C_{bt}(X_{v\text{-}v}) / K_1 + (F (X_{v\text{-}p}) L) / K_2] \times C_i$

W =	182	182	5
		Veh	*Ped*

Warranted

RESET SHEET

$W_{PED} = [F ((Xped_m)d_m/K_2) + (Xped_s)d_s/K_3)]$

W = 5

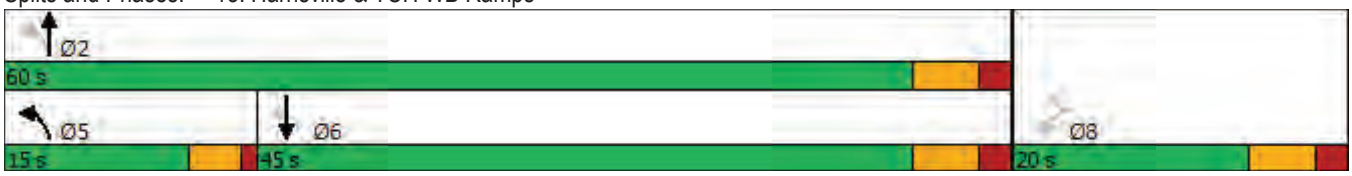
Warranted - Complex Intersection

Appendix F
Intersection Improvement Analyses

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	67	197	358	578	332	146
Future Volume (vph)	67	197	358	578	332	146
Lane Group Flow (vph)	268	318	442	696	391	187
Turn Type	Perm	Perm	pm+pt	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	8	8	2			6
Detector Phase	8	8	5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	8.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	12.5	26.0	26.0	26.0
Total Split (s)	20.0	20.0	15.0	60.0	45.0	45.0
Total Split (%)	25.0%	25.0%	18.8%	75.0%	56.3%	56.3%
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	6.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	Min	Min	Min
Act Effct Green (s)	13.4	13.4	38.2	36.2	21.2	21.2
Actuated g/C Ratio	0.22	0.22	0.62	0.59	0.34	0.34
v/c Ratio	0.70	0.56	0.75	0.64	0.61	0.28
Control Delay	34.2	8.8	15.8	11.8	21.7	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	8.8	15.8	11.8	21.7	3.8
LOS	C	A	B	B	C	A
Approach Delay				13.3	15.9	
Approach LOS				B	B	
Queue Length 50th (m)	28.8	3.1	23.5	49.6	38.5	0.0
Queue Length 95th (m)	12.9	4.9	33.4	68.5	58.6	7.3
Internal Link Dist (m)				202.4	151.0	
Turn Bay Length (m)			60.0			
Base Capacity (vph)	402	580	593	1635	1181	1072
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.55	0.75	0.43	0.33	0.17

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 61.6	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 15.8	Intersection LOS: B
Intersection Capacity Utilization 52.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 13: Harrisville & TCH WB Ramps

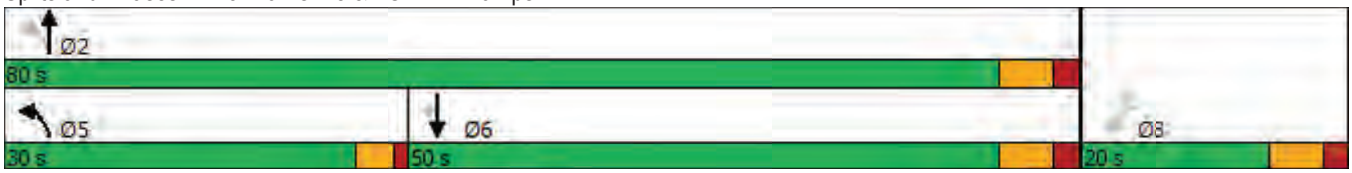


Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	30	105	507	234	564	315
Future Volume (vph)	30	105	507	234	564	315
Lane Group Flow (vph)	120	164	545	244	732	516
Turn Type	Perm	Perm	pm+pt	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	8	8	2			6
Detector Phase	8	8	5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	8.0	20.0	20.0	20.0
Minimum Split (s)	16.0	16.0	24.0	26.0	26.0	26.0
Total Split (s)	20.0	20.0	30.0	80.0	50.0	50.0
Total Split (%)	20.0%	20.0%	30.0%	80.0%	50.0%	50.0%
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	6.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	Min	Min	Min
Act Effct Green (s)	11.9	11.9	72.4	70.4	40.3	40.3
Actuated g/C Ratio	0.13	0.13	0.77	0.75	0.43	0.43
v/c Ratio	0.54	0.48	0.95	0.18	0.92	0.55
Control Delay	49.3	11.5	55.0	3.9	44.2	5.6
Queue Delay	0.0	0.0	0.0	0.0	5.9	0.1
Total Delay	49.3	11.5	55.0	3.9	50.2	5.7
LOS	D	B	D	A	D	A
Approach Delay				39.2	31.8	
Approach LOS				D	C	
Queue Length 50th (m)	22.9	0.0	88.3	11.2	128.3	7.4
Queue Length 95th (m)	10.5	4.0	#164.5	19.7	145.5	0.1
Internal Link Dist (m)				202.4	151.0	
Turn Bay Length (m)			60.0			
Base Capacity (vph)	263	375	572	1467	872	980
Starvation Cap Reductn	0	0	0	0	99	31
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.44	0.95	0.17	0.95	0.54

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 94.4	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.95	
Intersection Signal Delay: 33.8	Intersection LOS: C
Intersection Capacity Utilization 72.8%	ICU Level of Service C
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 13: Harrisville & TCH WB Ramps



Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	67	208	358	607	366	168
Future Volume (vph)	67	208	358	607	366	168
Lane Group Flow (vph)	268	335	442	731	431	215
Turn Type	Perm	Perm	pm+pt	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	8	8	2			6
Detector Phase	8	8	5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	8.0	20.0	20.0	20.0
Minimum Split (s)	16.0	16.0	12.0	26.0	26.0	26.0
Total Split (s)	20.0	20.0	15.0	60.0	45.0	45.0
Total Split (%)	25.0%	25.0%	18.8%	75.0%	56.3%	56.3%
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	6.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	Min	Min	Min
Act Effct Green (s)	13.4	13.4	39.2	37.2	22.1	22.1
Actuated g/C Ratio	0.21	0.21	0.63	0.59	0.35	0.35
v/c Ratio	0.71	0.61	0.78	0.66	0.66	0.31
Control Delay	35.9	11.6	18.3	12.1	22.5	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	11.6	18.3	12.1	22.5	3.6
LOS	D	B	B	B	C	A
Approach Delay				14.5	16.2	
Approach LOS				B	B	
Queue Length 50th (m)	28.8	6.6	23.5	53.4	43.6	0.0
Queue Length 95th (m)	13.7	8.8	#33.0	72.8	64.7	7.3
Internal Link Dist (m)				202.4	151.0	
Turn Bay Length (m)			60.0			
Base Capacity (vph)	397	561	565	1611	1163	1069
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.60	0.78	0.45	0.37	0.20

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 62.7	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 16.9	Intersection LOS: B
Intersection Capacity Utilization 54.8%	ICU Level of Service A
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

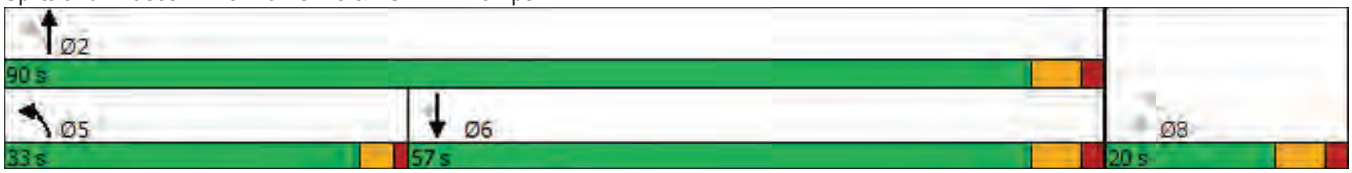
Splits and Phases: 13: Harrisville & TCH WB Ramps

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	30	120	507	262	579	323
Future Volume (vph)	30	120	507	262	579	323
Lane Group Flow (vph)	120	188	545	273	752	530
Turn Type	Perm	Perm	pm+pt	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	8	8	2			6
Detector Phase	8	8	5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	8.0	20.0	20.0	20.0
Minimum Split (s)	16.0	16.0	12.0	26.0	26.0	26.0
Total Split (s)	20.0	20.0	33.0	90.0	57.0	57.0
Total Split (%)	18.2%	18.2%	30.0%	81.8%	51.8%	51.8%
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	6.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	Min	Min	Min
Act Effct Green (s)	12.1	12.1	80.3	78.3	45.0	45.0
Actuated g/C Ratio	0.12	0.12	0.78	0.76	0.44	0.44
v/c Ratio	0.57	0.53	0.94	0.19	0.92	0.57
Control Delay	56.0	12.5	54.5	3.8	44.7	6.7
Queue Delay	0.0	0.0	0.0	0.0	8.7	0.2
Total Delay	56.0	12.5	54.5	3.8	53.4	6.9
LOS	E	B	D	A	D	A
Approach Delay				37.6	34.2	
Approach LOS				D	C	
Queue Length 50th (m)	25.8	0.0	100.8	13.3	144.6	12.8
Queue Length 95th (m)	11.6	3.0	#178.0	21.6	157.6	3.6
Internal Link Dist (m)				202.4	151.0	
Turn Bay Length (m)			60.0			
Base Capacity (vph)	243	380	580	1539	934	1006
Starvation Cap Reductn	0	0	0	0	154	92
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.49	0.94	0.18	0.96	0.58

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 102.5	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 34.7	Intersection LOS: C
Intersection Capacity Utilization 73.6%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 13: Harrisville & TCH WB Ramps

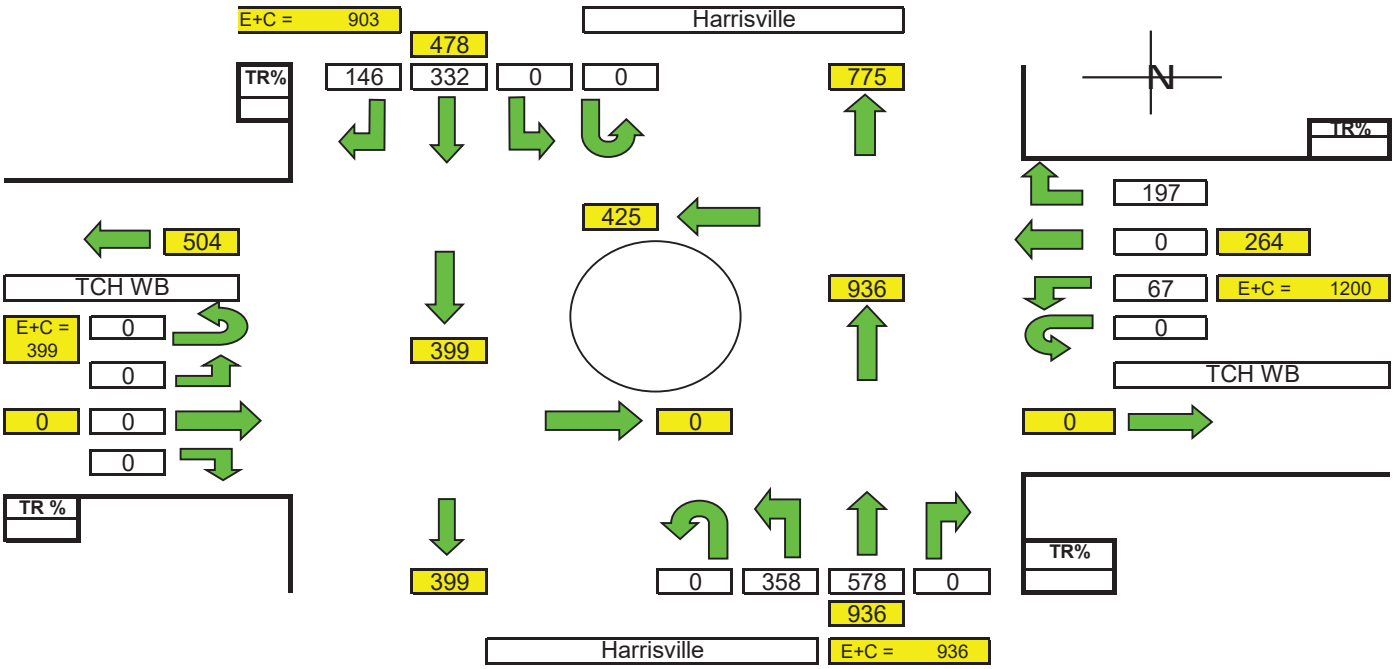


REGION OF WATERLOO
ROUNDABOUT TRAFFIC FLOW SHEET

VERSION 1.1 MARCH 12, 2009

Project: Ruedebusch Moncton
Project No.:
Intersection: Harrisville @ TCH WB
Time Period: AM Peak

Drawn By: Andrew Northmore
Sheet of

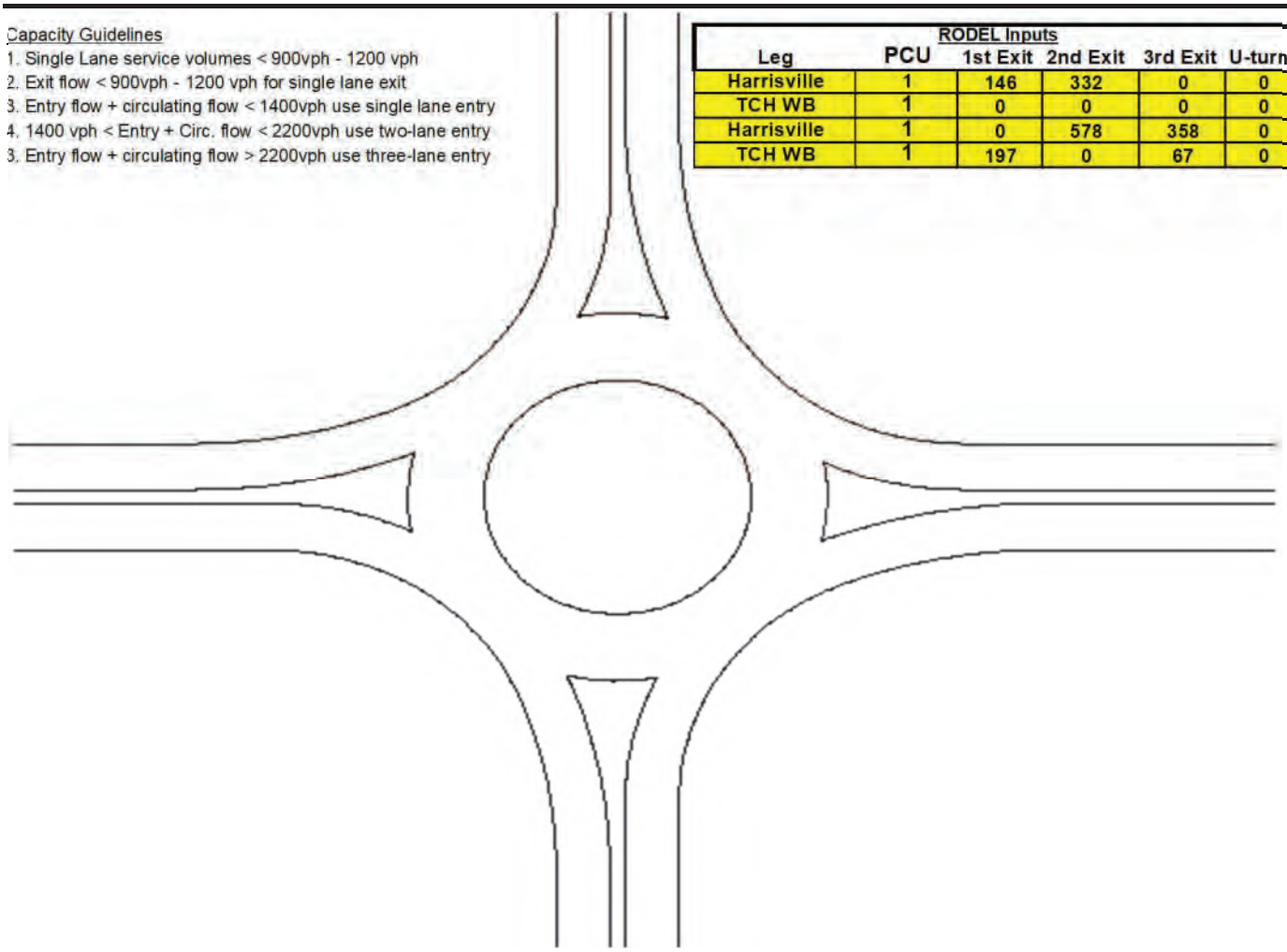


Capacity Guidelines

1. Single Lane service volumes < 900vph - 1200 vph
2. Exit flow < 900vph - 1200 vph for single lane exit
3. Entry flow + circulating flow < 1400vph use single lane entry
4. 1400 vph < Entry + Circ. flow < 2200vph use two-lane entry
3. Entry flow + circulating flow > 2200vph use three-lane entry

RODEL Inputs

Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
Harrisville	1	146	332	0	0
TCH WB	1	0	0	0	0
Harrisville	1	0	578	358	0
TCH WB	1	197	0	67	0

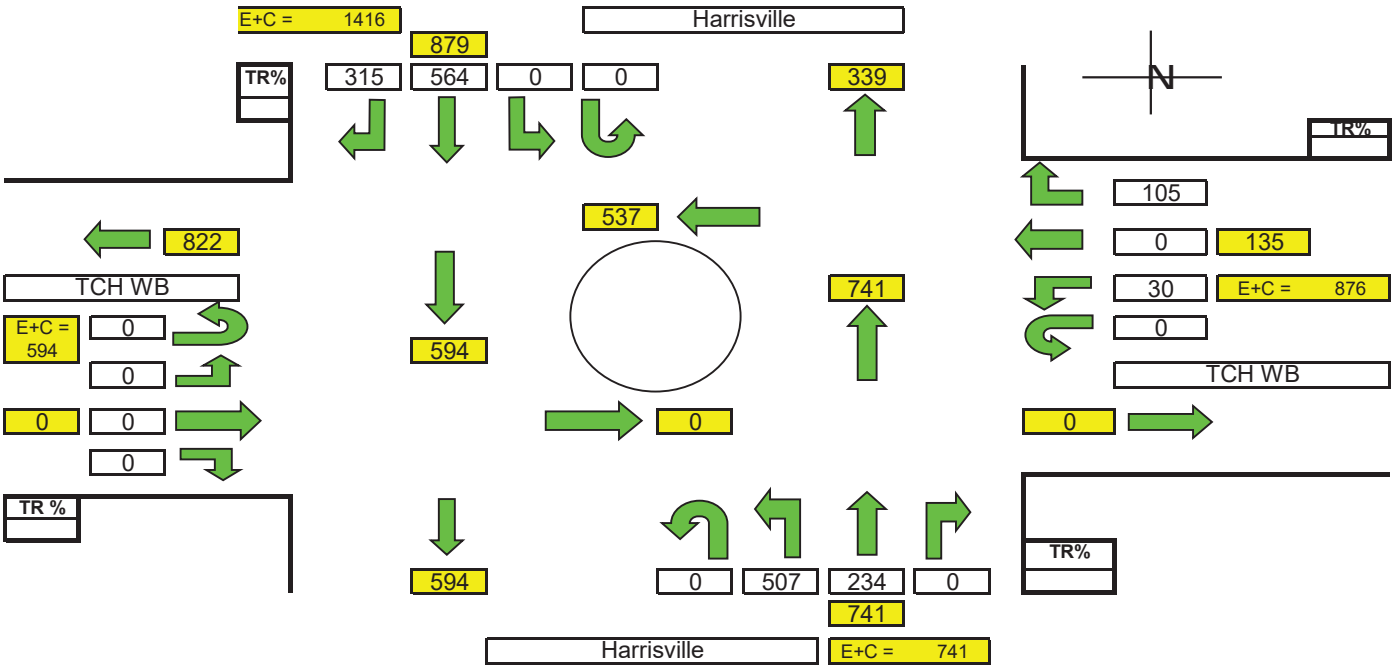


REGION OF WATERLOO
ROUNDABOUT TRAFFIC FLOW SHEET

VERSION 1.1 MARCH 12, 2009

Project: Ruedebusch Moncton
Project No.:
Intersection: Harrisville @ TCH WB
Time Period: PM Peak

Drawn By: Andrew Northmore
Sheet of

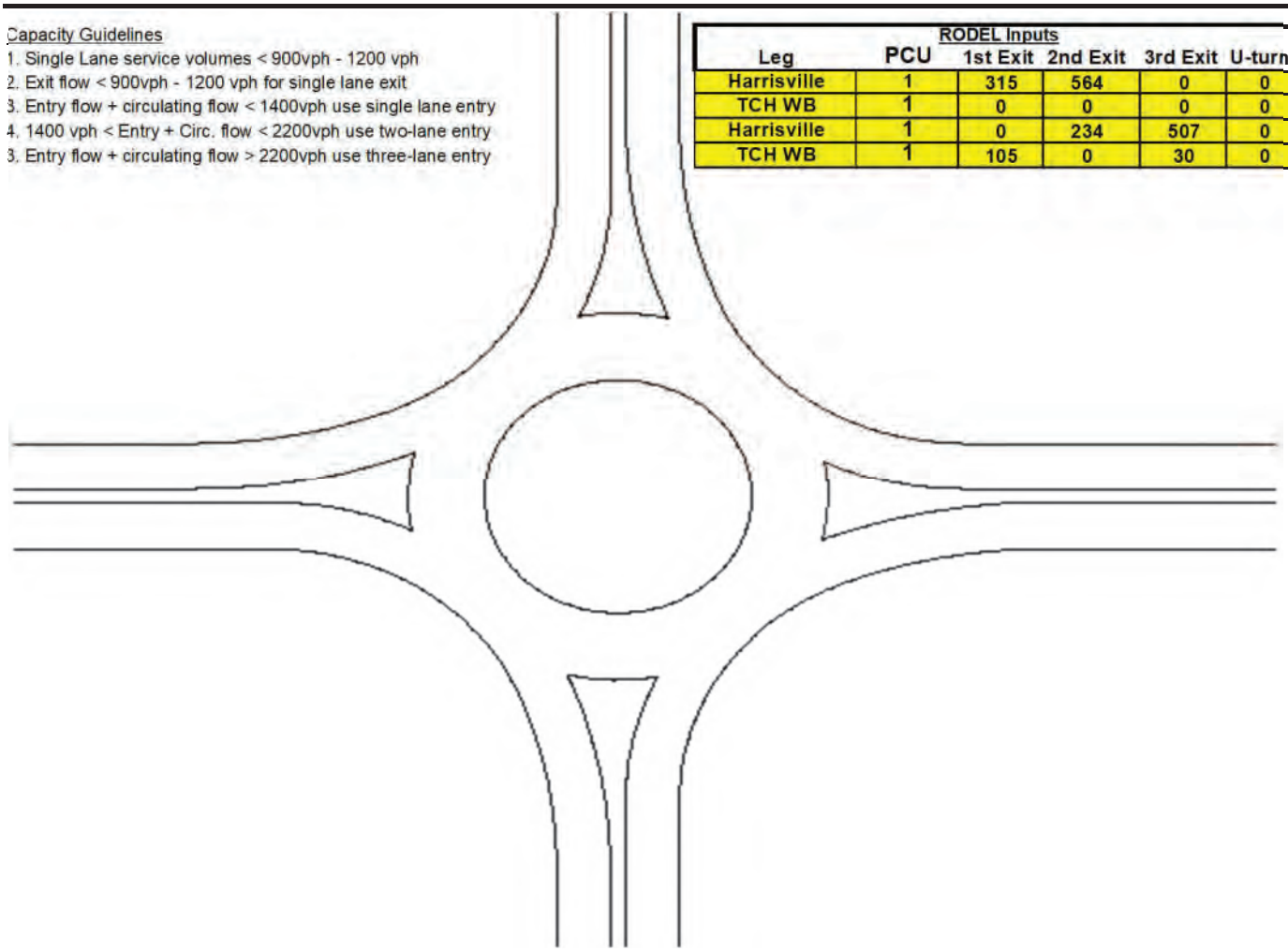


Capacity Guidelines

1. Single Lane service volumes < 900vph - 1200 vph
2. Exit flow < 900vph - 1200 vph for single lane exit
3. Entry flow + circulating flow < 1400vph use single lane entry
4. 1400 vph < Entry + Circ. flow < 2200vph use two-lane entry
3. Entry flow + circulating flow > 2200vph use three-lane entry

RODEL Inputs

Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
Harrisville	1	315	564	0	0
TCH WB	1	0	0	0	0
Harrisville	1	0	234	507	0
TCH WB	1	105	0	30	0

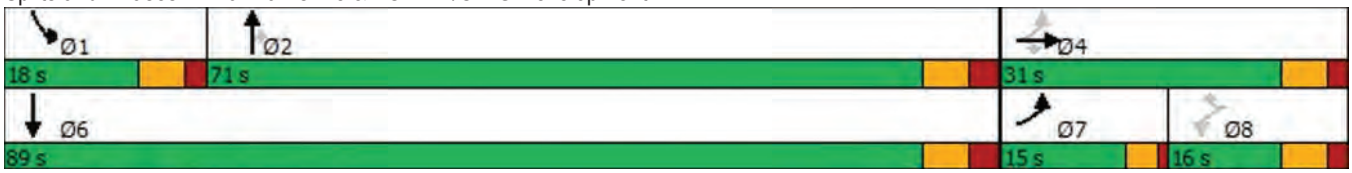


Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	222	66	348	17	31	683	49	234	165
Future Volume (vph)	222	66	348	17	31	683	49	234	165
Lane Group Flow (vph)	271	72	527	18	124	719	98	339	204
Turn Type	pm+pt	NA	Perm	Perm	Perm	NA	Perm	Prot	NA
Protected Phases	7	4				2		1	6
Permitted Phases	4		4	8	8		2		
Detector Phase	7	4	4	8	8	2	2	1	6
Switch Phase									
Minimum Initial (s)	8.0	14.0	14.0	10.0	10.0	20.0	20.0	10.0	20.0
Minimum Split (s)	12.0	24.0	24.0	16.0	16.0	27.0	27.0	16.0	27.0
Total Split (s)	15.0	31.0	31.0	16.0	16.0	71.0	71.0	18.0	89.0
Total Split (%)	12.5%	25.8%	25.8%	13.3%	13.3%	59.2%	59.2%	15.0%	74.2%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	7.0	7.0	6.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	Min	Min	None	Min
Act Effct Green (s)	27.3	25.3	25.3	10.1	10.1	47.0	47.0	12.1	65.2
Actuated g/C Ratio	0.26	0.24	0.24	0.10	0.10	0.45	0.45	0.12	0.63
v/c Ratio	0.58	0.16	0.67	0.14	0.46	0.85	0.13	0.84	0.17
Control Delay	41.7	35.9	8.2	50.7	14.5	35.4	2.0	66.1	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.7	35.9	8.2	50.7	14.5	35.4	2.0	66.1	8.0
LOS	D	D	A	D	B	D	A	E	A
Approach Delay		20.9				31.4			44.3
Approach LOS		C				C			D
Queue Length 50th (m)	49.9	12.0	0.0	3.6	0.0	130.0	0.0	36.7	16.3
Queue Length 95th (m)	82.6	28.3	0.0	12.0	0.0	179.4	0.0	#45.9	22.5
Internal Link Dist (m)		52.6				54.0			202.4
Turn Bay Length (m)			30.0					80.0	
Base Capacity (vph)	466	454	784	129	269	1163	1033	402	1491
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.16	0.67	0.14	0.46	0.62	0.09	0.84	0.14

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 103.7	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 29.8	Intersection LOS: C
Intersection Capacity Utilization 79.1%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 16: Harrisville & TCH EB/CIDG Development



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	120	28	321	38	60	561	20	227	367
Future Volume (vph)	120	28	321	38	60	561	20	227	367
Lane Group Flow (vph)	179	30	369	41	240	597	22	291	503
Turn Type	pm+pt	NA	Perm	Perm	Perm	NA	Perm	Prot	NA
Protected Phases	7	4				2		1	6
Permitted Phases	4		4	8	8		2		
Detector Phase	7	4	4	8	8	2	2	1	6
Switch Phase									
Minimum Initial (s)	8.0	14.0	14.0	5.0	5.0	20.0	20.0	10.0	20.0
Minimum Split (s)	13.0	20.0	20.0	24.0	24.0	27.0	27.0	16.0	27.0
Total Split (s)	13.0	37.0	37.0	24.0	24.0	46.0	46.0	17.0	63.0
Total Split (%)	13.0%	37.0%	37.0%	24.0%	24.0%	46.0%	46.0%	17.0%	63.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	7.0	7.0	6.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	Min	Min	None	Min
Act Effct Green (s)	23.4	21.4	21.4	8.5	8.5	32.8	32.8	10.9	49.8
Actuated g/C Ratio	0.28	0.25	0.25	0.10	0.10	0.39	0.39	0.13	0.59
v/c Ratio	0.36	0.06	0.56	0.30	0.64	0.82	0.03	0.66	0.46
Control Delay	28.3	26.1	8.1	42.9	13.8	34.3	0.1	44.9	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	26.1	8.1	42.9	13.8	34.3	0.1	44.9	11.5
LOS	C	C	A	D	B	C	A	D	B
Approach Delay		15.3				33.1			23.8
Approach LOS		B				C			C
Queue Length 50th (m)	25.6	4.1	3.8	6.8	0.0	87.9	0.0	25.4	42.9
Queue Length 95th (m)	32.3	11.2	23.7	17.2	0.0	#145.1	0.0	36.3	55.7
Internal Link Dist (m)		52.6				54.0			202.4
Turn Bay Length (m)			30.0					80.0	
Base Capacity (vph)	491	693	803	297	530	872	816	453	1252
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.04	0.46	0.14	0.45	0.68	0.03	0.64	0.40

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 84.4	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 23.4	Intersection LOS: C
Intersection Capacity Utilization 67.0%	ICU Level of Service C
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

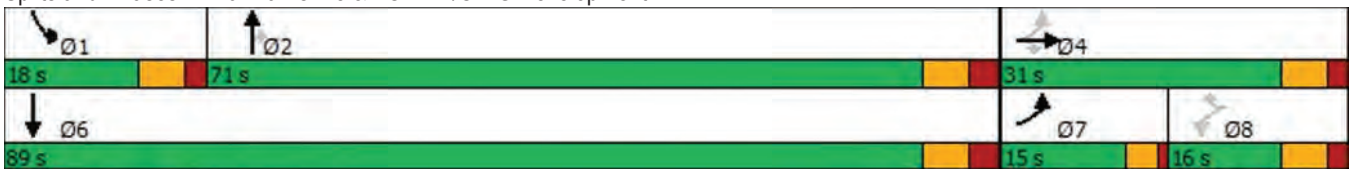
Splits and Phases: 16: Harrisville & TCH EB/CIDG Development

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	233	66	348	17	31	700	49	249	183
Future Volume (vph)	233	66	348	17	31	700	49	249	183
Lane Group Flow (vph)	284	72	527	18	124	737	98	361	226
Turn Type	pm+pt	NA	Perm	Perm	Perm	NA	Perm	Prot	NA
Protected Phases	7	4				2		1	6
Permitted Phases	4		4	8	8		2		
Detector Phase	7	4	4	8	8	2	2	1	6
Switch Phase									
Minimum Initial (s)	8.0	14.0	14.0	10.0	10.0	20.0	20.0	10.0	20.0
Minimum Split (s)	12.0	24.0	24.0	16.0	16.0	27.0	27.0	16.0	27.0
Total Split (s)	15.0	31.0	31.0	16.0	16.0	71.0	71.0	18.0	89.0
Total Split (%)	12.5%	25.8%	25.8%	13.3%	13.3%	59.2%	59.2%	15.0%	74.2%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	7.0	7.0	6.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	Min	Min	None	Min
Act Effct Green (s)	27.3	25.3	25.3	10.1	10.1	48.7	48.7	12.1	67.0
Actuated g/C Ratio	0.26	0.24	0.24	0.10	0.10	0.46	0.46	0.11	0.64
v/c Ratio	0.62	0.16	0.68	0.14	0.47	0.86	0.12	0.91	0.19
Control Delay	43.8	36.7	8.4	51.4	14.7	35.6	2.0	76.3	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.8	36.7	8.4	51.4	14.7	35.6	2.0	76.3	8.0
LOS	D	D	A	D	B	D	A	E	A
Approach Delay		22.1				31.6			50.0
Approach LOS		C				C			D
Queue Length 50th (m)	54.7	12.4	0.0	3.7	0.0	135.5	0.0	40.5	18.3
Queue Length 95th (m)	86.8	28.3	0.0	12.0	0.0	186.9	0.0	#51.9	24.6
Internal Link Dist (m)		52.6				54.0			202.4
Turn Bay Length (m)			30.0					80.0	
Base Capacity (vph)	458	447	780	127	266	1144	1018	395	1466
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.16	0.68	0.14	0.47	0.64	0.10	0.91	0.15

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 105.4	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 31.9	Intersection LOS: C
Intersection Capacity Utilization 80.6%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 16: Harrisville & TCH EB/CIDG Development



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	138	28	321	38	60	571	20	233	376
Future Volume (vph)	138	28	321	38	60	571	20	233	376
Lane Group Flow (vph)	206	30	369	41	240	607	22	299	515
Turn Type	pm+pt	NA	Perm	Perm	Perm	NA	Perm	Prot	NA
Protected Phases	7	4				2		1	6
Permitted Phases	4		4	8	8		2		
Detector Phase	7	4	4	8	8	2	2	1	6
Switch Phase									
Minimum Initial (s)	8.0	14.0	14.0	5.0	5.0	20.0	20.0	10.0	20.0
Minimum Split (s)	12.0	20.0	20.0	24.0	24.0	27.0	27.0	16.0	27.0
Total Split (s)	13.0	37.0	37.0	24.0	24.0	46.0	46.0	17.0	63.0
Total Split (%)	13.0%	37.0%	37.0%	24.0%	24.0%	46.0%	46.0%	17.0%	63.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	7.0	7.0	6.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	Min	Min	None	Min
Act Effct Green (s)	23.6	21.6	21.6	8.5	8.5	33.4	33.4	10.9	50.3
Actuated g/C Ratio	0.28	0.25	0.25	0.10	0.10	0.39	0.39	0.13	0.59
v/c Ratio	0.42	0.06	0.57	0.30	0.64	0.83	0.03	0.68	0.47
Control Delay	29.4	26.2	8.8	43.1	13.9	34.8	0.1	46.1	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	26.2	8.8	43.1	13.9	34.8	0.1	46.1	11.7
LOS	C	C	A	D	B	C	A	D	B
Approach Delay		16.6				33.6			24.3
Approach LOS		B				C			C
Queue Length 50th (m)	30.4	4.1	5.2	6.9	0.0	90.0	0.0	26.5	44.4
Queue Length 95th (m)	36.8	11.2	26.0	17.2	0.0	#151.6	0.0	37.3	57.5
Internal Link Dist (m)		52.6				54.0			202.4
Turn Bay Length (m)			30.0					80.0	
Base Capacity (vph)	491	686	792	294	527	864	810	449	1240
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.04	0.47	0.14	0.46	0.70	0.03	0.67	0.42

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 85.1	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 24.1	Intersection LOS: C
Intersection Capacity Utilization 68.5%	ICU Level of Service C
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

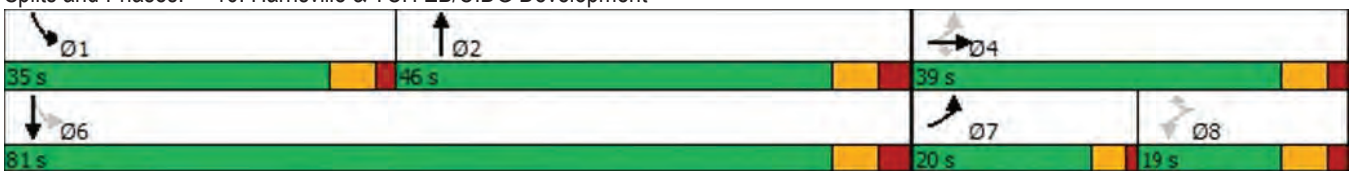
Queue shown is maximum after two cycles.

Splits and Phases: 16: Harrisville & TCH EB/CIDG Development

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	222	66	348	17	31	683	234	165
Future Volume (vph)	222	66	348	17	31	683	234	165
Lane Group Flow (vph)	271	72	527	18	124	817	339	204
Turn Type	pm+pt	NA	Perm	Perm	Perm	NA	pm+pt	NA
Protected Phases	7	4				2	1	6
Permitted Phases	4		4	8	8		6	
Detector Phase	7	4	4	8	8	2	1	6
Switch Phase								
Minimum Initial (s)	8.0	14.0	14.0	10.0	10.0	20.0	10.0	20.0
Minimum Split (s)	12.0	24.0	24.0	16.0	16.0	27.0	16.0	27.0
Total Split (s)	20.0	39.0	39.0	19.0	19.0	46.0	35.0	81.0
Total Split (%)	16.7%	32.5%	32.5%	15.8%	15.8%	38.3%	29.2%	67.5%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	7.0	6.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	Min	None	Min
Act Effct Green (s)	31.8	29.8	29.8	10.4	10.4	30.9	55.4	54.4
Actuated g/C Ratio	0.33	0.31	0.31	0.11	0.11	0.32	0.57	0.56
v/c Ratio	0.47	0.13	0.62	0.13	0.44	0.73	0.78	0.20
Control Delay	32.0	29.2	6.5	47.6	13.6	34.1	30.3	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.0	29.2	6.5	47.6	13.6	34.1	30.3	10.8
LOS	C	C	A	D	B	C	C	B
Approach Delay		16.3				34.1		23.0
Approach LOS		B				C		C
Queue Length 50th (m)	42.2	10.2	0.0	3.3	0.0	73.5	37.6	18.8
Queue Length 95th (m)	74.0	25.5	0.0	11.8	0.0	111.6	42.7	27.1
Internal Link Dist (m)		52.6				54.0		202.4
Turn Bay Length (m)			30.0				80.0	
Base Capacity (vph)	578	643	891	180	325	1427	617	1444
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.11	0.59	0.10	0.38	0.57	0.55	0.14

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 97.5			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 24.1		Intersection LOS: C	
Intersection Capacity Utilization 68.2%		ICU Level of Service C	
Analysis Period (min) 15			

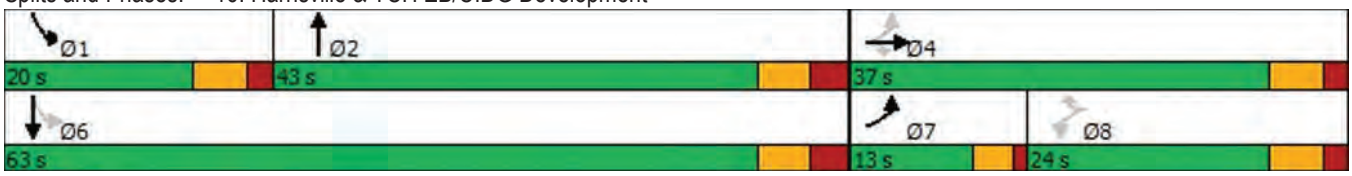
Splits and Phases: 16: Harrisville & TCH EB/CIDG Development



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	120	28	321	38	60	561	227	367
Future Volume (vph)	120	28	321	38	60	561	227	367
Lane Group Flow (vph)	179	30	369	41	240	619	291	503
Turn Type	pm+pt	NA	Perm	Perm	Perm	NA	pm+pt	NA
Protected Phases	7	4				2	1	6
Permitted Phases	4		4	8	8		6	
Detector Phase	7	4	4	8	8	2	1	6
Switch Phase								
Minimum Initial (s)	8.0	14.0	14.0	5.0	5.0	20.0	10.0	20.0
Minimum Split (s)	13.0	20.0	20.0	24.0	24.0	27.0	16.0	27.0
Total Split (s)	13.0	37.0	37.0	24.0	24.0	43.0	20.0	63.0
Total Split (%)	13.0%	37.0%	37.0%	24.0%	24.0%	43.0%	20.0%	63.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	7.0	6.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	Min	None	Min
Act Effct Green (s)	23.1	21.1	21.1	8.2	8.2	22.7	41.8	40.8
Actuated g/C Ratio	0.31	0.28	0.28	0.11	0.11	0.30	0.56	0.54
v/c Ratio	0.33	0.06	0.53	0.28	0.62	0.58	0.61	0.50
Control Delay	22.8	21.4	7.0	36.9	12.7	24.9	14.9	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.8	21.4	7.0	36.9	12.7	24.9	14.9	13.0
LOS	C	C	A	D	B	C	B	B
Approach Delay		12.7				24.9		13.7
Approach LOS		B				C		B
Queue Length 50th (m)	19.6	3.1	2.9	5.6	0.0	39.7	20.7	42.4
Queue Length 95th (m)	29.2	10.3	21.6	16.0	0.0	63.2	33.1	55.9
Internal Link Dist (m)		52.6				54.0		202.4
Turn Bay Length (m)			30.0				80.0	
Base Capacity (vph)	545	778	859	333	565	1710	516	1405
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.04	0.43	0.12	0.42	0.36	0.56	0.36

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 75			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 16.8		Intersection LOS: B	
Intersection Capacity Utilization 58.4%		ICU Level of Service B	
Analysis Period (min) 15			

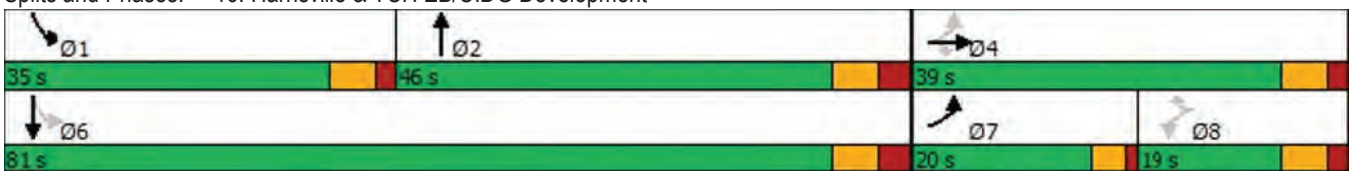
Splits and Phases: 16: Harrisville & TCH EB/CIDG Development



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	233	66	348	17	31	700	249	183
Future Volume (vph)	233	66	348	17	31	700	249	183
Lane Group Flow (vph)	284	72	527	18	124	835	361	226
Turn Type	pm+pt	NA	Perm	Perm	Perm	NA	pm+pt	NA
Protected Phases	7	4				2	1	6
Permitted Phases	4		4	8	8		6	
Detector Phase	7	4	4	8	8	2	1	6
Switch Phase								
Minimum Initial (s)	8.0	14.0	14.0	10.0	10.0	20.0	10.0	20.0
Minimum Split (s)	12.0	24.0	24.0	16.0	16.0	27.0	16.0	27.0
Total Split (s)	20.0	39.0	39.0	19.0	19.0	46.0	35.0	81.0
Total Split (%)	16.7%	32.5%	32.5%	15.8%	15.8%	38.3%	29.2%	67.5%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	7.0	6.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	Min	None	Min
Act Effct Green (s)	32.0	30.0	30.0	10.4	10.4	32.1	58.2	57.2
Actuated g/C Ratio	0.32	0.30	0.30	0.10	0.10	0.32	0.58	0.57
v/c Ratio	0.50	0.13	0.63	0.13	0.45	0.75	0.81	0.21
Control Delay	34.2	30.6	6.7	49.1	13.9	35.3	33.9	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	30.6	6.7	49.1	13.9	35.3	33.9	10.7
LOS	C	C	A	D	B	D	C	B
Approach Delay		17.5				35.3		25.0
Approach LOS		B				D		C
Queue Length 50th (m)	47.9	10.9	0.0	3.5	0.0	78.3	45.2	21.2
Queue Length 95th (m)	78.8	26.0	0.0	11.7	0.0	116.5	49.6	29.7
Internal Link Dist (m)		52.6				54.0		202.4
Turn Bay Length (m)			30.0				80.0	
Base Capacity (vph)	564	625	881	174	319	1385	602	1401
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.12	0.60	0.10	0.39	0.60	0.60	0.16

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 100.4			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 25.4		Intersection LOS: C	
Intersection Capacity Utilization 70.1%		ICU Level of Service C	
Analysis Period (min) 15			

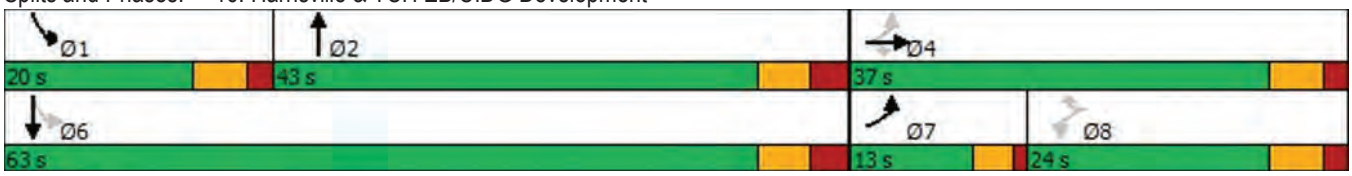
Splits and Phases: 16: Harrisville & TCH EB/CIDG Development



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	138	28	321	38	60	571	233	376
Future Volume (vph)	138	28	321	38	60	571	233	376
Lane Group Flow (vph)	206	30	369	41	240	629	299	515
Turn Type	pm+pt	NA	Perm	Perm	Perm	NA	pm+pt	NA
Protected Phases	7	4				2	1	6
Permitted Phases	4		4	8	8		6	
Detector Phase	7	4	4	8	8	2	1	6
Switch Phase								
Minimum Initial (s)	8.0	14.0	14.0	5.0	5.0	20.0	10.0	20.0
Minimum Split (s)	12.0	20.0	20.0	24.0	24.0	27.0	16.0	27.0
Total Split (s)	13.0	37.0	37.0	24.0	24.0	43.0	20.0	63.0
Total Split (%)	13.0%	37.0%	37.0%	24.0%	24.0%	43.0%	20.0%	63.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	7.0	6.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	Min	None	Min
Act Effct Green (s)	23.2	21.2	21.2	8.2	8.2	22.9	42.1	41.1
Actuated g/C Ratio	0.31	0.28	0.28	0.11	0.11	0.30	0.56	0.55
v/c Ratio	0.38	0.06	0.54	0.28	0.62	0.59	0.63	0.51
Control Delay	23.7	21.6	7.6	37.2	12.7	25.1	15.4	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.7	21.6	7.6	37.2	12.7	25.1	15.4	13.1
LOS	C	C	A	D	B	C	B	B
Approach Delay		13.8				25.1		14.0
Approach LOS		B				C		B
Queue Length 50th (m)	23.3	3.2	4.1	5.6	0.0	40.8	21.4	43.9
Queue Length 95th (m)	33.4	10.2	23.9	16.1	0.0	64.2	34.0	57.4
Internal Link Dist (m)		52.6				54.0		202.4
Turn Bay Length (m)			30.0				80.0	
Base Capacity (vph)	544	773	851	331	563	1701	511	1398
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.04	0.43	0.12	0.43	0.37	0.59	0.37

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 75.4			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 17.2		Intersection LOS: B	
Intersection Capacity Utilization 59.7%		ICU Level of Service B	
Analysis Period (min) 15			

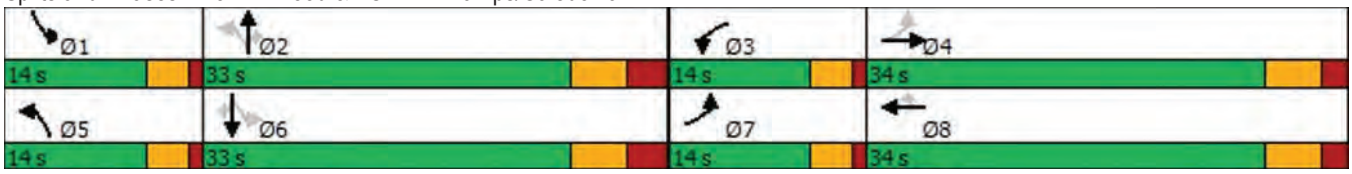
Splits and Phases: 16: Harrisville & TCH EB/CIDG Development



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	198	0	135	94	239	104	411	476	192	761	208
Future Volume (vph)	198	0	135	94	239	104	411	476	192	761	208
Lane Group Flow (vph)	215	192	147	115	306	141	457	721	337	875	251
Turn Type	pm+pt	NA	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8		5	2		1	6	
Permitted Phases	4				8	2		2	6		6
Detector Phase	7	4	3	8	8	5	2	2	1	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	20.0	20.0	10.0	20.0	20.0
Minimum Split (s)	14.0	16.0	14.0	34.0	34.0	14.0	27.0	27.0	14.0	30.0	30.0
Total Split (s)	14.0	34.0	14.0	34.0	34.0	14.0	33.0	33.0	14.0	33.0	33.0
Total Split (%)	14.7%	35.8%	14.7%	35.8%	35.8%	14.7%	34.7%	34.7%	14.7%	34.7%	34.7%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	23.8	11.8	10.0	11.8	11.8	39.0	26.0	26.0	39.0	26.0	26.0
Actuated g/C Ratio	0.30	0.15	0.13	0.15	0.15	0.49	0.33	0.33	0.49	0.33	0.33
v/c Ratio	0.48	0.40	0.34	0.41	0.62	0.40	0.27	0.72	0.61	0.75	0.36
Control Delay	23.0	3.3	34.4	35.0	9.8	13.1	20.3	6.6	16.7	28.8	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	3.3	34.4	35.0	9.8	13.1	20.3	6.6	16.7	28.8	4.7
LOS	C	A	C	C	A	B	C	A	B	C	A
Approach Delay		13.7		21.2			12.1			21.9	
Approach LOS		B		C			B			C	
Queue Length 50th (m)	24.5	0.0	10.9	16.6	0.0	9.9	18.7	0.0	26.9	62.5	0.0
Queue Length 95th (m)	41.7	3.5	20.6	28.5	11.6	17.0	29.3	0.0	27.9	87.8	12.1
Internal Link Dist (m)		159.7		135.1			77.3			127.3	
Turn Bay Length (m)	45.0				20.0	75.0		75.0	85.0		100.0
Base Capacity (vph)	447	744	435	662	759	351	1678	1005	552	1167	690
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.26	0.34	0.17	0.40	0.40	0.27	0.72	0.61	0.75	0.36

Intersection Summary			
Cycle Length: 95			
Actuated Cycle Length: 78.9			
Natural Cycle: 95			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 17.4		Intersection LOS: B	
Intersection Capacity Utilization 66.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Elmwood & TCH WB Ramps/Caledonia

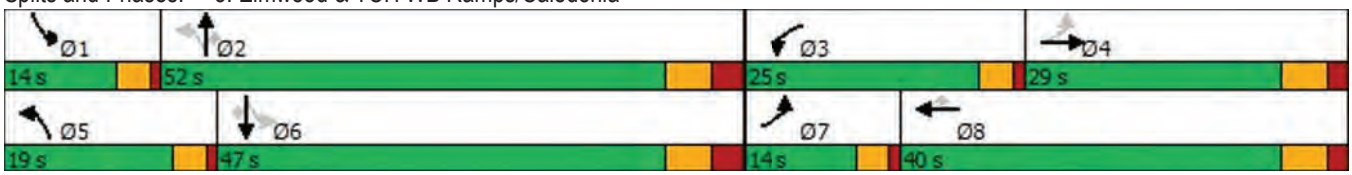


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	199	0	321	169	409	209	1337	167	73	985	368
Future Volume (vph)	199	0	321	169	409	209	1337	167	73	985	368
Lane Group Flow (vph)	237	332	406	192	476	255	1393	211	96	1037	443
Turn Type	pm+pt	NA	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8		5	2		1	6	
Permitted Phases	4				8	2		2	6		6
Detector Phase	7	4	3	8	8	5	2	2	1	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	20.0	20.0	10.0	20.0	20.0
Minimum Split (s)	14.0	16.0	14.0	34.0	34.0	14.0	27.0	27.0	14.0	30.0	30.0
Total Split (s)	14.0	29.0	25.0	40.0	40.0	19.0	52.0	52.0	14.0	47.0	47.0
Total Split (%)	11.7%	24.2%	20.8%	33.3%	33.3%	15.8%	43.3%	43.3%	11.7%	39.2%	39.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	29.7	17.6	18.3	25.8	25.8	61.4	47.6	47.6	52.8	39.7	39.7
Actuated g/C Ratio	0.27	0.16	0.16	0.23	0.23	0.55	0.43	0.43	0.47	0.36	0.36
v/c Ratio	0.64	0.80	0.72	0.45	0.88	0.82	0.64	0.27	0.38	0.82	0.52
Control Delay	36.8	33.2	52.8	39.5	39.2	46.3	29.0	4.6	18.7	40.3	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.8	33.2	52.8	39.5	39.2	46.3	29.0	4.6	18.7	40.3	5.1
LOS	D	C	D	D	D	D	C	A	B	D	A
Approach Delay		34.7		44.4			28.6			29.1	
Approach LOS		C		D			C			C	
Queue Length 50th (m)	39.0	30.4	46.5	38.1	58.7	38.3	98.1	0.7	10.4	116.2	0.0
Queue Length 95th (m)	54.7	66.2	57.3	58.4	93.7	#72.8	125.9	10.2	17.6	#158.9	14.2
Internal Link Dist (m)		159.7		135.1			77.3			127.3	
Turn Bay Length (m)	45.0				20.0	75.0		75.0	85.0		100.0
Base Capacity (vph)	368	486	651	572	644	318	2170	793	252	1279	855
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.68	0.62	0.34	0.74	0.80	0.64	0.27	0.38	0.81	0.52

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 111.4	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 32.8	Intersection LOS: C
Intersection Capacity Utilization 78.8%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

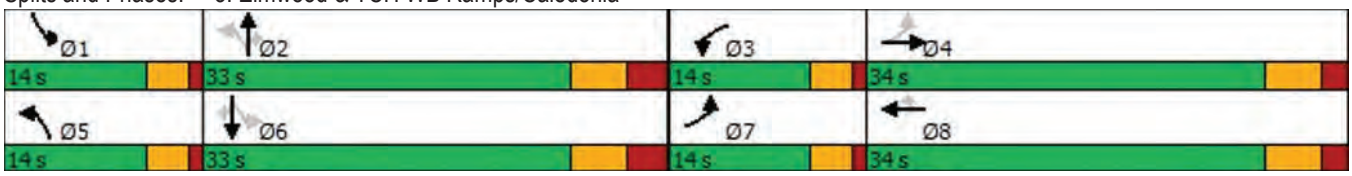
Splits and Phases: 3: Elmwood & TCH WB Ramps/Caledonia



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	198	0	151	94	244	104	411	498	203	761	208
Future Volume (vph)	198	0	151	94	244	104	411	498	203	761	208
Lane Group Flow (vph)	215	192	164	115	313	141	457	755	356	875	251
Turn Type	pm+pt	NA	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8		5	2		1	6	
Permitted Phases	4				8	2		2	6		6
Detector Phase	7	4	3	8	8	5	2	2	1	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	20.0	20.0	10.0	20.0	20.0
Minimum Split (s)	14.0	16.0	14.0	34.0	34.0	14.0	27.0	27.0	14.0	30.0	30.0
Total Split (s)	14.0	34.0	14.0	34.0	34.0	14.0	33.0	33.0	14.0	33.0	33.0
Total Split (%)	14.7%	35.8%	14.7%	35.8%	35.8%	14.7%	34.7%	34.7%	14.7%	34.7%	34.7%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	23.9	11.9	10.0	11.9	11.9	39.0	26.0	26.0	39.0	26.0	26.0
Actuated g/C Ratio	0.30	0.15	0.13	0.15	0.15	0.49	0.33	0.33	0.49	0.33	0.33
v/c Ratio	0.48	0.41	0.38	0.41	0.62	0.40	0.27	0.74	0.64	0.75	0.36
Control Delay	23.0	3.6	34.9	34.9	9.8	13.2	20.4	6.9	17.9	28.8	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	3.6	34.9	34.9	9.8	13.2	20.4	6.9	17.9	28.8	4.7
LOS	C	A	C	C	A	B	C	A	B	C	A
Approach Delay		13.8		21.6			12.1			22.1	
Approach LOS		B		C			B			C	
Queue Length 50th (m)	24.5	0.0	12.2	16.6	0.0	9.9	18.7	0.0	28.8	62.5	0.0
Queue Length 95th (m)	41.7	4.6	22.8	28.5	11.6	17.1	29.3	0.0	29.5	88.0	12.1
Internal Link Dist (m)		159.7		135.1			77.3			127.3	
Turn Bay Length (m)	45.0				20.0	75.0		75.0	85.0		100.0
Base Capacity (vph)	448	739	435	661	763	351	1677	1028	552	1167	690
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.26	0.38	0.17	0.41	0.40	0.27	0.73	0.64	0.75	0.36

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 78.9	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 17.6	Intersection LOS: B
Intersection Capacity Utilization 67.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: Elmwood & TCH WB Ramps/Caledonia

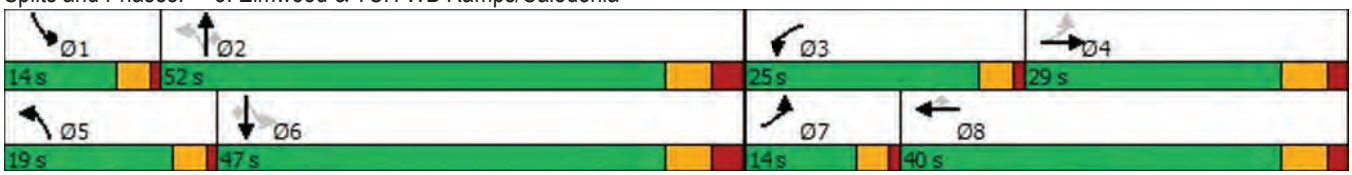


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	199	0	334	169	415	209	1337	175	75	985	368
Future Volume (vph)	199	0	334	169	415	209	1337	175	75	985	368
Lane Group Flow (vph)	237	332	423	192	483	255	1393	222	99	1037	443
Turn Type	pm+pt	NA	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8		5	2		1	6	
Permitted Phases	4				8	2		2	6		6
Detector Phase	7	4	3	8	8	5	2	2	1	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	20.0	20.0	10.0	20.0	20.0
Minimum Split (s)	14.0	16.0	14.0	34.0	34.0	14.0	27.0	27.0	14.0	30.0	30.0
Total Split (s)	14.0	29.0	25.0	40.0	40.0	19.0	52.0	52.0	14.0	47.0	47.0
Total Split (%)	11.7%	24.2%	20.8%	33.3%	33.3%	15.8%	43.3%	43.3%	11.7%	39.2%	39.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	29.8	17.7	18.6	26.2	26.2	60.6	44.0	44.0	52.9	39.8	39.8
Actuated g/C Ratio	0.27	0.16	0.17	0.23	0.23	0.54	0.39	0.39	0.47	0.36	0.36
v/c Ratio	0.64	0.80	0.74	0.44	0.88	0.84	0.69	0.29	0.41	0.82	0.52
Control Delay	36.7	33.6	53.5	39.2	40.1	49.9	31.2	4.7	20.1	40.5	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.7	33.6	53.5	39.2	40.1	49.9	31.2	4.7	20.1	40.5	5.1
LOS	D	C	D	D	D	D	C	A	C	D	A
Approach Delay		34.9		45.1			30.6			29.3	
Approach LOS		C		D			C			C	
Queue Length 50th (m)	39.0	31.1	49.0	38.1	60.9	39.6	99.4	0.7	10.9	117.8	0.0
Queue Length 95th (m)	54.7	66.8	59.4	58.4	96.2	#74.1	125.9	10.2	18.1	#158.9	14.2
Internal Link Dist (m)		159.7		135.1			77.3			127.3	
Turn Bay Length (m)	45.0				20.0	75.0		75.0	85.0		100.0
Base Capacity (vph)	369	484	651	571	643	315	2066	772	239	1278	855
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.69	0.65	0.34	0.75	0.81	0.67	0.29	0.41	0.81	0.52

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 111.6		
Natural Cycle: 95		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 0.88		
Intersection Signal Delay: 33.8	Intersection LOS: C	
Intersection Capacity Utilization 79.2%	ICU Level of Service D	
Analysis Period (min) 15		
# 95th percentile volume exceeds capacity, queue may be longer.		

Queue shown is maximum after two cycles.

Splits and Phases: 3: Elmwood & TCH WB Ramps/Caledonia



Appendix G
Long Combination Vehicle Correspondence and Guidelines

Andrew Northmore

From: Mitchell, Tanya (DTI/MTI) <Tanya.Mitchell@gnb.ca>
Sent: March 17, 2022 4:37 PM
To: Garrett Donaher
Subject: RE: Triple Trailer Combination
Attachments: LCV guidelines 2020 12 E.pdf; LCV guidelines 2020 12 F.pdf

Categories: - Agency

Hello Garret

In addition to vehicles found in the NB regulation 2001-67; Caledonia Industrial Park is an approved location for Long Combination Vehicles , which are currently transporting to other firms in this park . These long combination vehicles are also approved for Nova Scotia Quebec and Ontario and consist of two trailers generally 40 feet but one trailer may be up to 53 ft in length and may be of interest to clients importing large volume of goods to their distribution center.

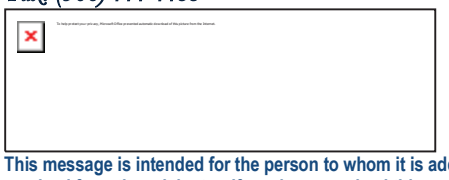
The vehicles used in redistribution to local business may then be done using the smaller 28' trailers

Each company requesting this vehicle to their business must apply individually to the province complete with vehicle turning templates to the facility.

Should your client would be interested in this unit , I have attached a guide to the program.

Tanya Mitchell P.Tech.

Senior Technical Officer/ Supervisor
Agente Technique Principale/ Superviseur
DTI Special Permits Office / MTI Bureau de Permis Speciaux
Tanya.Mitchell@gnb.ca
Phone:(506) 453-2982
Fax: (506) 444-4488



From: Garrett Donaher <Garrett.Donaher@englobecorp.com>
Sent: Thursday, March 17, 2022 3:10 PM
To: Mitchell, Tanya (DTI/MTI) <Tanya.Mitchell@gnb.ca>
Cc: Goguen, Matt (DTI/MTI) <Matt.Goguen@gnb.ca>
Subject: RE: Triple Trailer Combination

Good-day Tanya,

Thank you very much for the prompt response. Our client is interested in developing a distribution warehouse for general goods. They typically operate 28' trailers including double (and in other jurisdictions, triple) combinations. The site they are looking at is shown below in red.

Combinations would be broken up on site for unloading, storage, or delivery of individual trailers. Given these characteristics I don't see an obvious application of the permits or programs you mention. Is this assessment correct?

Thanks again,

-Garrett

Garrett Donaher, P.Eng.
Senior Engineer | Team Lead
Civil & Transportation Engineering
T 506 857-2777, 178304 | M 506 588-6268

ENGLOBE
1077 St. George Blvd, Suite 400, Moncton (NB) E1E 4C9
englobecorp.com

From: Mitchell, Tanya (DTI/MTI) <Tanya.Mitchell@gnb.ca>
Sent: Thursday, March 17, 2022 2:18 PM
To: Garrett Donaher <Garrett.Donaher@englobecorp.com>
Cc: Goguen, Matt (DTI/MTI) <Matt.Goguen@gnb.ca>
Subject: RE: Triple Trailer Combination

Good Afternoon Garrett,

Excepting for specialized heavy haul vehicle combinations , New Brunswick does not currently permit a semi-tractor operating with 3 trailers as configured in your proposal below.

Our office would be happy to review alternate designs with you. To begin, I am attaching a copy of the NB vehicle weights and dimension regulation 2001-67.
You will find 14 examples of various vehicle combinations, under Schedule A which of the regulation, which represent legal configurations for regular transport of general freight.

There are many other vehicle configurations which are authorized to operate under an oversize or over-mass permit for cargo such as:

1) Heavy Loads exceeding legal limits such construction or industrial equipment
2) Excessive wide or length loads such as wind blades or rings
3) Specialized working vehicles such as cranes and drill rigs
4) Long Combination Vehicles for high volume delivery on primary routes

In addition to the consideration a vehicle configuration, we also offer highway review programs which allow industry to optimize their transportation:

1) Highway Uprating Permits – Examines road weight increase for Industry located on rural roads to efficiently connect to main highway
2) Road Builder Permits – Examines road weight Increase to large road building projects
3) Seasonal Restriction Permits – Designed to assist industry that has primary exports occurring in spring thaw

It may be that the client will require a combination of a large vehicle and an Industry program to achieve a solution for most efficient transport of cargo from or between their locations.
We generally will ask firms to look at the following items in selecting a vehicle:

1) What type of product are they transporting
2) Is the location on a rural road or a main highway
3) What is the optimum cargo volume and respective mass required for the industry

If you have further questions on the vehicles or permit programs please reach out to us again.

Tanya Mitchell P.Tech.

Senior Technical Officer/ Supervisor
Agente Technique Principale/ Superviseur
DTI Special Permits Office / MTI Bureau de Permis Speciaux
Tanya.Mitchell@gnb.ca
Phone:(506) 453-2982
Fax: (506) 444-4488

From: Garrett Donaher <Garrett.Donaher@englobecorp.com>
Sent: Thursday, March 17, 2022 12:43 PM
To: Special Permits (DTI/MTI) <SpecialPermits@gnb.ca>
Subject: Triple Trailer Combination

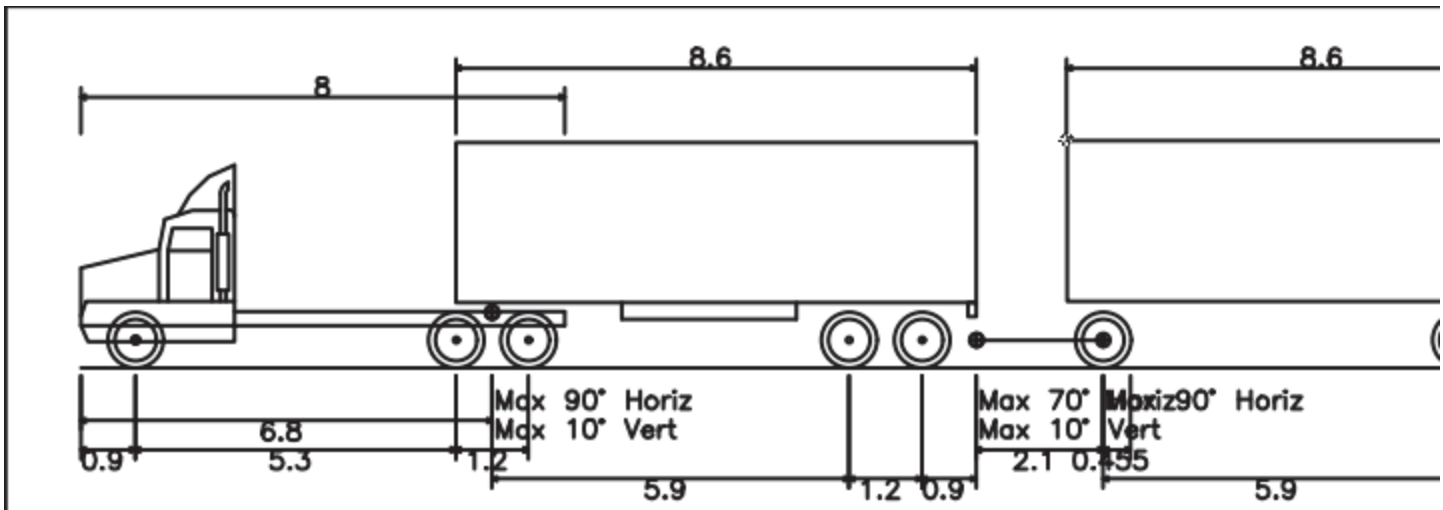
ATTENTION! External email / courriel externe.

Good-day,

I am working with a development client that is interested in serving their site with triple trailer combinations (see image below). Is this type of vehicle eligible for an Annual Permit?

Thank you,

-Garrett



WB–33 – Triple Trailer Combination

Overall Length	35.000m
Overall Width	2.600m
Overall Body Height	3.755m
Min Body Ground Clearance	0.435m
Track Width	2.600m
Lock–to–lock time	4.00s
Curb to Curb Turning Radius	15.500m

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Guidelines for Long Combination Vehicles (LCVs) in the Province of New Brunswick

Department of Transportation
First issue August 2008
Version 6.3 –
December 2020

Ce document est disponible en français

Table of Contents

NOTE:

This document is subject to change. Please check the New Brunswick Department of Transportation and Infrastructure (NBDTI) website for the latest updates at:

http://www2.gnb.ca/content/gnb/en/departments/dti/trucking.html

1.0 Program overview

Between 2004 and 2008, Long Combination Vehicles (LCV) operated on New Brunswick highways under a pilot project. As of 2008, New Brunswick began permitting operations on 4 lane highways. Since that time, LCV's have proven to be a successful transportation method, and have become an important part of our industry in Atlantic Canada.

LCVs provide economic benefits to both industry and consumers, reduce fuel consumption, greenhouse gas emission and provide for safe movement of goods.

This program is evolving in cooperation with the provinces of Nova Scotia Quebec and Ontario to provide for the free movement of LCV's amongst the 4 provinces, provided the conditions of the movement within each respective province is met.

A harmonization agreement is in the final stages of completion and this guidebook may be updated once a final agreement is in place.

2.0 Submission of application

The completed application, containing all information as required in *Appendix 1* is to be submitted to:

Project Development and Asset Management
Branch New Brunswick Department of
Transportation
P.O. Box 6000
Fredericton NB E3B 5H1

The original application and attachments must be mailed, couriered or hand delivered. E-mail versions of the original applications will not be accepted. However, amendment documentation and clarifications to the original application can be submitted via Fax to (506) 444-4488 or e-mail to special.permits@gnb.ca

Inquiries regarding your application may also be made by e-mail to special.permits@gnb.ca

2.1 Permit fee

The current annual permit fee for LCV operations on New Brunswick highways is $50 per power unit and is subject to change. The fee is to be

made payable to the New Brunswick Minister of Finance upon approval of the application.

2.2 Application Requirements

The information required in the application is provided in Appendix 1. All information listed must be provided in the application for the LCV operation. Issuance of a permit implies that the carrier will provide all records related to their LCV operations to NBDTI, upon request.

3.0 Permissible LCV configurations, operating routes and turning template requirements

A-Train LCV's must be configured as per Appendix 2.
B-Train LCV's must be configured as per Appendix 3.
Double Stinger-Steer Auto Carrier LCVs must be configured as per Appendix 4.

3.1 The A-Train LCV must be configured with two semi-trailers of minimum length 12.2 m (40ft) to maximum length of 16.2 m (53ft) (Van trailers or containers only). The position of lead and rear trailer may be any combination of the two; however the heaviest trailer must always be in the lead position. Operation is restricted to pre-approved routes.

3.2 The B-Train LCV must be configured with two semi-trailers; the lead trailer of minimum length 12 m (39 ft) to maximum length of 14.6 m (48ft) (Van trailers or containers only). The rear trailer may have a minimum length 12.2 m (40ft) to maximum length of 16.2 m (53ft) (Van trailers or containers only). The lead trailer must be heavier or equal to the rear trailer. Operation is restricted to pre-approved routes.

3.3 The Double Stinger-Steer Auto Carrier LCV must be configured with two non-enclosed semi-trailers designed to carry vehicles each with of a maximum length of 14.6 m (48 ft). The fifth wheel assemblies must be mounted on a drop frame located behind and below the center of the rearmost axle of the tractor and the lead trailer. The lead semi-trailer has a triple axle unit with the rearmost axle liftable by use of manual controls located on the trailer. The axle must be deployed at all times when operating as an LCV. The second trailer has a tandem axle.

3.4 Applications for container chassis configuration will be considered, provided they meet all other specifications.

3.5 The A-train LCV combination may be split with the tractor pulling one semi-trailer plus the dolly for purposes of repositioning the dolly to nearby staging areas or terminals. This combination must comply with the current New Brunswick regulation for Vehicle Dimensions and Mass with the exception

of overall length, which must not exceed 27.5 m. The allowable GVW of this combination is that of the tractor-trailer without dolly, plus 2,000 kg.

3.6 All conditions of the LCV permit apply to dolly repositioning as outlined in section 3.4, except that: Holiday restrictions do not apply, the LCV pictogram is not required, and the dolly does not require functioning brakes.

3.7 LCV units will be permitted to operate on New Brunswick, Route 2 between the New Brunswick/Nova Scotia border and the New Brunswick/Quebec border. Limited operation of LCV's on 2-lane highways to proposed staging areas or interim stopping locations will only be permitted for very short distances and is subject to approval from both the appropriate municipality if applicable, and NBDTI.

3.8 LCV units will be permitted to operate on New Brunswick, Route 1 between the junction of Routes 1 and Route 2 at River Glade, New Brunswick to an approved staging area (proposed by the applicant) near the Canada/U.S. border at Calais.

3.9 LCV units will also be permitted on Route 95 from the Route 95/Route 2 interchange at Woodstock to a pre-approved staging area (proposed by the applicant) near the Canada/U.S. border at Houlton.

3.10 Limited operation of LCV's on 2 lane highways will only be permitted for very short distances and is subject to approval from both the appropriate municipality (if applicable) and DTI.

3.11 **Turning Template Requirements** The applicant must provide turning template and various LCV turning radii and plan survey details (to scale). The templates submitted must demonstrate that the LCV can safely maneuver ramps and intersections throughout the entire 2-way routing involved. Templates are required to show how the LCV tracks while exiting/entering a ramp, intersection or private property (i.e. terminal, staging area or intermediate stop area). The template must clearly show the path of the LCV including its off-tracking details as well as location of the traffic lanes, pavement and shoulder edges, traffic sign posts, guide rail, lighting posts or masts, lane dividers or barriers and other potential obstacles. If the templates and drawings show conflicts with obstacles or traffic, the applicant must provide details on how they intend to resolve the situation.

The template drawings must be stamped by a Professional Engineer licensed to practice in the Province of New Brunswick.

NOTE: Refuge areas listed in Appendix 6 are not to be used as rest areas or to access food and washroom facilities. Applicants may submit turning

templates to include access to such facilities in their application.

4.0 Permit general conditions

Permit conditions are divided into two sections: general conditions and operating conditions.

4.1 General conditions

4.1.1 Permits will be valid for a period not exceeding one year only and must be renewed by the applicant each year. (Note: DTI may cancel a permit at any time for permit violations by the carrier or for safety reasons).

4.1.2 The LCV operating permit will be valid for the specific operation of an LCV A-Train, B-Train, or Double Stinger-Steer Auto Carrier configured as per Appendices 2, 3 or 4.

4.1.3 The carrier will be required to provide specific information regarding each power unit and trailer at time of permit application.

4.1.4 The total length of an LCV must not exceed 40 metres and gross vehicle weight must not exceed 63,500 kg for the A-Train and B-Train configurations or 55,000 kg for the Double Stinger-Steer Auto Carrier configuration.

4.1.5 The converter dolly must be registered when it is the rear most vehicle, unless the LCV carrier is originating from, and registered in Ontario and Québec. Converter dolly must be equipped with functioning tail, brake and turn signal lights as well as two red reflectors and have rear impact protection as required by Transport Canada, when it is the rear most vehicle. A converter dolly may have its service brake system disabled to prevent wheel lock-up when being operated on a highway without carrying a trailer.

4.1.6 Carriers must supply detailed information on all routes from origin to destination including staging areas, exits to/from the route for refueling, loading, staging or other reasons. Limited operation of LCV's on 2 lane highways will only be permitted for very short distances and is subject to approval from both the appropriate municipality (if applicable) and DTI.

4.1.7 The carrier must provide turning templates and scaled plan surveys as described in Section 3.10 above for the LCV's entrance and exit movements through all interchanges, ramps, and private property facilities for staging, interim stops, origin and destination. See section 3.10 for turning template requirements.

4.1.8 Permission for limited distance travel on 2-lane highways will require the carrier to obtain and submit written approval from the municipal jurisdiction, where applicable. DTI must also approve such travel. In addition, if the carrier intends to stop at a location on private property (i.e. a business property) for interim stops or staging, the carrier is to provide written confirmation from the property owner authorizing use of the location for the LCV. In these cases, municipal (where applicable) and DTI approval is also required.

5.0 Permit operating conditions

5.1 Operating Conditions:

5.1.1 Maximum speed of LCV units will be 90kph.

5.1.2 The LCV unit must not exit from the specified route except for emergencies or for enroute inspections using the designated refuge areas listed in Appendix 6. No parking is permitted on any Off Ramp.

5.1.3 Where practical, the LCV unit is expected to travel in right-most lane of highway. It is left to the professional discretion of the driver whether to move to left hand lane when needed to accommodate obstructions, or slow-moving vehicles.

5.1.4 The mass of the lead trailer must always be greater than that of the rear trailer.

5.1.5 If the lead or rear trailer is not fully loaded, it must be loaded such that the front of the trailer is heavier.

5.1.6 LCV's are prohibited from operating on public Holidays, as identified in the *Days of Rest Act*. Dolly Repositioning is not subject to this restriction.

5.1.7 Time of day restrictions for travel in or near urban areas will be set relative to morning and evening peak hour traffic flows. (If staging areas are used near the urban locations and the staging areas are adjacent to a four-lane divided highway, these restrictions may not apply depending on the traffic volume on the four-lane divided section of the network bypassing the urban area).

5.1.8 LCV'S operating on municipal roads, may have specific restrictions to travel, as set by the respective municipalities.

5.1.9 The LCV unit may travel with both trailers empty or with rear trailer empty and front trailer partially or fully loaded providing heavy cross winds are not forecast in the weather conditions or not occurring along the route during the particular trip.

5.1.10 The driver must activate 4-way flashing lights when speed of the unit travelling on the arterial network drops to 70kph or below.

5.1.11 LCV's must not run in a convoy mode that is, less than 300m between LCV units.

5.1.12 DTI will attempt to accommodate LCV's during construction and maintenance activities; however, LCV's are not automatically approved for detours without a permit. In some cases, LCV's must be split to accommodate detours.

5.2 Vehicle Requirements:

5.2.1 The tractors used to move LCV units must develop a minimum torque of 1650 lb-ft and have a minimum horsepower of 460 hp.

5.2.2 An LCV combination must be equipped with a functioning and accurate electronic on-board device that records speed, time and date at regular intervals not exceeding 5 minutes in length. The speed recording device must be a Global Position Satellite (GPS) or similar tracking system and must display in a legible table, including rows and columns. Tachograph and tachograph charts are not acceptable speed recording devices. Data from this device must be retained for at least 90 days and be capable of producing a report indicating the vehicle's speed at specified dates and times.

5.2.3 A reflectorized rigid or flexible placard as specified in 5.2.3.1 must be attached to rear trailer of each LCV such that it does not cover required reflectorized trailer markings or lights.

5.2.3.1 LCV Pictorial image placard specifications as depicted below (Acceptable in QC, NB, NS, ON)

- Colour: Background - Yellow 3M # 3931 or equivalent, minimum High-Intensity retro reflective
- Lettering: 5 cm to 10 cm high, series E black.
- Material: The sign panel must be fabricated of High-Intensity retro reflective material
- Position: At the rear of the last semi-trailer, mounted so that it is clearly visible by following drivers and must not obstruct lights or other safety devices. The sign must be removed when not in use.
- Sign size: 30 cm by 230-245 cm

5.2.4 Retro-reflective tape as per Transport Canada's standards must be present on the unit. (CMVSS 108)

5.2.5 Light Emitting Diode (LED) lighting must be present at the rear and along the sides of all trailers and power units, effective model year 2011. The lighting must meet or exceed Transport Canada standards. (CMVSS 108)

5.2.6 Anti-sail (rigid) mud flaps/splash guards must be placed on the rear axle of the power unit and on the rear axle of all axle groups of the trailers and convertors (dollies). They must remain in a rigid downward position at all times. Stinger-steer auto carrier trailers are exempt from the mud flap requirement as the structure and body of the trailer encloses the wheels.

5.2.7 All lighting and conspicuity devices must be frequently checked to ensure they are kept clean.

5.2.8 The trailers of an A-train LCV shall be joined together by means of no-slack pintle hook(s), equipped with an air or hydraulic ram. The no-slack ram is to be incorporated in either the pintle hook or the pintle hook eye of the coupling apparatus.

5.2.9 For any stinger-steer LCV combination, the tractor fifth wheel and the

structure to which it is mounted must be rated for at least 100,000 lbs (45,360 kg) pulling capacity.

5.2.10 Note: See Appendices 2, 3 ,4 for schematics of vehicle configurations.

5.3 LCV Driver Certification

The Atlantic Provinces Trucking Association (APTA) is the sole coordinating body for all LCV driver training in NB. – see appendix 4 for an overview of the APTA Driving Certification Program

The APTA is responsible to issue an annual LCV Driver's Certificate to all drivers operating LCV units. The Driver's Certificate is to be valid for a period of 12 months after the date of issue and must be in the possession of the driver at all times when operating an LCV. The certificate must be presented when requested by a peace officer.

The Driver's Certificate will be issued by the carrier after confirmation has been received that the driver has:

5.3.1 A valid class 1 driver's license or equivalent with air endorsement.

5.3.2 A minimum of five (5) years of tractor trailer driving experience. (Experience on multi-trailer units would be an asset).

5.3.3 Passed the Atlantic Provinces Trucking Association's (APTA) Longer Combination Vehicles Driver Training Course (see appendix 4).

5.3.4 A driver's abstract dated not more than one month prior to the issue date of the Drivers Certificate that shows no driving related criminal code convictions in the prior 36 months, no more than 2 moving violations in the prior 12 months, and no more than 3 moving violations in the past 36 months.

5.3.5 Notes:

5.3.5.1 The driver instructor must be certified as a Driver Trainer and be qualified to instruct the APTA Longer Combination Vehicle Driver Training Course.

5.3.5.2 The date of conviction and the date of assessment will be the dates used to determine time periods.

5.3.5.3 The APTA will keep a list of all drivers holding valid LCV Driving Certificates and must make it available to NBDTI when requested.

5.3.5.4 The carrier must be able to produce to DTI all documents to support driver's qualifications, upon request

5.3.5.5 A driver-in-training who meets: the driver's license requirements; driving experience; and abstract requirements may operate an LCV vehicle while accompanied by a driver who holds a valid LCV Driver's Certificate.

5.3.5.6 Note: See Appendix 5 for example of LCV Driver's Certificate

5.3.5.7 Section 5.3, notwithstanding, DTI will accept those LCV drivers with Quebec Drivers Licenses containing "T" Endorsements, without additional requirements. All Ontario LCV drivers operating in New Brunswick must hold a valid ATPA Driver Certificate. An OTA trained and certified LCV driver is eligible for an APTA certificate without further training or testing.

5.4 Carrier Qualifications

5.4.1 Carriers with Unsatisfactory Carrier Safety Ratings will be disqualified from operating LCV's in New Brunswick. Carriers with Conditional Carrier Safety Ratings may be disqualified from operating LCV's in New Brunswick.

5.5 Weather conditions

The current road report for the Province should be noted but final operational decisions should not be based entirely on that report. The latest weather forecasts from Environment Canada should be taken into consideration before a decision to operate LCVs is rendered. It will be necessary for carriers to provide their drivers with specific weather restriction data. **Note:** New Brunswick has a network of highway cameras connected to the Internet. These cameras can show real-time weather conditions. Drivers and dispatchers should make use of this tool. The following link is the site where these cameras are listed:

http://www.gnb.ca/0113/cameras/cameras-e.asp

Road and weather condition information, including road construction, is available through New Brunswick's 511 Traveller Information service. The information can be accessed as follows:

On-line at www.nb511.ca

By phone:
511 (within New Brunswick)
1-800-561-4063 (from outside New Brunswick)

Weather forecasts and current conditions are available through Environment Canada and can be accessed as follows:

On-line at www.weather.gc.ca

By phone:

Bas Caraquet Region – (506)-726-5286
Bathurst Region – (506)-548-3220
Edmundston Region – (506)-739-1814
Fredericton Region – (506)-451-6001
Miramichi-Chatham Region – (506)-773-7045
Moncton Region – (506)-851-6610
Saint John Region – (506)-636-4991

LCV units shall not operate when weather systems include:

a) freezing rain, sleet, hail, fog
b) heavy snowfall accumulations resulting over short time periods
c) highway surface is partially snow covered, fully snow covered, snow packed, icy, or there is a road closure.
d) visibility is less than 500 m (due to blowing snow, rain, or other conditions)
e) blizzard like conditions exist
f) slippery road conditions exist such as ice or snow covered
g) heavy cross winds are present throughout the haul route or at specific sections of the haul route. (This factor is especially important when empty trailers form part of the LCV configuration).

LCV units must not be dispatched when adverse weather conditions are expected or known to be present on the route during the hours of travel. It is appropriate to consult additional resources regarding road and weather conditions other than the ones described above, to support the decision of whether it is appropriate to operate an LCV. All carriers are required to carefully evaluate the risk of changing weather conditions that have the potential to affect visibility and road conditions.

The carrier, at time of application for the permit, is to provide DTI with a copy of their instructions to drivers relative to weather conditions and vehicle operations.

NOTE:

In cases where a driver commences a run under acceptable weather conditions and encounters unexpected inclement weather, **the unit must exit the highway at the first designated refuge area – Highway on ramps only.** It may be necessary for the driver to reduce speed to the nearest refuge area. (List of refuge areas are presented in Appendix 5)

6.0 Freight conditions

6.1 The carrier shall indicate on the permit application the type of freight to be transported, and whether it is being transported in a van or a container.

6.2 LCV must not carry any dangerous goods of Class 1 or Class 7 (explosives or radioactive products).

6.3 LCV must not carry livestock.

6.4 Where product is subject to movement anti-skid mats may be required.

6.5 The load on the LCV must be assembled to prevent cargo movement. The National Safety Code Standard 10 - Cargo Securement – will apply.

7.0 The APTA LCV Driver's Certificate

The LCV Driver's Certificate is to be issued by the APTA and will be valid for one year. If a driver holding a APTA LCV Driver's Certificate ceases to be employed by a carrier, the carrier shall inform the DTI to ensure that the driver's name be removed from the list of current LCV drivers. The LCV Driver's Certificate must show the following information:

- Driver's name;
- Company's name;
- Date of issue and expiry date;
- Signature and printed name of the person issuing certificate.

An example of a Driver's Certificate is presented in Appendix 5.

8.0 Reportable Collision/incident reporting procedures

DTI will use the incident information provided on its collision/incident reporting form as completed by the appropriate police officer. However, to complete a full analysis of a LCV Collision/incident, additional data must be provided to the

Project Development and Asset Management Branch - DTI, by the carrier within 48 hours of the Collision/incident. This information will be subject to the same confidentiality agreements as the form completed by the police. A form called LCV Collision/incident Reporting Form will be provided.

Reportable Collision/incidents include vehicle and property damage greater than $1,000 or any severity of injury to occupant(s). Note that the dollar amount at which a collision/incident is reportable is set by provincial legislation and is subject to change. Incidents that occur in the carrier's yard or terminal do not require reporting of damage.

Example: A report to DTI would be required if an LCV ran off the road with or without any sustained damage to the LCV or damage to property, or injuries to one or more persons.

The information to be provided includes, but is not limited to:

1. Description of LCV unit
2. GVW of unit at time of Collision/incident
3. Cargo type
4. Description of load and placement of load on each trailer of the LCV unit.
5. Copy of on-board speed record at time of accident
6. Copy of LCV Driver's Certificate
7. Description of vehicle trip (e.g. origin and time of trip start, route to destination)
8. Copy of driver's log book for this trip
9. Tractor and trailers registration number
10. Driver's description of weather along route and at Collision/incident site
11. Driver experience on LCV's, estimated number of trips and total distance driven on LCV's

Appendix 1: Information Required to Support LCV Application

The following information must be included in the application for the LCV operating permit.

1.1 Operation details

- Registered owner of the power unit(s) and trailers:
- Carrier name:
- Contact person:
- Telephone:
- Fax:
- E-Mail Address:
- Street Address:
- City:
- Postal Code
- Province or State:
- Insurance Company:
- Policy Number:

1.2 Vehicle data

Vehicles (Number of vehicle types to be operated)
Power Units (Tractors)
Trailers (A-train configuration)
Trailers (B-train configuration)
Trailers (Double Stinger-Steer Auto Carrier configuration)

1.2.1 Power unit details (Include information for each power unit to be operated)

Year
Make
License Plate Number
Province or State
Full Serial Number
Horsepower
Torque
Speed recording device
Vehicle Length (ft. or m)

1.2.2 General route details

Origin
Destination
One-way or return trip
Highway numbers of desired routing
Highway Exit number (leaving from origin)
Highway Exit number(s) for other intermediate stops
Highway Exit number (arriving at destination)
Frequency (Daily, weekly, etc.)
Number of LCV's on route
Arrival and departure times (Approx.)

1.2.3 Specific operating details to include

1.2.3.1 Origin terminal

- Describe route including map from origin terminal to entrance ramp of four-lane divided highway
  - Include street names and intersections.
  - If travelling within a municipality, written evidence of municipal endorsement of the route must be provided.
  - If the location requires use of private business facilities or property, written evidence of endorsement from property owner must be provided.
- Each turning movement required for LCV operation must be fully described in the permit application and include turning template drawing details.
  - Any modifications required to accommodate LCV operation at intersections are the responsibility of applicant carriers, including arranging permissions from local authorities (municipal and provincial governments). Written evidence of these endorsements must be provided at time of application.

1.2.3.2 Intermediate stops

- Describe route including map from exit ramp of four-lane divided highway to/from intermediate stopping locations
  - Include street names and intersections.
  - If travelling within a municipality, written evidence of municipal endorsement of the route must be provided.
  - If the location requires use of private business facilities or property, written evidence of endorsement from property owner must be provided.

- Each turning movement required for LCV operation must be fully described in the permit application and include turning template drawing details.
  - Any modifications required to accommodate LCV operation at intersections are the responsibility of applicant carriers, including arranging permissions from local authorities (municipal and provincial governments). Written evidence of this agreement must be provided at time of application.

NOTE: Refuge areas listed in Appendix 5 are not to be used as rest areas or to access food and washroom facilities. Applicants may submit turning templates to request access to such facilities.

1.2.3.3 Destination terminal

- Describe route including map from exit ramp of four-lane divided highway to destination terminal
  - Include street names and intersections.
  - If travelling within a municipality, written evidence of municipal endorsement of the route must be provided.
  - If the location requires use of private business facilities or property, written evidence of endorsement from property owner must be provided.
- Each turning movement required for LCV operation must be fully described in the permit application and include turning templates drawing details.
  - Any modifications required to accommodate LCV operation at intersections are the responsibility of applicant carriers, including arranging permissions from local authorities (municipal and provincial governments). Written evidence of this agreement must be provided at time of application.

1.2.3.4 Note: These details (1.2.4.1; 1.2.4.2 & 1.2.4.3) must also be provided for the route from origin to destination for the return trip.

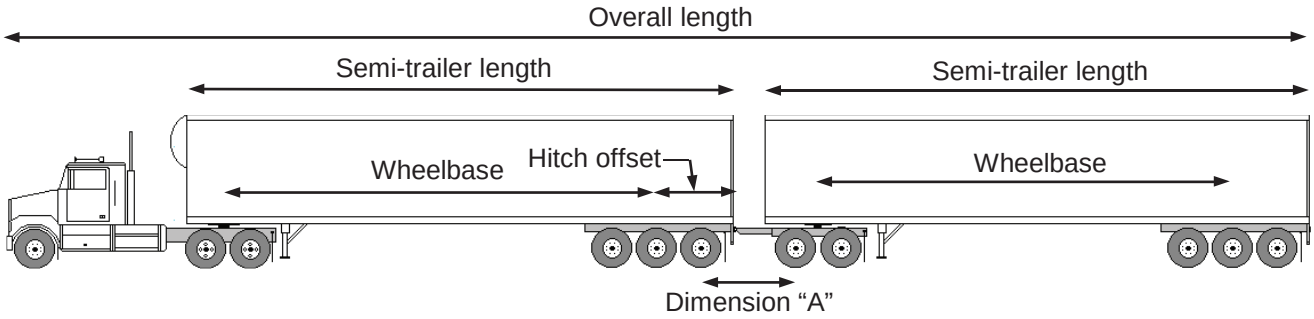
1.3 Driver Information (Include information for each driver to be registered)

Name
Driver's License Number
Class of Licence
Endorsements
Restrictions
Driving experience on articulated vehicles (years & km)
Completion date of Longer Combination Vehicles Driver Training Course (M,D,Y)

Please be aware that information you provide may be subject to an audit in accordance with appendix 4.

1.4 Weather Conditions – copy of instructions to drivers relative to weather conditions and LCV operations

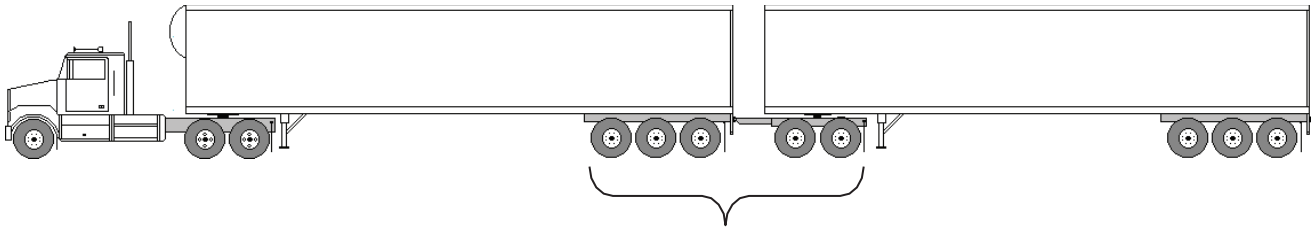
Appendix 2: LCV A-train configuration



DIMENSION PARAMETERS	LIMITS
Overall	
Length of combination and load	Maximum 40 metres*
Width of vehicle and load	Maximum 2.6 metres
Height of Vehicle and Load	Maximum 4.15 metres
Tractor	
Interaxle Spacing	Minimum 3.0 metres
Tandem Axle Spread	1.2 metres to 1.85 metres
Wheelbase	Maximum 6.2 metres
Lead Semi-trailer	
Length	Minimum 12.2 metres*, Maximum 16.2 metres*
Wheelbase	Maximum 14.0 metres
Tandem Spread	1.2 metres to 1.85 metres
Tridem Spread	2.4 metres to 3.7 metres
Hitch Offset	
with tandem axle	Maximum 2.8 metres
with tridem axle	Maximum 3.4 metres
i) Converter Dolly	
Tandem Spread	1.2 metres to 1.85 metres
Drawbar Length	Not controlled
Track Width	2.5 metres to 2.6 metres
Second Semi-trailer or Full Trailer	
Length	Minimum 12.2 metres*, Maximum 16.2 metres*
Wheelbase	Minimum 9.5 metres, Maximum 12.5 metres
Tandem Spread	1.2 metres to 1.85 metres
Tridem Spread	2.4 metres to 3.7 metres
Effective Rear Overhang	Maximum 35% of Wheelbase
Track Width	2.5 metres to 2.6 metres
Dimension "A"	See next page

Note: 6X2 tractor axle configuration systems are not approved for use with LCV's

Appendix 2: LCV A-train configuration (continued)



Mass Limitation 1

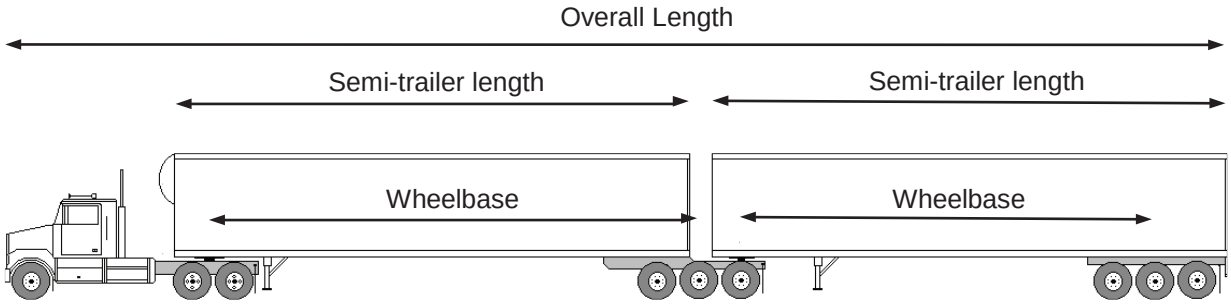
MASS PARAMETERS	LIMITS
Axle Mass Limits	
Steering Axle	Max 5,500 kilograms
Single Axle	Max 9,100 kilograms
Tandem Axle	
Axle Spread 1.2 metres to 1.85 metres	Max 18,000 kilograms
Tridem Axle	
Axle spread 2.4 m to less than 3.0 m	Max 21,000 kilograms
Axle Spread 3.0 m to less than 3.6 m	Max 24,000 kilograms
Axle Spread 3.6 m 3.7 m	Max 26,000 kilograms
Mass Limitation 1 (2 or 3 axles) (If Dimension "A" is less than 3 metres) Sum of Axle Masses of Lead Semi-trailer Plus Mass of Converter Dolly Axles	For 2 axle group: Maximum 18,000 kilograms For a 3-axle group: Maximum 24,000 kilograms
Mass Limitation 1 (4 axles, tandem - tandem) (If Dimension "A" is less than 5 metres) Sum of Axle Masses of Lead Semi-trailer Plus Mass of Converter Dolly Axles	Maximum 36,000 kilograms, less 1000 kilograms for every 0.5 m or portion of 0.5 m that Dimension "A" is less than 5 m
Mass Limitation 1 (5 axles, tandem - tridem) (If Dimension "A" is less than 5.5 metres) Sum of Axle Masses of Lead Semi-trailer Plus Mass of Converter Dolly Axles	Maximum 36,000 kilograms, less 1000 kilograms for every 0.5 m or portion of 0.5 m that Dimension "A" is less than 5.5 m
LCV number of axles	**LCV Maximum Gross Vehicle Weight**
7 Axle	57,500 kilograms
8 or more Axles	63,500 kilograms

Note:

- In all cases, the weight of lead semi-trailer of the configuration must be equal to or heavier than the weight of second trailer or semi-trailer.

Note: 6X2 tractor axle configuration systems are not approved for use with LCV

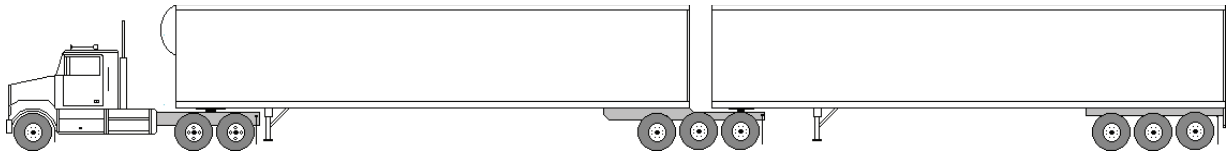
Appendix 3: LCV B-train configuration



DIMENSION PARAMETERS	Limits
Overall	
Length of combination and load	Maximum 40 metres*
Width of vehicle and load	Maximum 2.6 metres
Height of Vehicle and Load	Maximum 4.15 metres
Tractor	
Interaxle Spacing	Minimum 3.0 metres
Tandem Axle Spread	1.2 metres to 1.85 metres
Wheelbase	Maximum 6.2 metres
Lead Semi-trailer	
Length	Minimum 12.0 metres, Maximum 14.6 metres
Wheelbase	Maximum 13.5 metres
Tridem Spread	2.4 metres to 3.7 metres
Track Width	2.5 metres to 2.6 metres
Center of fifth wheel assembly	Maximum 0.3 metres rearward of the center of the rearmost axle on the semi-trailer
Second Semi-trailer	
Length	Minimum 12.2 metres, Maximum 16.2 metres
Wheelbase	Maximum 12.5 metres
Tandem Spread	1.2 metres to 1.85 metres
Tridem Spread	2.4 metres to 3.7 metres
Effective Rear Overhang	Max 35% of Wheelbase
Track Width	2.5 metres to 2.6 metres

Note: 6X2 tractor axle configuration systems are not approved for use with LCV's.

Appendix 3: LCV B-train configuration (continued)



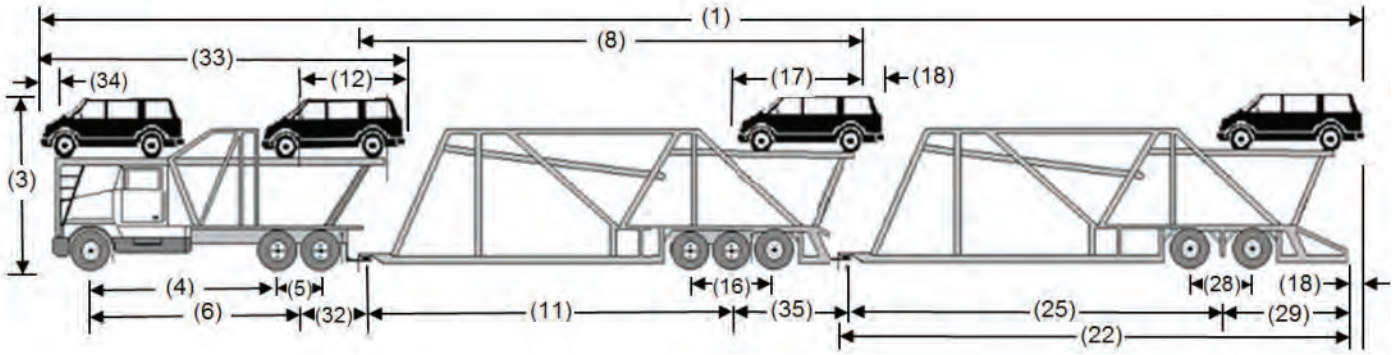
MASS PARAMETERS	Limits
Axle Mass Limits	
Steering Axle	Max 5,500 kilograms
Single Axle	Max 9,100 kilograms
Tandem Axle	
Axle Spread 1.2 metres – 1.85 meters	Max 18,000 kilograms
Tridem Axle	
Axle Spread 2.4 metres to less than 3.0 metres	Max 21,000 kilograms
Axle Spread 3.0 metres to less than 3.6 metres	Max 24,000 kilograms
Axle Spread 3.6 metres to 3.7 metres	Max 26,000 kilograms
LCV number of axles	**LCV Maximum Gross Vehicle Weight**
7 Axle	59,500 kilograms
8 or more Axles	63,500 kilograms

Notes:

- This configuration may include a tridem axle group on the second semi-trailer
- In all cases, the lead semi-trailer of the configuration must be equal to or heavier than the second trailer or semi-trailer.

Note: 6X2 tractor axle configuration systems are not approved for use with LCV's**.**

Appendix 4: LCV Double Stinger-Steer Auto Carrier

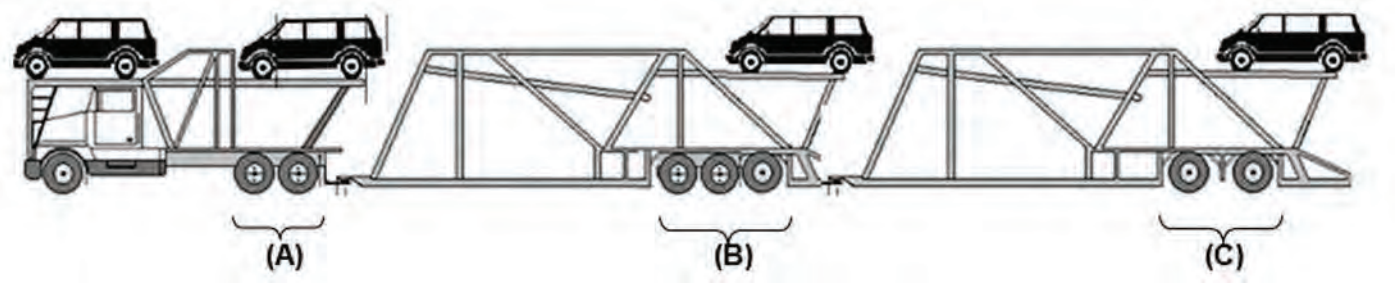


Ref.	Dimension Parameters	Limits
	Overall	
(1)	Length of Combination and Load	Maximum 40 m
(2)	Width of Vehicle and Load	Maximum 2.6 m
	Height of Vehicle	Maximum 4.15 m
(3)	Height of Vehicle and Load	Maximum 4.3 m
	Tractor	
(4)	Interaxle Spacing	Minimum 3.5 m
(5)	Tandem Axle Spread	1.2 m to 1.85 m
(6)	Wheelbase	Not Controlled
(12)	Effective Rear Overhang	Maximum 4.6 m
(32)	Hitch Offset	Maximum 1.9 m
(33)	Length	Maximum 12.5 m
(34)	Front Load Overhang	Maximum 1.0 m
	Lead Semi-trailer	
(8)	Length	Maximum 14.65 m
(11)	Wheelbase	11.35 m to 12.5 m
(16)	Tridem Axle Spread	2.4 m to 2.8 m
(17)	Effective Rear Overhang of Vehicle	Maximum 4.0 m or 42% of wheelbase (whichever is greater)
(18)	Rear Load Overhang	Maximum 1.2 m
(19)	Track Width	2.3 m to 2.6 m
	-trailer with single tires built before 2010	2.45 m to 2.6 m
	-trailer with single tires built after 2009	2.5 m to 2.6 m
	-all other trailers	2.5 m to 2.6 m
(35)	Hitch Offset	Maximum 2.4 m
	Second Semi-trailer	
(22)	Length	Maximum 14.65 m
(25)	Wheelbase	10.0 m to 12.5 m
(28)	Tandem Axle Spread	1.2 m to 3.1 m

		2.4 m to 3.7 m
(29)	Effective Rear Overhang of Vehicle	Maximum 4.0 m or 42% of wheelbase (whichever is greater)
(18)	Rear Load Overhang	Maximum 1.2 m
(30)	Track Width	2.3 m to 2.6 m
	-trailer with single tires built before 2010	2.45 m to 2.6 m
	-trailer with single tires built after 2009	2.5 m to 2.6 m
	-all other trailers	2.5 m to 2.6 m

Note: When the trailers are de-coupled and pulled individually behind a tractor, the resulting tractor trailer combination must comply with the dimension and mass requirements of a Stinger-Steer automobile or boat carrier, as described in New Brunswick *Regulation 2001-67 Vehicle Dimension and Mass Regulation* under the *Motor Vehicle Act.*

Appendix 4: LCV Double Stinger-Steer Auto Carrier (continued)



MASS PARAMETERS	Limits
Axle Mass Limits	
Steering Axle	Maximum 5,500 kg
Tandem Axle	
Tractor	Maximum 18,000 kg
Trailer	Maximum 18,000 kg
Tridem Axle	Maximum 21,300 kg
Mass Limitation 1 (A) > (C)	Mass on drive axles (A) must exceed mass on second trailer axles (C)
Mass Limitation 2 (B) > (C)	Mass on lead trailer axles (B) must exceed mass on second trailer axles (C).
Allowable Gross Vehicle Weight (AGVW)	Sum of the actual weight on the front axle plus the allowable masses of all other axles (none of which exceed any limits in this chart). **AGVW shall not exceed 55,000 kg.**

Appendix 5: Overview of the APTA LCV Driver's Certification Program

The Atlantic Provinces Trucking Association (APTA) is the sole coordinating body for all LCV driver training in New Brunswick.

APTA Database

APTA will maintain a database that contains the names of all LCV drivers, instructors and carrier LCV contacts of companies approved by (DTI) for LCV operations in New Brunswick. The purpose of the database is to ensure all drivers, instructors and carriers are registered and there is a single source of information available to various Government Departments to validate drivers and instructors training certificates.

The responsibility for inputting information into the database for instructors and drivers remains the responsibility of the carrier's primary LCV contact.

Standards for curriculum

The curriculum for LCV training in New Brunswick with the APTA LCV Program is as follows:

- 3 pre-requisite tests (Air Brakes, Vehicle Inspection, Hours of Service)

- In class training, based on the Canadian Trucking Alliance's Longer Combination Vehicles Driver Training Course and that includes the regulatory requirements pertaining to LCV's in New Brunswick, Nova Scotia, Quebec and Ontraio,

- Final Exam

- Yard Training (Coupling & De-coupling)

- On-route Training (1,000km of Local & Highway)

- Final Road Test

Certifying LCV Drivers

LCV driver certification is obtained by drivers who meet the entry criteria through the carrier that employs or contracts them to operate LCVs on their behalf. Drivers can only be certified by approved LCV instructors working on behalf of a carrier. There are two categories of drivers; drivers with current valid LCV experience, and drivers that have no experience.

Drivers with Previous LCV Experience

Currently, Drivers holding a valid and current certificate to operate an LCV in another province, having at least 1000 km of LCV driving experience, can be certified to operate an LCV in New Brunswick and Nova Scotia through the carrier that employs them. Additional training is not required; however the carrier must orient the driver on all aspects of the NB and NS permit conditions. Once satisfied the driver meets all the requirements as outline in Section 5.3 of this guide, the carrier primary LCV contact must sign off on the driver and submit information to APTA. APTA will then issue an LCV drivers certificate to the carrier in the name of the driver.

Drivers without Previous LCV Experience

Drivers who do not yet have LCV certification must attend certification training. Certified APTA LCV instructors working for the carrier for whom the driver works will provide classroom and practical instruction. After successful completion of prerequisite knowledge tests, participation in a day of classroom instruction and successful completion of a final knowledge examination, drivers will receive a driver-in-training certificate. During the practical skill development stage the novice LCV driver must be accompanied by a certified LCV instructor approved under the APTA program.

Responsibility of Carriers for LCV Drivers

The carrier must validate all driver qualifications as outlined in section 5.3 of this guide. and provide a signed declaration and supporting documents to APTA. Upon successful completion of all aspects of the training, the driver obtains his/her LCV driver certificate that is valid for one year as long as the driver remains with that carrier. Drivers who move to a different carrier must be

recertified by that carrier. Once satisfied the driver meets all the requirements, the carrier primary LCV contact must sign off on the driver and submit information to APTA, who will then issue an LCV driver certificate to the carrier in the name of the driver.

Certifying LCV Instructors

LCV Instructors will also be certified through the APTA program. The information below outlines two types of instructors. All instructors must be qualified and/or experienced to deliver adult learning.

Previously Qualified LCV Instructors

Instructors holding a valid and current LCV Instructor certificate in another province can migrate to the APTA program through the carrier that employs them or contracts their services. These instructors will attend an orientation session to familiarize themselves with all aspects of the APTA program and obtain certification as Instructors.

New LCV Instructors

Persons wishing to become certified as LCV Instructors, but who have no previous qualifications as an LCV Instructor, must first become qualified as an LCV driver and accumulate a minimum of 10,000 km LCV driving experience. Instructors can then participate in the APTA train-the-trainer program. This involves one day of the classroom instruction and one day of yard training.

Standard for Program Admin

Each LCV approved company will assign a LCV Primary Contact to manage the system and be the key contact for this carrier. A LCV contact administrator can also be assigned to do all the administrative work. An LCV contact will assume the administrative role on behalf of the carrier for LCV instructors and LCV drivers employed or contracted to work for that carrier. The LCV Contact must submit information to APTA and enters data into the online LCV Program Management System and Database (lcv.apta.ca). The LCV Contact has the highest level of database access available to the carrier.

Compliance officers will be able to validate all APTA Driver certificates with the help of this website lcv.apta.ca/validate. They will simply require identifying themselves and enter the certificate number that requires validation.

Audit

DTI must each be able to ensure that driver training and certification meet the oversight requirements set out above.

The APTA and LCV carriers delivering the training must also ensure that they have the capacity to monitor the LCV driver training program and report back to NBDTI.

In order to meet these objectives, DTI will require that APTA conduct an audit to confirm compliance with the LCV driver training and certification requirements and provide a report to DTI. All drivers participating in the LCV Program will be audited over a five-year period with 20% of the drivers being audited in any one year. It is expected that approximately 2%- 5% drivers in any year will audited to the detail of logbooks entries and driver abstracts to validate that drivers have met and continue to meet the minimum entrance requirements.

By end of each fiscal year a briefing of the audit will be provided to DTI reporting on that years finding, with a full report compiling the 5-year history once every five years.

Key element of the audit program:

- An independent auditor will be chosen and agreed upon by DTI based on recommendations by APTA .
- The cost of the audit will be borne by industry/APTA.
- The areas to be reviewed will include but not be limited to:
    - Ensuring the training program requirements are met in relation to curriculum, program delivery and administration.
    - Ensuring that all LCV Instructors, Drivers, and Carrier Representatives are certified through the APTA's program.
    - Ensuring that drivers entering the APTA's LCV Driver Certification Program without previous LCV experience have met the entrance requires of section 5.3 of this guide and have participated in the full APTA LCV Driver Training Program for new LCV drivers, which includes classroom instruction and successful completion of a final knowledge examinations, completion of in-yard practical training, 1,000 km (minimum) of LCV driving accompanied by a certified instructor, and their final road test.

- Ensuring that all drivers entering the APTA LCV Program with previous LCV experience have met the entrance requirements of section 5.3 of this guide and be registered and certified, applicable to their experience level, and be able to demonstrate an understanding of the New Brunswick and Nova Scotia LCV Program Conditions and requirements.
- The format of the report back from the independent auditor to NBDTI will be agreed upon by APTA and DTI.
- Based on the audit, DTI may identify areas that require attention the APTA and/or specific LCV carriers.
- In addition, DTI reserves the right to require an audit of any participating carrier at any time, where specific attention is necessary

Appendix 6: Example of LCV Driver's Certificate

apta
ATLANTIC PROVINCES TRUCKING ASSOCIATION

LCV Driver Certificate

Certificate #:
Driver Name:
Lic #:
Effective Date: 2015-01-01 Expiry Date: 2015-12-31

Driver Signature: _____
Carrier:

LCV Contact Signature: _____
LCV Contact:

Appendix 7: List of LCV refuge areas - Highway on-ramps only

Note: WB = Westbound, EB = Eastbound

Note: The following is a list of pre-approved refuge areas that can be used by LCV operators in case of emergency, a breakdown, or unexpected adverse weather conditions. These may also be used for en-route inspections.

Route 2			
Exit/*km*	**Location**	**WB Refuge (To QC)**	**EB Refuge (To NS)**
	Memramcook weigh scale	**Yes**	**Yes**
	Salisbury weigh scale	**Yes**	**Yes**
433	Salisbury	**Yes**	**Yes**
414	885 - Havelock/Petitcodiac	**Yes**	No
365	Chipman/Sussex	No	**Yes**
347	Mill Cove	**Yes**	**Yes**
303	Oromocto	**Yes**	No
297	Nevers Road Lincoln	**Yes**	**Yes**
285	New Maryland	No	**Yes**
275.4	Deerwood Scale	**Yes**	*NA*
271	Mazzerole St. Road	No	Yes
253	Kings Landing	**Yes**	**Yes**
212	Canterbury/Meductic	**Yes**	**Yes**
200	Debec / Dugan Rd.	**Yes**	**Yes**
185	Connell Rd Woodstock	No	**Yes**
172	Hartland	**Yes**	**Yes**
99	New Denmark	**Yes**	No
88	Rte. 130/Limestone ME	No	**Yes**
83	Grand Falls Portage Road	**Yes**	No
75	Rte. 108 / 255	No	**Yes**
58	Rte. 17 St Leonard	No	**Yes**
56	Grande Riviere St Leonard Irving Mill	**Yes**	**Yes**
49.5	*Scale WB*	***Yes***	*NA*
26	Sainte Basile - Principale St	No	**Yes**
21	Saint Basile – Iroquois St	No	**Yes**
18	Edmundston Centre	**Yes**	No
3.4	*Weigh scale St. Jacques*	*NA*	No
0	*Quebec/NB Border*	*NA*	

NOTE: Refuge areas listed are not to be used as rest areas or to access food and washroom facilities. Applicants may submit turning templates to request access to such facilities.

Appendix 7: List of LCV refuge areas – Highway on ramps only (cont'd)

Route 95			
Exit/*km*	**Location**	**Refuge**	**Refuge**
There are no refuge areas on Route 95			

Route 1			
Exit/*km*	**Location**	**WB Refuge (To U.S.)**	**EB Refuge (To Moncton)**
233	Petitcodiac	**Yes**	**Yes**
211	Fundy Park	No	**Yes**
195	Sussex	**Yes**	**Yes**
175	Norton	**Yes**	No
167	Bloomfield	No	**Yes**
159	Hampton	No	**Yes**
	Fairvale Scale site	**Yes**	No
96	Musquash	No	**Yes**
93.5	Temporary Weigh Scale	*NA*	**Yes**
84.8	End of divided highway		

NOTE: Refuge areas listed are not to be used as rest areas or to access food and washroom facilities. Applicants may submit turning templates to request access to such facilities.

Appendix 8: NB LCV Accident Reporting Form

LCV ACCIDENT REPORTING FORM

NB Department of Transportation and Infrastructure
Project Development and Asset Management Branch
PO Box 6000 Fredericton NB E3B 5H1

This form must be completed in addition to Accident Reporting Form that is completed by the police officer at the scene. Ensure that this form is submitted to the NB Department of Transportation and Infrastructure, Project Development and Asset Management Branch within 48 hours of the accident. The information contained here-in is subject to the same confidentiality agreements as the form completed by the police.

All pages must be completed when submitted.

City:

Date of accident (day-month-year):

Time of accident:

Driver's description Road & Weather conditions at the location and at time accident occurred:

Location of Accident: (describe the location by kilo markers or exit number and direction of travel)

LCV Description (e.g. A or B train configuration):

Trailer combinations: e.g. 48,48 or 53,53 etc

GVW of combination at time of accident:

Cargo Type Description for each trailer:

Description of load and placement of load on each trailer of the LCV unit: draw sketch below (or attach):

Detailed Description of LCV's trip (e.g. origin, start time, route taken)

Driver's experience on LCV's:

Estimate number of trips by driver:

Driver's description and account of accident:

(Provide photos if available)

Attach copy of on-board speed record at time of accident ☐

Attach copy of LCV Driver's Certificate ☐

Attach copy of Drivers log book for this trip ☐

Appendix H
Truck Route Turning Movement Analysis

NOTES

NO.	DATE	REVISIONS	BY	APPR.

PRELIMINARY ONLY
NOT TO BE UTILIZED FOR CONSTRUCTION

PROJECT TITLE

RUEDEBUSCH
DEVELOPMENT
&
CONSTRUCTION

MONCTON N.B.

DRAWING TITLE

TRUCK TURNING PATH

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RUEDEBUSCH
DEVELOPMENT & CONSTRUCTION

MONCTON N.B.

DRAWING TITLE

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DEVELOPMENT & CONSTRUCTION

MONCTON N.B.

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DEVELOPMENT & CONSTRUCTION

MONCTON N.B.

DRAWING TITLE

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DEVELOPMENT & CONSTRUCTION

MONCTON N.B.

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DEVELOPMENT & CONSTRUCTION

MONCTON N.B.

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PROJECT TITLE

RUEDEBUSCH
DEVELOPMENT & CONSTRUCTION

MONCTON N.B.

DRAWING TITLE

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PROJECT TITLE

RUEDEBUSCH
DEVELOPMENT & CONSTRUCTION

MONCTON N.B.

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Appendix G Environmental Management Plan – August 29, 2022

Ruedebusch Development & Construction

ENVIRONMENTAL MANAGEMENT PLAN

New Distribution Center

Submitted to:

PROVINCE OF NEW BRUNSWICK
DEPARTMENT OF ENVIRONMENTAND LOCAL GOVERNMENT
P.O. Box 6000
Fredericton, N.B.
E3B 5H1

Prepared by:

Englobe Corp.
1077 St. George Blvd., Suite 400
Moncton, N.B.
E1E 4C9

August 29, 2022
Project No. 2200406

TABLE OF CONTENTS

SECTION 1 - INTRODUCTION

1.1 Introduction

The Environmental Management Plan (EMP) for the New Distribution Center project focuses on the activities related to the construction of a new distribution center building, parking lots, undergrounding servicing, site work, security fencing & gates, and associated work. This Environmental Management Plan is divided into the following sections:

Section 1	Introduction
Section 2	Site Work
Section 3	Waste Management
Section 4	Dust Management
Section 5	Wetland and Watercourse General Measures
Section 6	Noise Management
Section 7	Clean-Up and Re-Vegetation
Section 8	Heritage and Archeological Resources
Section 9	Emergency Response Plan
Section 10	Environmental Effects Monitoring Plan
Section 11	Emergency Contacts

1.2 Purpose of the EMP

The EMP is an important component of the overall Project in order to protect the environment. This is a working document that is used by the project personnel in the field during construction as well as by employees of Ruedebusch Development & Construction to ensure that commitments made in the Environmental Impact Assessment (EIA) registration document are implemented and monitored. Specifically, the purpose of this EMP is to:

a) Comply with the conditions and requirements of the "EIA" determination received by the New Brunswick Department of Environment and Local Government (NBDELG);
b) Provide a summary of potential environmental issues and protective/ mitigation measures to be implemented during construction;
c) Outline Ruedebusch's commitment to minimize potential project environmental impacts, including those identified during the regulatory review process and the EIA.

1.3 Project Description and Schedules

1.3.1 Project Description

The Proponent (Ruedebusch Development & Construction) proposes to construct a distribution center over a total footprint of approximately 77,000 sq.m. (19 acres) on two vacant land parcels (PID 70489349 and PID 70502919) within a commercial/industrial area of Moncton, known as the Caledonia Industrial Park.

The project will generally include the following:

— A 50,540 sq.m. (544,000 sq. ft.) building;
— Tractor staging area;
— Van staging area;

— Long trailer parking area;
— An auto parking area;
— Municipal servicing;
— Storm water management infrastructure;
— Ingress and egress to the site from Galloway Street.

1.3.2 Schedule

The distribution center construction described herein is being proposed for construction with an anticipated start date of late winter 2023. The following main tasks will be performed:

- Mobilization and installation of environmental protection devices;
- Clearing and grubbing of the work site, and disposal of materials off-site (remaining portion of the property to remain in current state);
- Stripping;
- Excavation related to underground piping and structures, building foundation, and storm detention pond;
- Underground municipal service piping installation;
- New electrical site service connection;
- Importing of structural fill if required to bring site up to sub-grade level;
- Building construction;
- Sit grading, and ditching;
- Supply and installation of new security fencing and gates;
- Asphalt parking lot and driveway construction;
- Property restoration with topsoil/hydroseed, and granular materials.
- Start up and commissioning of equipment.

The new site will be constructed by importing borrow material (if required to achieve the required grades) and granular material, and any excess or unsuitable excavated material that is not re-used on-site will be disposed of off-site.

Environmental protection will include the installation of silt fence around the work zone prior to the start of any construction activities, as well as erosion protection structures as appropriate. These will remain in place and be maintained in good condition until the site is completely restored.

The Project is expected to be completed by early winter 2023/2024.

1.4 EMP Communication

This Environmental Management Plan was developed for construction of the Project in accordance with all applicable federal and provincial environmental protection legislation and regulations as of the date of its preparation. This document will become part of the contract between Ruedebusch Development & Construction and any contractors involved.

Ruedebusch Development & Construction will communicate its commitment to this EMP to any staff or other contractors involved in the work prior to construction commencing.

SECTION 2 - SITE WORK

All activities relating to site work will adhere to all relevant regulatory requirements, including but not limited to, the Environmental Impact Assessment Regulation under the Clean Environmental Act, Migratory Birds Convention Act, Species at Risk Act, and the Canadian Environmental Protection Act.

2.1 General

Appropriate measures will be made to diminish the risk of introducing invasive species to the area. These measures include:

a) Inspecting machinery and cleaning with a pressure water hose if necessary, as well as regular equipment inspection (before, during, and after construction), to ensure that vegetation is not transported from one site to another.
b) All machinery should be cleaned before being brought on-site.

If encountered, wildlife is not to be handled, touched, or harassed. Wildlife will be provided ample space to vacate the work site on their own accord.

2.2 Clearing

Clearing involves the removal of trees, shrubs, brush and other vegetative cover. The measures listed below will be undertaken to prevent potential impacts upon valued environmental components.

a) All clearing activities will be conducted before nesting season begins in 2023 (mid April). For this project, any necessary clearing will be conducted outside of the regional annual breeding season for migratory birds (mid-April to late August). If clearing is required during breeding season, a non-intrusive bird survey will be conducted;
b) Activities will be minimized by establishing vegetated buffer zones around any nests;
c) The removal of shrubs within 30 m of all streams and/or wetlands will be minimized where possible. Work to be done within 30 m of a wetland and/or watercourse must adhere to the conditions set forth in the WAWA permit;
d) Where possible, vegetation must be maintained along the banks of watercourses in sufficient quantity to provide for bank stability and shading;
e) All trees and slash lying on the ground within 15 m of the edge of the bank of a watercourse must be removed and disposed of such that it cannot enter a watercourse during high flow;
f) Any debris generated during the Project must be prevented from washing downstream and must be removed from a watercourse;
g) Organic material, such as topsoil, removed during construction should be stockpiled and reused when possible;

h) Prior to starting the stripping & clearing activity, erosion control measures must be installed where necessary and adequately maintained to prevent the discharge of sediment to a wetland and/or watercourse. This includes the installation of silt fences and the construction of "sedimentation" ponds if required;
i) Clearing limits shall be flagged prior to the commencement of clearing.

2.3 Erosion Protection

With respect to erosion protection, the mitigation measures listed below shall be followed:

a) Install sediment fence and erosion control structures as shown on the Contract drawings for all activities potentially resulting in an increased presence of sediment;
b) All erosion and sediment control devices shall be inspected and maintained on a regular basis or after any significant rainfall until the Project site is permanently stabilized;
c) Erodible soils shall be covered with hay mulch if the area is not actively worked for more than one (1) week.

2.4 Dewatering in Work Areas

Work areas may require dewatering during construction. The following measures will be implemented, as required, in order to minimize the impact of dewatering:

a) All pumped water will be directed to a sediment control pond to remove silt from, and reduce turbidity of, water pumped from work areas before discharging to nearby ditches with erosion protection structures;
b) Total suspended solids (TSS) of the pumped water should be monitored throughout the construction process;
c) Where possible, water should be discharged to vegetated work areas in order to further reduce any potential impacts on a wetland and/or watercourse;
d) All discharged water will be encouraged to follow natural surface drainage patterns.

2.5 Pumps and Generators

A variety of equipment such as pumps, hoses and generators are used during construction activities as well as accompanying support and supply facilities. Environmental concerns associated with the operation and use of such equipment include accidental spills of fuel or lubricating oil and chronic leaks, which may contaminate local water bodies and surface soils.

The following measures will be implemented in order to prevent or minimize potential impacts related to issues or equipment use and maintenance.

a) Fuel shall not be stored near generators or located within 30 m of a watercourse or wetland;
b) Drip pans shall be placed underneath pumps and generators located near watercourses and wetlands where practical;
c) Hoses and connections on all equipment shall be inspected daily for leaks and drips;

d) All leaks shall be reported immediately to the on-site supervisor, and shall be addressed to remediate the problem, as well as remediate the affected areas as discussed in Section 9: Emergency Response Plan;
e) Refueling and maintenance of equipment must take place in designated areas, on level terrain, a minimum of 30 m from any surface water bodies, wetlands, and potable water supply wells, with a collection system to contain oil, gasoline and hydraulic fluids.

2.6 Stripping & Grading

Stripping and grading activities are some of the most critical with regard to the control of erosion and sediment transport. Stripping consists of the removal of topsoil, and grading involves the shaping of new driveways / parking lots and the overall site as well as drainage control.

a) All construction activities, including clearing and stockpiling of materials will take place outside of the 30 meter buffer from watercourses and wetlands as identified on the drawings, except where specifically required by the work;
b) Stripping of the organic vegetation mat and/or the upper soil horizons will be minimized and, where possible, they will be left in place;
c) The stripped organic vegetation mat and upper soil horizon material will be used, where practicable, to cover exposed areas and promote re-vegetation;
d) Stripping activities near watercourses and wetlands, particularly areas with steep slopes, should be avoided if possible and shall be minimized where specifically required for the work;
e) Where work is to occur within 30 m of a watercourse or wetland, the work must adhere to the conditions set forth in the NBDELG's WAWA permit;
f) The length of time that stripped areas are left exposed to the elements will be minimized to prevent unnecessary erosion. Refer to Section 2.3: Erosion Protection for further detail;
g) Stripped material may be temporarily stored in adjacent areas of the Project but shall be stored within the silt fence perimeter shown on the drawings. Appropriate surface water and sedimentation control measures will be implemented as needed for stockpile locations.

SECTION 3 – WASTE MANAGEMENT

All waste generated during this project will be managed in accordance with all relevant regulatory requirements.

3.1 Descriptions of Effects of Wastes

Solid waste (*e.g.*, domestic waste, paper, cardboard, wood and other construction debris), if not properly controlled and disposed of, will be unsightly and may cause human safety and health concerns and could result in a conflict with wildlife.

The release of untreated sewage is a concern to human health, drinking water quality, and aquatic ecosystems. No untreated sewage will be discharged during the construction activities.

There will be fuels and hazardous materials used in association with equipment operation and maintenance activities, which occur during construction activities. The major concern regarding the use of hazardous substances is their uncontrolled release into the environment through spillage, and the subsequent adverse effects on the terrestrial, and aquatic habitat, species, soil, groundwater quality and human health and safety.

It is noted that biodegradable alternatives to petroleum-based hydraulic fluids for heavy machinery are commonly available. The use of these biodegradable hydraulic fluids is encouraged, where possible.

3.2 Handling, Storage and Disposal

3.2.1 Solid Waste

The following measures will be implemented in order to mitigate potential impacts related to solid waste disposal:

a) All domestic solid waste will be collected, properly stored, removed, and disposed of at an appropriate site;
b) The site and working area will be kept clear of all scraps and garbage;
c) Materials such as paper, cardboard, wood, scrap steel and metal, and tires will be collected and offered for recycling where practical. All materials not able to be recycled will be disposed of in an approved facility;
d) Waste accumulated on site prior to disposal shall be placed in a secured location, so as to not pose a threat or concern to human health and safety, or wildlife.

3.2.2 Sewage

The following measures will be implemented in order to mitigate potential impacts related to sewage disposal.

a) Sanitary waste from construction activities will be handled using portable restrooms. These will be self contained units, and will not require additional water;
b) The portable restrooms located at the site will conform to the Canada *Occupational Health and Safety Act* and any City ordinances;
c) All septic waste will be collected by a licensed waste disposal operator and transported off site for disposal at a proper handling facility.

3.2.3 Fuel

The highest protocols will be implemented in association with the handling and storage of hazardous materials and hydrocarbons as mentioned in Section 9: Emergency Response Plan. These will include:

a) Transportation, storage and use of fuels will be conducted in compliance with government laws and regulations, including New Brunswick Regulation 87-97 Petroleum Product Storage and Handling under the *Clean Environment Act* and the *Transportation of Dangerous Goods Act*;
b) Machinery will be checked on a daily basis for leakage of lubricants or fuel and must be in good working order;
c) Refueling and maintenance of equipment will take place in designated areas, on level terrain, a minimum of 30 m from any surface water or wetland, with a collection system to contain oil, gasoline and hydraulic fluid. In addition to the condition stated above, equipment maintenance (greasing, refueling, and oiling operations) shall not be performed within ditches;
d) Ensure crews are aware of contingency plans in advance of the start of construction work;
e) All spills or leaks will be promptly contained, cleaned up and reported to the 24 hour environmental emergencies reporting system;
f) To ensure preparedness in the case of a hazardous spill, resources (skimmer, absorbent pads and overpack drums – refer to 9.3) required will be obtained and kept on site;
g) Greasy or oily rags or contaminated materials will be disposed of in an appropriate fire resistant receptacle. Contaminated materials are to be sent to the appropriate waste disposal site;
h) Waste oils and lubricants will be retained in a tank or closed container and be disposed of in an approved manner as directed by NBDELG.

SECTION 4 - DUST MANAGEMENT

Excavated and work areas may produce dust in the time prior to the re-vegetation of the disturbed areas. The environmental concerns related to dust include human health effects and potential impacts on aquatic ecosystems and vegetation. Dust management will be conducted in accordance to the Air Quality Regulation-*Clean Air Act*. The measures provided below will be taken in order to mitigate potential impacts associated with dust management.

a) Cover truck loads of materials which could generate dust as necessary;
b) Dust from construction activities will be controlled where possible by using frequent applications of water or calcium chloride. Waste oil will not be permitted to be used for dust control;
c) Applications of calcium chloride shall be in accordance with the Guidelines available from Environment Canada.

SECTION 5 – WETLAND AND WATERCOURSE GENERAL MEASURES

5.1 Mitigation Measures

Mitigation measures identified within the EIA have been included within this section, along with additional mitigation means:

a) Prior to construction within the 30 m buffer of wetlands and/or a watercourse, install sedimentation control along each side of the buffer zone wherever necessary. These devices shall be placed as shown on the drawings unless otherwise specified by the NBDELG and shall be maintained until the area has been stabilized;
b) Refueling of equipment shall take place outside of the 30 m setback buffer from any wetland and/or watercourse, with the exception of pumps used to dewater the site (if required);
c) Work near wetlands and/or watercourses will be performed in a way such that deleterious substances including, but not limited to, sediment, fuel and oil do not enter a watercourse or wetland;
d) Machinery must be checked for leakage of lubricants of fuel and must be in good working order. Equipment maintenance must take place in designated areas, on level terrain, a minimum of 30 m from any surface water or wetland, with a collection system to contain oil, gasoline, and hydraulic fluids;
e) Basic petroleum spill clean-up equipment shall be kept onsite during construction;
f) Erosion control structures are to be used as shown on the drawings and where required as a result of the construction work;
g) All erosion and sedimentation control measures will be inspected and maintained prior to the end of each workday;
h) Construction debris and excavated material generated during the Project must be prevented from washing downstream, removed from the wetland and/or watercourse and Project area and disposed of in the proper manner;
i) Visual monitoring of all wetlands near the work area will take place prior to the end of each week, and during and after significant rain events, and any work necessary to ensure the effects are minimized will be undertaken;
j) There shall be no lay-down areas, grubbing and waste disposal piles, equipment/machinery storage, material/rock/fill storage, bullpens, yarding, etc. located outside the area fenced in with silt fencing as shown on the drawings;
k) Disturbed areas will be reinstated as soon as is practical, silt fences and other erosion protection devices around excavations and stockpiles will also be used. All hydroseeded areas will also be hay mulched;
l) Work within the wetland is to be carried out during ground frost conditions (winter like conditions), to limit the disturbance in the wetland. Any heavy equipment required for work within the wetland and its 30 m buffer must travel over heavy mats to further minimize impacts on the wetland.

SECTION 6 - NOISE MANAGEMENT

A variety of noises associated with heavy construction activity can cause negative effects on wildlife resources in terms of their distribution and abundance. Noises associated with heavy equipment are temporary in nature.

Best management practices shall be implemented, wherever possible, to minimize potential impacts arising from a variety of noise sources. Mitigative measures taken will include the following:

a) All vehicles and generators will have exhaust systems in good condition without leaks and be inspected regularly; mufflers will be operating properly;
b) Noisy activities shall be scheduled to be done during normal daylight hours on workdays;
c) Proper functioning and monitoring of noise abatement equipment.

SECTION 7 – CLEAN-UP AND RE-VEGETATION

The following will be performed in order to mitigate impacts which might result from construction activities:

a) As soon as possible following the construction activities, identify areas requiring planting or seeding for re-vegetation purposes. These will include:
    - Areas adjacent to a watercourse where erodible soil is exposed and where mechanical stabilization techniques are not deemed to be sufficient to guarantee stability or prevent uncontrolled introduction of sediment to a watercourse.
    - Any other areas deemed to require quick re-vegetation, and as required by NBDELG.
b) Restoration of lands disturbed during construction will commence as soon as possible after construction activity has ceased. Although seasonal weather conditions may delay seeding, it should be commenced as soon as conditions permit;
c) Should seed mixes for herbaceous native species for the area be required and not be available, it should be ensured that plants used in re-vegetation efforts are not known to be invasive;
d) The areas subject to restoration activities will be visually inspected periodically to ensure adequate results. Additional restoration activities will be performed as deemed appropriate;
e) Necessary interim measures will be implemented to prevent erosion prior to re-establishment of vegetation;
f) Silt fences and erosion control structures will remain in place until vegetation and resurfacing has matured to the point where erosion carried into watercourses is no longer a concern.

SECTION 8 – HERITAGE AND ARCHEOLOGICAL RESOURCES

If evidence of past activity or objects of an archaeological nature are discovered, the following mitigative measures shall be implemented:

a) All personnel will be informed of the historic resources potential of the area, of their responsibility to report any unusual findings, and to leave such findings undisturbed;
b) In the event of historic or pre-contact artifact discovery or archaeological site, the following list of procedures will apply:
    - Cease all work in the vicinity of the find and the Archaeology and Heritage Branch, Department of Tourism, Heritage and Culture must be contacted immediately at (506) 453-2738.
    - Under the *Historic Conservation Act*, all archaeological sites and artifacts are considered property of the Crown, and must not be disturbed. Ruedebusch Development & Construction or the contractor on-site will take all reasonable precautions to prevent employees or other persons from removing or damaging any such articles or sites as they may be held liable for prosecution for all contraventions. Personnel working in the vicinity will be advised of the find. The site area will be flagged for protection and avoidance.
    - If required, a full assessment will be conducted of the site and immediate area.
    - Archaeological materials encountered will be reported initially to the on-site supervisor, and immediately thereafter to Resource Archaeologist with the following information:
        i. Nature of activity;
        ii. Nature of the material discovered;
        iii. Precise location of the find.
    - Work may only resume once approval has been received from the Archaeology and Heritage Branch.

SECTION 9 – EMERGENCY RESPONSE PLAN

Contingency plans to deal with accidental spills have been developed and are presented in this Section. They will be modified as required during the execution of the Project. They are as follows:

9.1 Introduction

The transfer of fuel from tanker trucks to storage tanks or machinery, vehicle accidents involving heavy equipment, and leaks from fuel storage tanks and associated lines all offer the potential for fuel oil spills. Other hazardous liquid products associated with operations, such as hydraulic fluids, lubricating oil, and solvents will be used in relatively small quantities.

9.2 Action Plan

In the event of fuel or hazardous material spill, refer to the following procedures outlined below:

a) The individual who discovers a leak or spill shall immediately call for help and then attempt to stop and contain the leak or spill if safe to do so;
b) Any spill or leak on land or water (regardless of size) should first be reported immediately to the site foreman, upon implementation of (a) above. Ruedebusch Development & Construction or the Contractor on-site will be responsible for notifying the proper authorities.

The site foreman shall halt work in the immediate area if necessary and report the spill to the project manager. In case of an environmental emergency, all calls should be directed to the 24-hour environmental reporting system (Maritime Provinces: 1-800-565-1633).

If the spill occurs near or in the water, the Canadian Coast Guard will be notified by the foreman and specific action will be taken.

The on-site supervisor will have the full authority to take appropriate action without unnecessary delay. The following information shall be provided:

i. Name of person reporting the spill and phone number;
ii. Time of spill or leak;
iii. Time of detection of spill or leak;
iv. Type of product spilled or leaked;
v. Amount of product spilled or leaked;
vi. Location of spill or leak;
vii. Source of spill or leak;
viii. Type of accident – collision, rupture, overflow;
ix. Owner of product and phone number;
x. If the spill or leak is still occurring;
xi. If the spill or leaked product is contained, and if not, where it is flowing;
xii. Cleanup efforts already underway;
xiii. Wind velocity and direction;
xiv. Temperature;
xv. Proximity to water bodies, wells, water intakes, and buildings;
xvi. Snow cover and depth, terrain, and soil conditions.

c) The foreman shall assume overall responsibility of coordinating a cleanup and maintaining this contingency plan up-to-date. Any spills that occur should be remediated to meet or exceed regulatory requirements. The foreman will, in consultation with the regulatory authorities:

i. Assess site conditions and environmental impact of various cleanup procedures;
ii. Assess potential for fuel recovery versus burning;
iii. Deploy on-site personnel to mobilize pumps and empty appropriate storage drums to the spill site;
iv. Deploy on-site personnel to build containment dykes and commence dumping contaminant in drums or if drainage system is involved, leakage will be isolated by digging a sump, deploying a pollution boom around area or a combination of both;
v. Apply absorbents or utilize skimmers as necessary to prevent the spill from spreading;
vi. Dispose of all contaminated debris, cleaning materials, and absorbents by placing in appropriate containers and label for disposing;
vii. Take all necessary precautions to ensure that the incident does not recur.

d) The continuing monitoring of the site of the accidental release, and damage reporting will be the responsibility of all contractors on-site.

9.3 Resource List

During construction, the following resources will be available at appropriate locations and distance from the Project site to readily mitigate accidental releases of stored fuels and/or hazardous materials.

a) Skimmer (for spills on water);
b) Suitable quantities of absorbent pads;
c) Overpack drums containing sorbent pads, sorbent booms, splash suits, shovels, rakes, tool kit, sledgehammer, buckets and stakes and flagging tape;
d) Emergency numbers and contingency procedures.

Small spill response kits and equipment will be strategically located in construction areas where materials handling or equipment activity presents and increased risk of spill (*i.e.*, refueling locations and hazardous waste storage areas). These kits shall be checked on a regular basis for content, and items shall be replaced immediately after their use.

9.4 Birds and Oil

In the event of a spill, Ruedebusch Development & Construction or the Contractor on-site is responsible to respond as required to protect bird species in the impacted areas. Measures could include:

a) Hazing;
b) Disperse oil;
c) Bird Collection;
d) Wildlife monitoring;
e) Beached bird surveys;
f) Drift blocks;
g) Live oiled bird response.

The measures employed in response shall be coordinated with the relevant authority having jurisdiction. Please refer to "*Birds and Oil – CWS Response Plan Guidance",* prepared by Environment and Climate Change Canada's (ECCC) Canadian Wildlife Service (CWS) for more information.

SECTION 10 – ENVIRONMENTAL EFFECTS MONITORING PLAN

In the event that an environmental effect should occur on site, certain measures will be taken in order to monitor and verify the effectiveness of the mitigation steps implemented on this project.

a) If the presence of sediment within the water is visible or questionable, a sample will be collected upstream of the construction zone, at the construction site and downstream of the construction site which shall be analyzed for total suspended solids (TSS);
b) Hoses and connections on all equipment shall be inspected daily for leaks and drips, with special attention to those located near wetlands and/or watercourses;

c) Visual monitoring of all wetlands will take place prior to the end of each week and any work necessary to ensure the effects are minimized will be undertaken;
d) All vehicles/generators will have exhaust systems inspected regularly and mufflers will be operating properly to better manage noise on the site;
e) The areas subject to reclamation activities will be visually inspected periodically to ensure adequate results. Additional reclamation activities will be performed as deemed appropriate;
f) The continuing monitoring of the site of the accidental release of a leak and damage reporting will be the responsibility of all contractors on-site.

SECTION 11 – EMERGENCY CONTACTS

In the event that an emergency should occur on site the following is a list of key contacts for each part of the project:

- Ambulance/Fire/Police: 911
- Canadian Coast Guard: 1-800-565-1633
- Codiac Regional - RCMP 506-857-2400 or 911
- Enbridge Gas Pipeline: 1-866-763-5427
- NBDELG – Region 3 - Moncton: 506-856-2374
- NB Power: 1-800-663-6272
- Ruedebusch Development & Construction (David Hull) 608-957-7720

The complete project address is as follow (accessible from local street):

Distribution Center
1-33 Galloway Street
Moncton, N.B.
E1H 2J5

This Project is located immediately east from 45 Galloway St. and can be accessed from Galloway Street.

Appendix EMP-A

"*Birds and Oil – CWS Response Plan Guidance*"
Canadian Wildlife Service

Birds and Oil - CWS Response Plan Guidance

In all circumstances where a polluter is identified the burden of cleanup and response lies with the polluter. However, responsibility for government overview of a response to an oil spill depends on the source of the spill. The identified **lead agency** has responsibility to monitor an oil spill response and to take control if an appropriate response is not undertaken by a polluter or their agent.

Lead agency responsibilities lie with:

- **Environment Canada**
  - For spills and incidents on federal lands and from federal vessels
  - Potentially for land-based incidents in waters frequented by fish
  - May take lead if environment is not being protected by other leads, Cabinet Directive 1973
- **Canadian Coast Guard**
  - For spills from ships
  - All spills of unknown sources in marine environment
- **Provincial Department of Environment**
  - For spills from land-based sources
- **Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) and Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB)**
  - For spills related to offshore oil and gas exploration and production
- **Transport Canada**
  - To investigate ship source and mystery spills in the marine environment

The Canadian Wildlife Service has the responsibility for licensing activities which involve the handling or disturbance of birds, and of providing advice and often direction to other agencies, responders and the polluter during oil spill incidents.

1. Hazing[1]

Purpose: Prevent birds from coming in contact with oil

Options:

- Hazing by helicopter
- Hazing by FRC or other watercraft
- Release of scare devices (e.g. Breco Buoys, Phoenix Wailer)
- Use of hazing sound makers: propane cannons, whizzers, bangers, pyrotechnic devices etc.

Scare devices have a limited range of influence and likely are not a viable option with a large slick. Use of Breco Buoys and Phoenix Wailers can be used but we consider them to be largely ineffective in the situation of a large slick. Logistically, helicopter hazing would be difficult unless it was possible for a helicopter to remain on a platform offshore overnight. Hazing by FRC or other vessels would be ideal.

[1] There are several scare techniques which may be effective and do not require a permit, however a permit under the Migratory Bird Regulations **is required** for the use of aircraft or firearms (defined as capable of emitting at projectile at more than 495 feet per second). Propane cannons, blank pistols or pyrotechnical pistols firing crackers shells with **less than 495fps are legal without a permit**. Most scare tactics are relatively short lived in terms of effectiveness as birds acclimatize to the disturbance so scare techniques should be alternated to be effective.

Short-term focused hazing by the most expedient means should be attempted to move the birds away from the slick, if logistical conditions permit. Vessels at the site should have the ability to use sound makers (propane canons, pyrotechnic devices) to disperse birds in local areas. Such equipment should be deployed immediately to these ships with trained personnel to operate them. The vessels on site should be tasked to actively search and monitor for congregations of birds which could be vulnerable to oiling. If such groups are found then attempts should be made to disperse the birds away from the oil.

2. Disperse oil

Purpose: Prevent birds from contacting oil by getting oil off the surface of the water as soon as possible.

Options:

- Dispersants
- Mechanical dispersal with FRCs or other vessels
- Natural dispersal by environmental conditions

For small spills, mechanical dispersal would be the preferred method.

3. Bird Collection[2]

Purpose: Implement a humane response to oiled birds as required by Environment Canada's National Policy on Oiled Birds and Oiled Species At Risk (http://www.ec.gc.ca/ee-ue/default.asp?lang=En&n=A4DD63E4-1)

Options:

- The only option would be a ship-based effort to detect and collect dead and live oiled birds, both within the slick and adjacent to it.

All vessels in or near the slick should understand the need to collect birds. All vessels should have dip-nets, large plastic collecting bags to hold dead birds, and cloth bags or cardboard boxes in which to hold live oiled birds. Efforts should be made to retrieve live oiled birds to ensure they are dealt with humanely.

4. Wildlife monitoring

Purpose: Determine potential impact of spill

Options:

- Ship-based surveys for oiled and unoiled wildlife
- Aerial surveys for oiled and unoiled wildlife. Will require structured surveys (e.g. strip or transect surveys of spill area)
- Placement of CWS staff on vessels and aircraft

[2] Only those individuals authorized to do so (nominee on an existing federal salvage permit) can be involved with the collection of migratory birds.

Dedicated ship-based bird surveys should be initiated immediately. Ideally arrangements should be made to have a CWS observer on vessels or flights. In addition trained seabird observers need to be placed on all vessels monitoring a slick. This should continue until the slick is dispersed.

5. Beached Bird Surveys

Purpose: Determine impact of spill on wildlife and retrieve any live oiled wildlife on beaches.

Options:

- Conduct daily beached bird surveys during the incident and until one week after slick has been removed or dissipated.

CWS or other government officials (CCG, Enforcement Officers) will oversee the collection of dead and live oiled birds[3] as instructed in CWS' protocol for collecting birds during an oil spill response. This would only be required in circumstances where a large number of birds are potentially oiled or if the spill occurs in a sensitive area.

6. Drift Blocks

Purpose: Drift blocks may be deployed in slick to provide an estimate of bird mortality.

Options:

- Release from vessel
- Release from aircraft

The deployment of drift blocks would only be expected if there was a large spill and blocks should be released as soon as possible after a spill (CWS should be consulted to determine protocol for drift block deployment and tracking). The polluter or their agent would be expected to ensure drift blocks are tracked and collected as appropriate.

7. Live oiled bird response

Purpose: Implement a humane response to oiled birds as required by Environment Canada's National Policy On Oiled Birds And Oiled Species At Risk

Options:

- Rehabilitation
- Euthanization

CWS will be consulted to determine the appropriate response and treatment strategies which may include cleaning and rehabilitation or euthanization. CWS policy specifically requires that species at risk or other species of concern be rehabilitated.

[3] Only those individuals authorized to do so (nominee on an existing federal salvage permit) can be involved with the collection of migratory birds.

Appendix H Fauna, Flora and Habitat Description

1. Flora

An ACCDC search was requested by Englobe in August 2022. The ACCDC reported one floral specie described below within 5 km of the site that, although is not protected under SARA, is identified provincially as rare (S2). The ACCDC report is appended.

1.1 Red-disk Yellow Pond-lily *(Nuphar x rubrodisca)*

The Red-disk Yellow Pond-lily occurs in ponds, lakes and slow moving rivers, growing in water up to 5 meters deep. Wetland soils are hypoxic, and this genus (Nuphar) is known to be capable of temporary growth even in the absence of oxygen. There is potential favorable habitat for this species on or near the site; however a field survey is required to confirm the presence/absence of this species at the site.

2. SARA Birds

Species at Risk (SAR) appearing on the federal SARA Schedule 1 benefit from all the legal protection afforded and the mandatory recovery planning required under SARA (ECCC, 2022). The ACCDC search revealed the following 12 faunal SAR on Schedule 1 of SARA and one faunal SAR on Schedule 1 of SARA NB having been identified within 5 km of the site or within the study area (i.e. location sensitive species). Habitat descriptions are outlined in the following paragraphs.

2.1 Bank Swallow (*Riparia riparia)*

Bank Swallows are insectivorous birds that nest in colonies dug into the sides of sandy cliffs or banks. They also nest in gravel and sand piles in construction sites and freight yards (ECCC, 2022). There is negligible favourable habitat at the site; however a field survey is required to confirm the presence/absence of this species at the site.

2.2 Bobolink (*Dolichonyx oryzivorus*)

Bobolinks nest in grassland and herbaceous habitats (such as wetlands), including forage fields. Fall migration begins in mid-July and they return to their Canadian nesting grounds in mid-May, after which time the males establish territories and court females. Females construct nests directly on the ground, often at the base of large herbaceous plants. Bobolinks feed on both insects and plant matter during the breeding period, though nestlings are fed only insects (mostly butterflies, moths, grasshoppers, and crickets) (Cornell University, 2022). There is favorable habitat for this species on or near the site; however a field survey is required to confirm the presence/absence of this species at the site.

2.3 Barn Swallow (*Hirundo rustica*)

Barn Swallows are insectivorous birds feeding predominantly on flying insects. They largely nest in or on an artificial structure, including barns and other outbuildings, garages, houses, bridges and road culverts. Barn swallows prefer various types of open habitats for foraging, including grassy fields, pastures, various kinds of agricultural crops, lake and river shorelines, cleared rights-of-way, cottage areas and farmyards, islands, wetlands and subarctic tundra. (NatureServe Explorer, 2022). There is negligible favorable habitat

for this species on or near the site; however a field survey is required to confirm the presence/absence of this species at the site.

2.4 Common Nighthawk (*Chordeiles minor*)

The breeding habitat includes moist thickets of woodland undergrowth (especially aspen-poplar), bogs, tall shrubbery along streams or near swamps, and deciduous second growth. Nests are on or near the ground, among roots of fallen trees, in cavities in banks, or on ledges, sides of rocks, hummocks, stumps, or fallen logs, or on the ground under shrubbery. In migration, this warbler uses various forest, woodland, scrub, and thicket habitats, mostly in humid areas. In winter, it occurs in forested areas of foothills and mountains. (NatureServe Explorer, 2022). There is potential favorable habitat for this species on or near the site; however a field survey is required to confirm the presence/absence of this species at the site.

2.5 Canada Warbler (*Cardellina canadensis*)

The Canada Warbler habitat includes moist thickets of woodland undergrowth (especially aspen poplar), bogs, tall shrubbery along streams or near swamps, and deciduous second growth. Nests are on or near the ground, among roots of fallen trees, in cavities in banks, or on ledges, sides of rocks, hummocks, stumps, or fallen logs, or on the ground under shrubbery. In migration, this warbler uses various forest, woodland, scrub, and thicket habitats, mostly in humid areas. In winter, it occurs in forested areas of foothills and mountains. (NatureServe Explorer, 2022). There is potential favorable habitat for this species on or near the site; however a field survey is required to confirm the presence/absence of this species at the site.

2.6 Eastern Wood-Pewee (*Contopus virens*)

The Eastern Wood-Pewee inhabits a wide variety of wooded upland and lowland habitats including deciduous, coniferous, or mixed forests and occurs most frequently in forests with some degree of openness, whether it be the result of forest structure, natural disturbance, or human alteration. Intermediate-aged forests with a relatively sparse midstory are preferred. Also occurs in anthropogenic habitats providing an open forested aspect such as parks and suburban neighborhoods. Nests are constructed atop a horizontal branch, 1.2-21.4 meters above the ground, in a wide variety of deciduous and coniferous trees (NatureServe Explorer, 2022). There is potential favorable habitat for this species on or near the site; however a field survey is required to confirm the presence/absence of this species at the site.

2.7 Wood Thrush (*Hylocichla mustelina*)

Terrestrial (riparian) habitat type. Breeding is noted as deciduous or mixed forests with a dense tree canopy and a fairly well-developed deciduous understory, especially where moist. Bottomlands and other rich hardwood forests are prime habitats. Also frequents pine forests with a deciduous understory and well-wooded residential areas. Nesting in stands of young white pine with a canopy under 9 m in height. Nests usually are placed in a crotch or are saddled on a branch of a shrub, sapling, or large tree.

In migration and winter, habitats include forest and woodland of various types from humid lowland to arid or humid montane forest, also scrub and thickets; primarily undisturbed to moderately disturbed wet primary forest; may wander into riparian forest and various stages of second growth (NatureServe Explorer, 2022). There is negligible favorable habitat for this species on or near the site; however a field survey is required to confirm the presence/absence of this species at the site.

2.8 Eastern Whip-Poor-Will (*Antrostomus vociferus*)

The Eastern Whip-Poor-Will breeding habitat includes forest and open woodland, from lowland moist and deciduous forest to montane forest and pine-oak association. In open woodlands with well spaced trees and a low canopy. Lays eggs on ground in open site under trees or under bush, usually on a bed of dead leaves at woods edge or in open woodland. There is negligible favorable habitat for this species on or near the site; however a field survey is required to confirm the presence/absence of this species at the site.

2.9 Bicknell's Thrush (*Catharus bicknelli*)

The Bicknell's Thrush is a habitat specialist, generally associated with undisturbed dense habitat or disturbed areas undergoing vigorous succession (mid-successional) of Balsam Fir-dominated habitat and high stem densities (>10,000–15,000 stems/ha). Three breeding habitat types have been identified: montane/high-elevation forests, coastal lowlands and highland-industrial forests (ECCC, 2022). There is negligible favorable habitat for this species on or near the site; however a field survey is required to confirm the presence/absence of this species at the site.

2.10 Olive-sided Flycatcher (*Contopus cooperi*)

The Olive-sided flycatchers breed in various forest and woodland habitats: taiga, subalpine coniferous forest, mixed coniferous-deciduous forest, burned-over forest, spruce or tamarack bogs and other forested wetlands, and along the forested edges of lakes, ponds, and streams Most nesting sites contain dead standing trees, which are used as singing and feeding perches. Nests are placed most often in conifers, on horizontal limbs 2-15 meters from the ground (NatureServe Explorer, 2022). There is favorable habitat for this species on or near the site; however a field survey is required to confirm the presence/absence of this species at the site.

2.11 Evening Grosbeak (*Coccothraustes vespertinus*)

The Evening Grosbeak habitat includes coniferous (primarily spruce and fir) and mixed coniferous-deciduous woodland, second growth, and occasionally parks; in migration and winter in a variety of forest and woodland habitats, and around human habitation. They usually nest in dense foliage of deciduous tree or conifer, 2-21 m above ground (NatureServe Explorer, 2022). There is negligible favorable habitat for this species on or near the site; however a field survey is required to confirm the presence/absence of this species at the site.

2.12 Peregrine Falcon - anatum/tundrius (*Falco peregrinus pop. 1*)

The Peregrine Falcon habitats includes various open situations from tundra, moorlands, steppe, and seacoasts, especially where there are suitable nesting cliffs, to mountains, open forested regions, and human population centers. When not breeding, occurs in areas where prey concentrate, including farmlands, marshes, lakeshores, river mouths, tidal flats, dunes and beaches, broad river valleys, cities, and airports. Nests typically are situated on ledges of vertical rocky cliffs, commonly with a sheltering overhang. Ideal locations include undisturbed areas with a wide view, near water, and close to plentiful prey (NatureServe Explorer, 2022). There is negligible favorable habitat for this species on or near the site; however a field survey is required to confirm the presence/absence of this species at the site.

2.13 Bald Eagle (*Haliaeetus leucocephalus*)

The Bald eagle breeding habitat most commonly includes areas close to (within 4 km) coastal areas, bays, rivers, lakes, reservoirs, or other bodies of water that reflect the general availability of primary food sources including fish, waterfowl, or seabirds. Nests usually are in tall trees or on pinnacles or cliffs near water (NatureServe Explorer, 2022). This species may occasionally occur on or near the site, however a field survey is required to confirm the presence/absence of this species at the site.

3. Provincial Rarity Rank Birds

The ACCDC reported the following twelve bird species listed below within 5 km of the site that, although are not protected under SARA, are identified provincially as very rare (S1) or rare (S2).

Common Name	Scientific Name
Snowy Owl	*Bubo scandiacus*
Horned Lark	*Eremophila alpestris*
Willow Flycatcher	*Empidonax traillii*
American Scoter	*Melanitta americana*
Cliff Swallow	*Petrochelidon pyrrhonota*
Northern Mockingbird	*Mimus polyglottos*
Vesper Sparrow	*Pooecetes gramineus*
Gadwall	*Mareca strepera*
Pine Grosbeak	*Pinicola enucleator*
Glaucous Gull	*Larus hyperboreus*
Baltimore Oriole	*Icterus galbula*
Ring-billed Gull	*Larus delawarensis*

4. References

Atlantic Canada Conservation Data Centre (ACCDC). 2022. Data Report 7380: Ruedebusch Caledonia Development, NB.

Bird Studies Canada. 2022. Important Bird Areas of Canada Database. http://www.ibacanada.org.

Cornell University. 2022. All About Birds. www.allaboutbirds.org

Environment and Climate Change Canada. 2022. Species at Risk Act. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

NatureServe Explorer. 2022. https://explorer.natureserve.org/.

Appendix I Atlantic Canada Conservation Data Centre (ACCDC) Report - August 2022

DATA REPORT 7380: Ruedebusch Caledonia Development, NB

Prepared 15 August 2022
by C. Robicheau, Conservation Data Analyst

CONTENTS OF REPORT

Map 1. A 100 km buffer around the study area

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (AC CDC; www.accdc.com) is part of a network of NatureServe data centres and heritage programs serving 50 states in the U.S.A, 10 provinces and 1 territory in Canada, plus several Central and South American countries. The NatureServe network is more than 30 years old and shares a common conservation data methodology. The AC CDC was founded in 1997, and maintains data for the jurisdictions of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Although a non-governmental agency, the AC CDC is supported by 6 federal agencies and 4 provincial governments, as well as through outside grants and data processing fees.

Upon request and for a fee, the AC CDC queries its database and produces customized reports of the rare and endangered flora and fauna known to occur in or near a specified study area. As a supplement to that data, the AC CDC includes locations of managed areas with some level of protection, and known sites of ecological interest or sensitivity.

1.1 DATA LIST

Included datasets:

Filename	Contents
RuedebuschCaNB_7380ob.xls	Rare or legally-protected Flora and Fauna in your study area
RuedebuschCaNB_7380ob100km.xls	A list of Rare and legally protected Flora and Fauna within 100 km of your study area
RuedebuschCaNB_7380msa.xls	Managed and Biologically Significant Areas in your study area
RuedebuschCaNB_7380ff_py.xls	Rare Freshwater Fish in your study area (DFO database)

1.2 RESTRICTIONS

The AC CDC makes a strong effort to verify the accuracy of all the data that it manages, but it shall not be held responsible for any inaccuracies in data that it provides. By accepting AC CDC data, recipients assent to the following limits of use:

a) Data is restricted to use by trained personnel who are sensitive to landowner interests and to potential threats to rare and/or endangered flora and fauna posed by the information provided.
b) Data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
c) The AC CDC requires Data Users to cease using and delete data 12 months after receipt, and to make a new request for updated data if necessary at that time.
d) AC CDC data responses are restricted to the data in our Data System at the time of the data request.
e) Each record has an estimate of locational uncertainty, which must be referenced in order to understand the record's relevance to a particular location. Please see attached Data Dictionary for details.
f) AC CDC data responses are not to be construed as exhaustive inventories of taxa in an area.
g) The absence of a taxon cannot be inferred by its absence in an AC CDC data response.

1.3 ADDITIONAL INFORMATION

The accompanying Data Dictionary provides metadata for the data provided.

Please direct any additional questions about AC CDC data to the following individuals:

Plants, Lichens, Ranking Methods, All other Inquiries	Sean Blaney	Senior Scientist / Executive Director	(506) 364-2658	sean.blaney@accdc.ca
Animals (Fauna)	John Klymko	Zoologist	(506) 364-2660	john.klymko@accdc.ca
Data Management, GIS	James Churchill	Conservation Data Analyst / Field Biologist		james.churchill@accdc.ca
Billing	Jean Breau	Financial Manager / Executive Assistant	(506) 364-2657	jean.breau@accdc.ca

Questions on the biology of Federal Species at Risk can be directed to AC CDC: (506) 364-2658, with questions on Species at Risk regulations to: Samara Eaton, Canadian Wildlife Service (NB and PE): (506) 364-5060 or Julie McKnight, Canadian Wildlife Service (NS): (902) 426-4196.

New Brunswick. For information about rare taxa, protected areas, game animals, deer yards, old growth forests, archeological sites, fish habitat etc., or to determine if location-sensitive species (section 4.3) occur near your study site, please contact Hubert Askanas, Energy and Resource Development: (506) 453-5873.

Nova Scotia. For information about Species at Risk or general questions about Nova Scotia location-sensitive species please contact the Biodiversity Program at biodiversity@novascotia.ca. For questions about protected areas, game animals, deer yards, old growth forests, archeological sites, fish habitat etc., or to determine if location-sensitive species (section 4.3) occur near your study site please contact a Regional Biologist:

DIGB, ANNA, KING	Emma Vost	(902) 670-8187	Emma.Vost@novascotia.ca
SHEL, YARM	Sian Wilson	(902) 930-2978	Sian.Wilson@novascotia.ca
QUEE, LUNE	Peter Kydd	(902) 523-0969	Peter.Kydd@novascotia.ca
HALI, HANT	Shavonne Meyer	(902) 893-0816	Shavonne.Meyer@novascotia.ca
Central Region	Jolene Laverty	(902) 324-8953	Jolene.Laverty@novascotia.ca
COLC, CUMB	Kimberly George	(902) 890-1046	Kimberly.George@novascotia.ca
ANTI, GUYS	Harrison Moore	(902) 497-4119	Harrison.Moore@novascotia.ca
INVE, VICT	Maureen Cameron-MacMillan	(902) 295-2554	Maureen.Cameron-MacMillan@novascotia.ca
CAPE, RICH, PICT	Elizabeth Walsh	(902) 563-3370	Elizabeth.Walsh@novascotia.ca

Prince Edward Island. For information about rare taxa, protected areas, game animals, fish habitat etc., please contact Garry Gregory, PEI Department of Environment, Energy and Climate Action: (902) 569-7595.

2.0 RARE AND ENDANGERED SPECIES

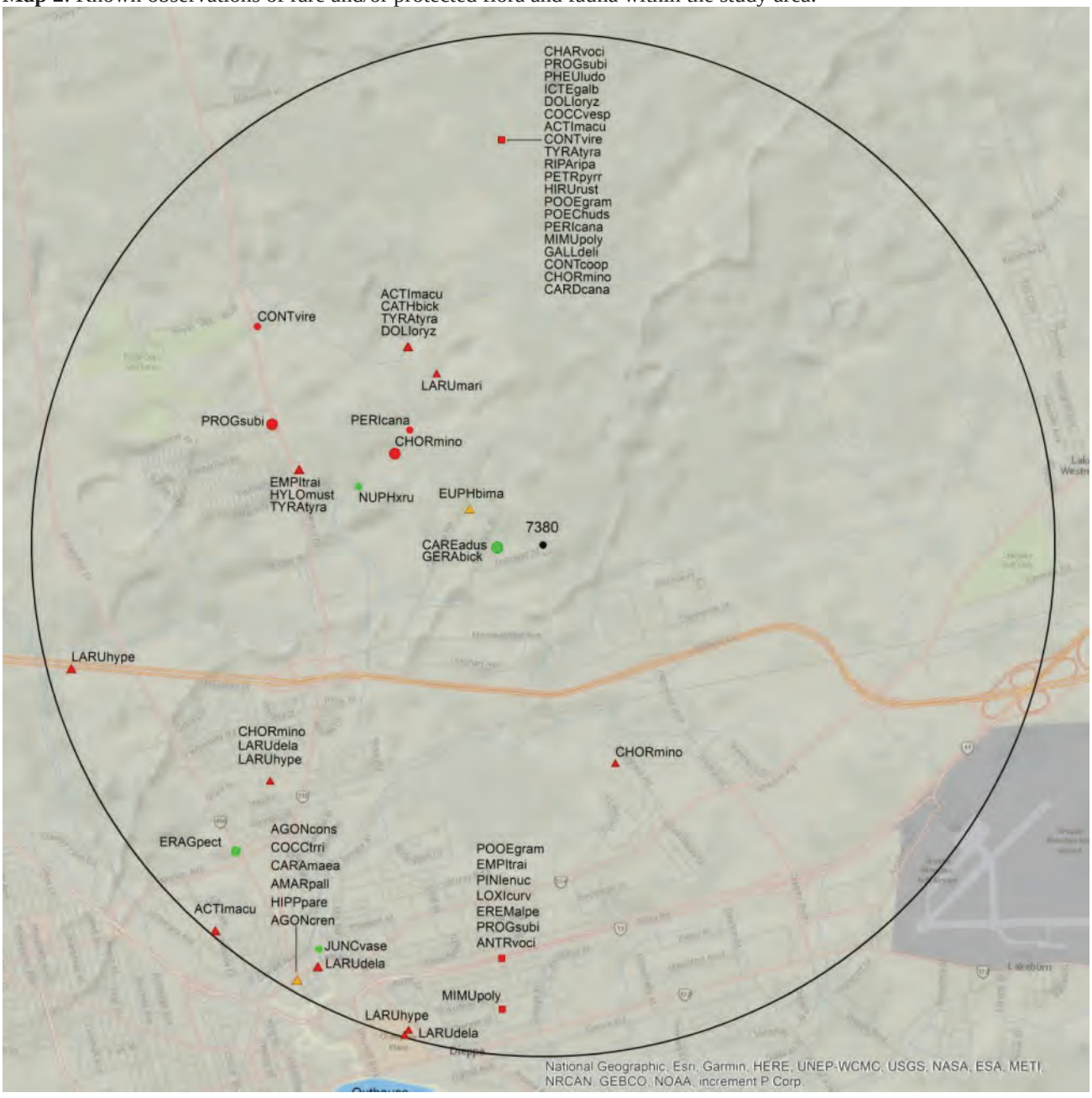
2.1 FLORA

The study area contains 6 records of 5 vascular and no records of nonvascular flora (Map 2 and attached: *ob.xls).

2.2 FAUNA

The study area contains 84 records of 30 vertebrate and 22 records of 7 invertebrate fauna (Map 2 and attached data files - see 1.1 Data List). Please see section 4.3 to determine if 'location-sensitive' species occur near your study site.

Map 2: Known observations of rare and/or protected flora and fauna within the study area.



RESOLUTION

- 4.7 within 50s of kilometers
- 4.0 within 10s of kilometers
- 3.7 within 5s of kilometers
- 3.0 within kilometers
- 2.7 within 500s of meters
- 2.0 within 100s of meters
- 1.7 within 10s of meters

HIGHER TAXON

- vertebrate fauna
- invertebrate fauna
- vascular flora
- nonvascular flora

3.0 SPECIAL AREAS

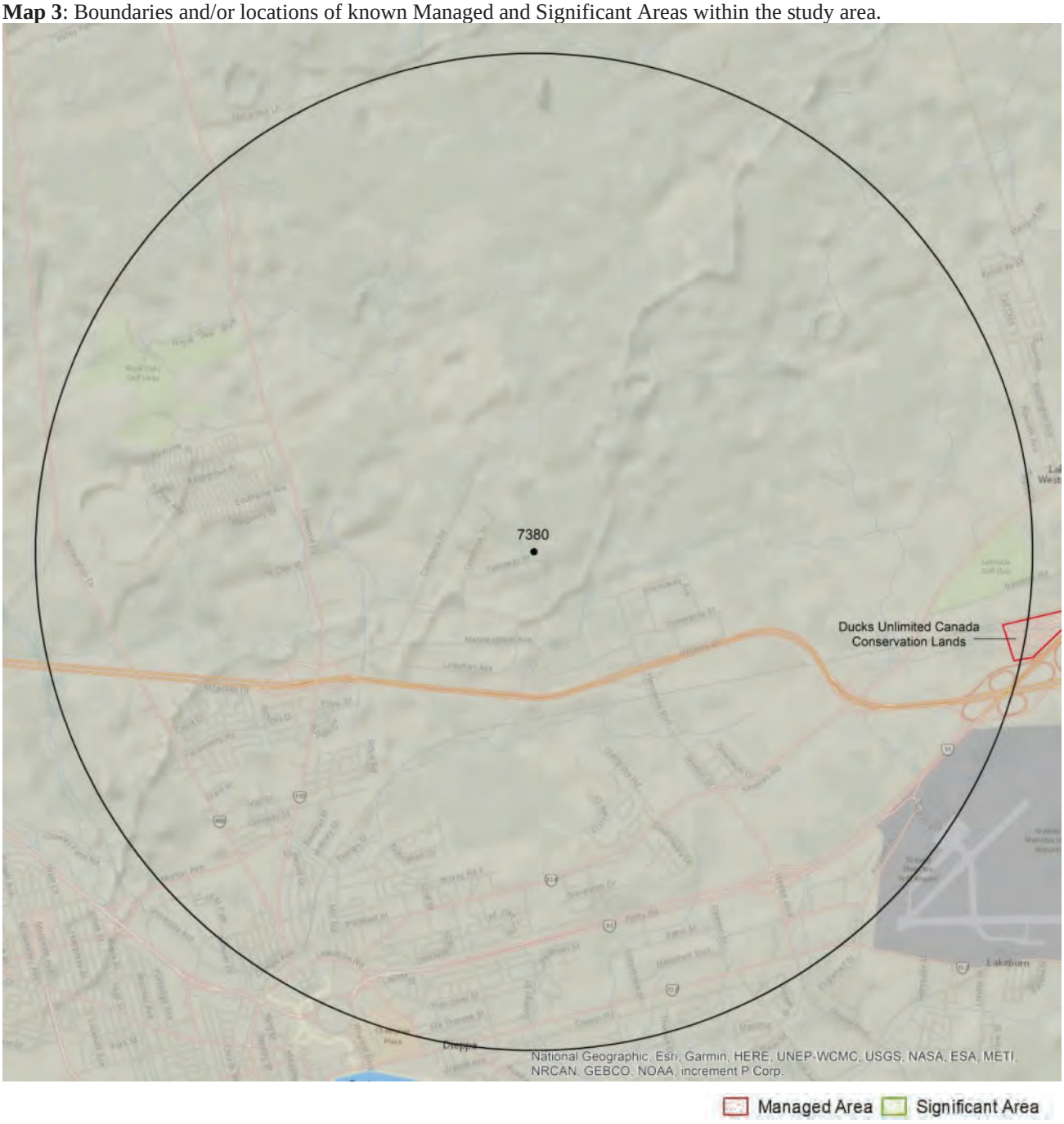
3.1 MANAGED AREAS

The GIS scan identified 1 managed area in the vicinity of the study area (Map 3 and attached file: *ma*.xls).

3.2 SIGNIFICANT AREAS

The GIS scan identified no biologically significant sites in the vicinity of the study area (Map 3 and attached file: *sa*.xls).

Map 3: Boundaries and/or locations of known Managed and Significant Areas within the study area.



4.0 RARE SPECIES LISTS

Rare and/or endangered taxa (excluding “location-sensitive” species, section 4.3) within the study area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (± the precision, in km, of the record). [P] = vascular plant, [N] = nonvascular plant, [A] = vertebrate animal, [I] = invertebrate animal, [C] = community. Note: records are from attached files *ob.xls/*ob.shp only.

4.1 FLORA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
P	*Nuphar x rubrodisca*	Red-disk Yellow Pond-lily				S2	1	1.9 ± 0.0
P	*Geranium bicknellii*	Bicknell's Crane's-bill				S3	1	0.4 ± 0.0
P	*Carex adusta*	Lesser Brown Sedge				S3	1	0.4 ± 0.0
P	*Juncus vaseyi*	Vasey Rush				S3	1	4.5 ± 0.0
P	*Eragrostis pectinacea*	Tufted Love Grass				S3S4	2	4.2 ± 0.0

4.2 FAUNA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	*Hylocichla mustelina*	Wood Thrush	Threatened	Threatened	Threatened	S1S2B	1	2.5 ± 2.0
A	*Antrostomus vociferus*	Eastern Whip-Poor-Will	Threatened	Threatened	Threatened	S2B	1	4.1 ± 7.0
A	*Catharus bicknelli*	Bicknell's Thrush	Threatened	Threatened	Threatened	S2B	1	2.3 ± 2.0
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened		S2B	2	4.0 ± 7.0
A	*Hirundo rustica*	Barn Swallow	Special Concern	Threatened	Threatened	S2B	3	4.0 ± 7.0
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Special Concern	S3B	3	3.5 ± 0.0
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S3B	1	4.0 ± 7.0
A	*Dolichonyx oryzivorus*	Bobolink	Special Concern	Threatened	Threatened	S3B	2	2.3 ± 2.0
A	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern		S3B,S3S4N,SUM	1	4.0 ± 7.0
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	4	1.7 ± 0.0
A	*Cardellina canadensis*	Canada Warbler	Special Concern	Threatened	Threatened	S3S4B	1	4.0 ± 7.0
A	*Progne subis*	Purple Martin				S1B	5	2.9 ± 0.0
A	*Eremophila alpestris*	Horned Lark				S1B,S4N,S5M	1	4.1 ± 7.0
A	*Empidonax traillii*	Willow Flycatcher				S1S2B	2	2.5 ± 2.0
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2B	3	4.0 ± 7.0
A	*Mimus polyglottos*	Northern Mockingbird				S2B	6	4.0 ± 7.0
A	*Pooecetes gramineus*	Vesper Sparrow				S2B	3	4.0 ± 7.0
A	*Pinicola enucleator*	Pine Grosbeak				S2B,S4S5N,S4S5M	1	4.1 ± 7.0
A	*Larus hyperboreus*	Glaucous Gull				S2N	14	3.5 ± 0.0
A	*Icterus galbula*	Baltimore Oriole				S2S3B	1	4.0 ± 7.0
A	*Larus delawarensis*	Ring-billed Gull				S2S3B,S4N,S5M	9	3.5 ± 0.0
A	*Larus marinus*	Great Black-backed Gull				S3	1	2.0 ± 0.0
A	*Loxia curvirostra*	Red Crossbill				S3	1	4.1 ± 7.0
A	*Charadrius vociferus*	Killdeer				S3B	3	4.0 ± 7.0
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3B	1	4.0 ± 7.0
A	*Perisoreus canadensis*	Canada Jay				S3S4	2	1.7 ± 0.0
A	*Poecile hudsonicus*	Boreal Chickadee				S3S4	1	4.0 ± 7.0
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B	4	2.3 ± 2.0
A	*Actitis macularius*	Spotted Sandpiper				S3S4B,S4M	3	2.3 ± 2.0
A	*Gallinago delicata*	Wilson's Snipe				S3S4B,S5M	3	4.0 ± 7.0
I	*Coccinella transversoguttata richardsoni*	Transverse Lady Beetle	Special Concern			SH	15	4.9 ± 1.0
I	*Agonum crenistriatum*	Scalloped Harp Ground Beetle				S3	1	4.9 ± 1.0
I	*Agonum consimile*	Consimile Ground Beetle				S3	1	4.9 ± 1.0
I	*Amara pallipes*	Pale-footed Sun Beetle				S3	1	4.9 ± 1.0
I	*Carabus maeander*	Meander Ground Beetle				S3	1	4.9 ± 1.0
I	*Hippodamia parenthesis*	Parenthesis Lady Beetle				S3	2	4.9 ± 1.0

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
I	*Euphyes bimacula*	Two-spotted Skipper				S3	1	0.8 ± 1.0

4.3 LOCATION SENSITIVE SPECIES

The Department of Natural Resources in each Maritimes province considers a number of species "location sensitive". Concern about exploitation of location-sensitive species precludes inclusion of precise coordinates in this report. Those intersecting your study area are indicated below with "YES".

New Brunswick

Scientific *Name*	Common Name	SARA	Prov Legal Prot	Known within the Study Site?
Chrysemys picta picta	Eastern Painted Turtle	Special Concern		No
Chelydra serpentina	Snapping Turtle	Special Concern	Special Concern	No
Glyptemys insculpta	Wood Turtle	Threatened	Threatened	No
Haliaeetus leucocephalus	**Bald Eagle**		**Endangered**	**YES**
Falco peregrinus pop. 1	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Endangered	No
Cicindela marginipennis	Cobblestone Tiger Beetle	Endangered	Endangered	No
Coenonympha nipisiquit	Maritime Ringlet	Endangered	Endangered	No
Bat hibernaculum or bat species occurrence		[Endangered][1]	[Endangered][1]	No

1 *Myotis lucifugus* (Little Brown Myotis), *Myotis septentrionalis* (Long-eared Myotis), and *Perimyotis subflavus* (Tri-colored Bat or Eastern Pipistrelle) are all Endangered under the Federal Species at Risk Act and the NB Species at Risk Act.

4.4 SOURCE BIBLIOGRAPHY

The recipient of these data shall acknowledge the AC CDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

# recs	CITATION
33	eBird. 2014. eBird Basic Dataset. Version: EBD_relNov-2014. Ithaca, New York. Nov 2014. Cornell Lab of Ornithology, 25036 recs.
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2	Blaney, C.S.; Mazerolle, D.M. 2010. Fieldwork 2010. Atlantic Canada Conservation Data Centre. Sackville NB, 15508 recs.
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2	Blaney, C.S.; Spicer, C.D.; Mazerolle, D.M. 2005. Fieldwork 2005. Atlantic Canada Conservation Data Centre. Sackville NB, 2333 recs.
1	Chiasson, R. 2018. Breeding bird observations from NBWTF project. pers. comm. to S. Blaney.
1	Dept of Fisheries & Oceans. 2001. Atlantic Salmon Maritime provinces overview for 2000. DFO.
1	Ducks Unlimited Canada (DUC). 2020. DUC owned properties in Atlantic Canada (v. DUC_Lands_Sept2020). DUC.
1	e-Butterfly. 2016. Export of Maritimes records and photos. Maxim Larrivee, Sambo Zhang (ed.) e-butterfly.org.
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1	iNaturalist. 2020. iNaturalist Data Export 2020. iNaturalist.org and iNaturalist.ca, Web site: 128728 recs.
1	Porter, Caitlin. 2021. Field data for 2020 in various locations across the Maritimes. Atlantic Canada Conservation Data Centre, 3977 records.
1	Wilhelm, S.I. et al. 2011. Colonial Waterbird Database. Canadian Wildlife Service, Sackville, 2698 sites, 9718 recs (8192 obs).

5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 61330 records of 150 vertebrate and 989 records of 64 invertebrate fauna; 9666 records of 280 vascular and 2551 records of 205 nonvascular flora (attached: *ob100km.xls).

Taxa within 100 km of the study site that are rare and/or endangered in the province in which the study site occurs (including "location-sensitive" species). All ranks correspond to the province in which the study site falls, even for out-of-province records. Taxa are listed in order of concern, beginning with legally listed taxa, with the number of

observations per taxon and the distance in kilometers from study area centroid to the closest observation (± the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Myotis lucifugus*	Little Brown Myotis	Endangered	Endangered	Endangered	S1	21	24.0 ± 1.0	NB
A	*Myotis septentrionalis*	Northern Myotis	Endangered	Endangered	Endangered	S1	12	24.0 ± 1.0	NB
A	*Perimyotis subflavus*	Tricolored Bat	Endangered	Endangered	Endangered	S1	17	22.1 ± 1.0	NB
A	*Charadrius melodus melodus*	Piping Plover melodus subspecies	Endangered	Endangered	Endangered	S1B	1924	20.0 ± 0.0	NB
A	*Dermochelys coriacea pop. 2*	Leatherback Sea Turtle - Atlantic population	Endangered	Endangered	Endangered	S1S2N	5	44.9 ± 1.0	NB
A	*Salmo salar pop. 1*	Atlantic Salmon - Inner Bay of Fundy population	Endangered	Endangered	Endangered	S2	643	8.0 ± 1.0	NB
A	*Salmo salar pop. 7*	Atlantic Salmon - Outer Bay of Fundy population	Endangered		Endangered	SNR	400	22.1 ± 0.0	NB
A	*Rangifer tarandus pop. 2*	Caribou - Atlantic-Gasp ├⌐sie population	Endangered	Endangered	Extirpated	SX	2	27.9 ± 1.0	NB
A	*Lanius ludovicianus*	Loggerhead Shrike	Endangered	Endangered		SXB	1	5.9 ± 0.0	NB
A	*Sturnella magna*	Eastern Meadowlark	Threatened	Threatened	Threatened	S1B	50	9.6 ± 0.0	NB
A	*Asio flammeus*	Short-eared Owl	Threatened	Special Concern	Special Concern	S1S2B	49	6.8 ± 64.0	NB
A	*Ixobrychus exilis*	Least Bittern	Threatened	Threatened	Threatened	S1S2B	19	7.2 ± 0.0	NB
A	*Hylocichla mustelina*	Wood Thrush	Threatened	Threatened	Threatened	S1S2B	86	2.5 ± 2.0	NB
A	*Hydrobates leucorhous*	Leach's Storm-Petrel	Threatened			S1S2B	1	29.4 ± 0.0	NB
A	*Antrostomus vociferus*	Eastern Whip-Poor-Will	Threatened	Threatened	Threatened	S2B	25	4.1 ± 7.0	NB
A	*Catharus bicknelli*	Bicknell's Thrush	Threatened	Threatened	Threatened	S2B	11	2.3 ± 2.0	NB
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened		S2B	1666	4.0 ± 7.0	NB
A	*Glyptemys insculpta*	Wood Turtle	Threatened	Threatened	Threatened	S2S3	712	7.7 ± 0.0	NB
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Threatened	S2S3B,S2M	264	6.1 ± 7.0	NB
A	*Acipenser oxyrinchus*	Atlantic Sturgeon	Threatened		Threatened	S3B,S3N	3	25.0 ± 1.0	NB
A	*Tringa flavipes*	Lesser Yellowlegs	Threatened			S3M	1732	6.6 ± 0.0	NB
A	*Limosa haemastica*	Hudsonian Godwit	Threatened			S3M	439	22.7 ± 0.0	NB
A	*Anguilla rostrata*	American Eel	Threatened		Threatened	S4N	7009	8.0 ± 1.0	NB
A	*Coturnicops noveboracensis*	Yellow Rail	Special Concern	Special Concern	Special Concern	S1?B,SUM	5	38.0 ± 3.0	NB
A	*Histrionicus histrionicus pop. 1*	Harlequin Duck - Eastern population	Special Concern	Special Concern	Endangered	S1B,S1S2N,S2M	6	35.1 ± 0.0	NB
A	*Hirundo rustica*	Barn Swallow	Special Concern	Threatened	Threatened	S2B	1572	4.0 ± 7.0	NB
A	*Salmo salar pop. 12*	Atlantic Salmon - Gaspe - Southern Gulf of St. Lawrence population	Special Concern		Special Concern	S2S3	12	27.0 ± 50.0	NB
A	*Balaenoptera physalus*	Fin Whale	Special Concern	Special Concern		S2S3	1	58.3 ± 1.0	NB
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S2S3B,S3M	128	5.9 ± 0.0	NB
A	*Bucephala islandica*	Barrow's Goldeneye	Special Concern	Special Concern	Special Concern	S2S3N,S3M	112	8.8 ± 119.0	NB
A	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Special Concern	S3	9	14.0 ± 1.0	NB
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Special Concern	S3B	789	3.5 ± 0.0	NB
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S3B	590	4.0 ± 7.0	NB
A	*Dolichonyx oryzivorus*	Bobolink	Special Concern	Threatened	Threatened	S3B	2114	2.3 ± 2.0	NB
A	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern		S3B,S3S4N,SUM	344	4.0 ± 7.0	NB
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	243	1.7 ± 0.0	NB
A	*Phalaropus lobatus*	Red-necked Phalarope	Special Concern	Special Concern		S3M	22	15.9 ± 0.0	NB
A	*Podiceps auritus*	Horned Grebe	Special Concern	Special Concern	Special Concern	S3N	53	20.0 ± 1.0	NB
A	*Cardellina canadensis*	Canada Warbler	Special Concern	Threatened	Threatened	S3S4B	750	4.0 ± 7.0	NB
A	*Phocoena phocoena*	Harbour Porpoise	Special Concern		Spec.Concern	S4	3	37.5 ± 0.0	NB
A	*Chrysemys picta picta*	Eastern Painted Turtle	Special Concern	Special Concern		S4	26	26.4 ± 0.0	NB
A	*Hemidactylium scutatum*	Four-toed Salamander	Not At Risk			S1?	5	68.6 ± 0.0	NB
A	*Fulica americana*	American Coot	Not At Risk			S1B	65	6.6 ± 0.0	NB
A	*Falco peregrinus pop. 1*	Peregrine Falcon - anatum/tundrius	Not At Risk	Special Concern	Endangered	S1B,S3M	322	5.2 ± 5.0	NB
A	*Falco peregrinus*	Peregrine Falcon	Not At Risk	Special Concern		S1B,S3M	1	71.7 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Bubo scandiacus*	Snowy Owl	Not At Risk			S1N,S2S3M	50	5.1 ± 0.0	NB
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1S2B	7	7.1 ± 0.0	NB
A	*Buteo lineatus*	Red-shouldered Hawk	Not At Risk			S1S2B	25	5.9 ± 0.0	NB
A	*Aegolius funereus*	Boreal Owl	Not At Risk			S1S2B,SUM	11	38.2 ± 0.0	NB
A	*Sorex dispar*	Long-tailed Shrew	Not At Risk			S2	3	37.8 ± 1.0	NB
A	*Chlidonias niger*	Black Tern	Not At Risk			S2B	187	12.0 ± 7.0	NB
A	*Podiceps grisegena*	Red-necked Grebe	Not At Risk			S2N,S3M	51	20.0 ± 1.0	NB
A	*Desmognathus fuscus pop. 2*	Northern Dusky Salamander - Quebec / New Brunswick population	Not At Risk			S3	1	64.5 ± 0.0	NB
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B,SUM	712	7.3 ± 1.0	NB
A	*Lagenorhynchus acutus*	Atlantic White-sided Dolphin	Not At Risk			S3S4	3	35.5 ± 1.0	NB
A	*Haliaeetus leucocephalus*	Bald Eagle	Not At Risk		Endangered	S4	1377	1.9 ± 0.0	NB
A	*Lynx canadensis*	Canada Lynx	Not At Risk		Endangered	S4	21	24.8 ± 10.0	NB
A	*Canis lupus*	Grey Wolf	Not At Risk		Extirpated	SX	2	68.8 ± 100.0	NB
A	*Puma concolor pop. 1*	Cougar - Eastern population	Data Deficient		Endangered	SU	116	6.0 ± 1.0	NB
A	*Calidris canutus rufa*	Red Knot rufa subspecies - Tierra del Fuego / Patagonia wintering population	E,SC	Endangered	Endangered	S2M	728	22.3 ± 44.0	NB
A	*Morone saxatilis*	Striped Bass	E,SC			S3S4B,S3S4N	8640	25.0 ± 0.0	NB
A	*Thryothorus ludovicianus*	Carolina Wren				S1	10	7.9 ± 0.0	NB
A	*Salvelinus alpinus*	Arctic Char				S1	3	73.2 ± 1.0	NB
A	*Vireo flavifrons*	Yellow-throated Vireo				S1?B	4	8.4 ± 0.0	NB
A	*Tringa melanoleuca*	Greater Yellowlegs				S1?B,S4S5M	2525	5.2 ± 0.0	NB
A	*Aythya americana*	Redhead				S1B	10	18.0 ± 0.0	NB
A	*Gallinula galeata*	Common Gallinule				S1B	53	11.6 ± 0.0	NB
A	*Grus canadensis*	Sandhill Crane				S1B	26	23.1 ± 0.0	NB
A	*Bartramia longicauda*	Upland Sandpiper				S1B	56	5.4 ± 0.0	NB
A	*Phalaropus tricolor*	Wilson's Phalarope				S1B	33	15.9 ± 0.0	NB
A	*Leucophaeus atricilla*	Laughing Gull				S1B	9	6.5 ± 1.0	NB
A	*Rissa tridactyla*	Black-legged Kittiwake				S1B	4	31.7 ± 0.0	NB
A	*Fratercula arctica*	Atlantic Puffin				S1B	3	62.7 ± 11.0	NB
A	*Progne subis*	Purple Martin				S1B	123	2.9 ± 0.0	NB
A	*Aythya marila*	Greater Scaup				S1B,S2N,S4M	12	22.5 ± 1.0	NB
A	*Oxyura jamaicensis*	Ruddy Duck				S1B,S2S3M	110	16.5 ± 0.0	NB
A	*Aythya affinis*	Lesser Scaup				S1B,S4M	175	12.1 ± 0.0	NB
A	*Eremophila alpestris*	Horned Lark				S1B,S4N,S5M	67	4.1 ± 7.0	NB
A	*Sterna paradisaea*	Arctic Tern				S1B,SUM	26	16.9 ± 7.0	NB
A	*Chroicocephalus ridibundus*	Black-headed Gull				S1N,S2M	14	6.3 ± 0.0	NB
A	*Branta bernicla*	Brant				S1N,S2S3M	36	20.0 ± 1.0	NB
A	*Calidris alba*	Sanderling				S1N,S3S4M	1603	19.9 ± 0.0	NB
A	*Butorides virescens*	Green Heron				S1S2B	8	12.0 ± 7.0	NB
A	*Nycticorax nycticorax*	Black-crowned Night-heron				S1S2B	5	5.9 ± 0.0	NB
A	*Empidonax traillii*	Willow Flycatcher				S1S2B	82	2.5 ± 2.0	NB
A	*Stelgidopteryx serripennis*	Northern Rough-winged Swallow				S1S2B	6	8.3 ± 0.0	NB
A	*Troglodytes aedon*	House Wren				S1S2B	12	6.1 ± 7.0	NB
A	*Calidris bairdii*	Baird's Sandpiper				S1S2M	51	15.9 ± 0.0	NB
A	*Melanitta americana*	American Scoter				S1S2N,S3M	268	5.0 ± 0.0	NB
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2B	592	4.0 ± 7.0	NB
A	*Cistothorus palustris*	Marsh Wren				S2B	82	11.8 ± 0.0	NB
A	*Mimus polyglottos*	Northern Mockingbird				S2B	139	4.0 ± 7.0	NB
A	*Pooecetes gramineus*	Vesper Sparrow				S2B	124	4.0 ± 7.0	NB
A	*Mareca strepera*	Gadwall				S2B,S3M	365	5.2 ± 5.0	NB
A	*Tringa solitaria*	Solitary Sandpiper				S2B,S4S5M	188	5.9 ± 0.0	NB
A	*Pinicola enucleator*	Pine Grosbeak				S2B,S4S5N,S4S5M	41	4.1 ± 7.0	NB
A	*Phalacrocorax carbo*	Great Cormorant				S2N	49	6.9 ± 2.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Somateria spectabilis*	King Eider				S2N	4	20.4 ± 0.0	NB
A	*Larus hyperboreus*	Glaucous Gull				S2N	94	3.5 ± 0.0	NB
A	*Melanitta perspicillata*	Surf Scoter				S2N,S4M	34	44.2 ± 0.0	NB
A	*Melanitta deglandi*	White-winged Scoter				S2N,S4M	24	33.7 ± 1.0	NB
A	*Asio otus*	Long-eared Owl				S2S3	29	5.4 ± 0.0	NB
A	*Picoides dorsalis*	American Three-toed Woodpecker				S2S3	16	31.0 ± 7.0	NB
A	*Toxostoma rufum*	Brown Thrasher				S2S3B	31	20.5 ± 7.0	NB
A	*Icterus galbula*	Baltimore Oriole				S2S3B	118	4.0 ± 7.0	NB
A	*Somateria mollissima*	Common Eider				S2S3B,S2S3N,S4M	215	8.3 ± 0.0	NB
A	*Larus delawarensis*	Ring-billed Gull				S2S3B,S4N,S5M	453	3.5 ± 0.0	NB
A	*Pluvialis dominica*	American Golden-Plover				S2S3M	221	20.0 ± 1.0	NB
A	*Calcarius lapponicus*	Lapland Longspur				S2S3N,SUM	42	5.9 ± 0.0	NB
A	*Larus marinus*	Great Black-backed Gull				S3	518	2.0 ± 0.0	NB
A	*Picoides arcticus*	Black-backed Woodpecker				S3	77	6.1 ± 7.0	NB
A	*Loxia curvirostra*	Red Crossbill				S3	167	4.1 ± 7.0	NB
A	*Spinus pinus*	Pine Siskin				S3	426	6.1 ± 7.0	NB
A	*Salvelinus namaycush*	Lake Trout				S3	1	30.5 ± 0.0	NB
A	*Sorex maritimensis*	Maritime Shrew				S3	143	42.3 ± 1.0	NB
A	*Spatula clypeata*	Northern Shoveler				S3B	465	5.3 ± 0.0	NB
A	*Charadrius vociferus*	Killdeer				S3B	1005	4.0 ± 7.0	NB
A	*Tringa semipalmata*	Willet				S3B	1134	5.2 ± 0.0	NB
A	*Cepphus grylle*	Black Guillemot				S3B	46	45.3 ± 5.0	NB
A	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3B	150	5.9 ± 0.0	NB
A	*Myiarchus crinitus*	Great Crested Flycatcher				S3B	67	6.1 ± 7.0	NB
A	*Piranga olivacea*	Scarlet Tanager				S3B	58	6.1 ± 7.0	NB
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3B	706	4.0 ± 7.0	NB
A	*Passerina cyanea*	Indigo Bunting				S3B	51	10.8 ± 0.0	NB
A	*Molothrus ater*	Brown-headed Cowbird				S3B	299	5.2 ± 5.0	NB
A	*Setophaga tigrina*	Cape May Warbler				S3B,S4S5M	316	6.1 ± 7.0	NB
A	*Mergus serrator*	Red-breasted Merganser				S3B,S4S5N,S5M	323	6.6 ± 0.0	NB
A	*Anas acuta*	Northern Pintail				S3B,S5M	162	5.9 ± 0.0	NB
A	*Anser caerulescens*	Snow Goose				S3M	24	10.4 ± 5.0	NB
A	*Numenius phaeopus hudsonicus*	Whimbrel				S3M	258	22.5 ± 1.0	NB
A	*Arenaria interpres*	Ruddy Turnstone				S3M	1061	6.7 ± 0.0	NB
A	*Calidris pusilla*	Semipalmated Sandpiper				S3M	2681	6.0 ± 0.0	NB
A	*Calidris melanotos*	Pectoral Sandpiper				S3M	476	5.2 ± 0.0	NB
A	*Limnodromus griseus*	Short-billed Dowitcher				S3M	1411	6.7 ± 0.0	NB
A	*Phalaropus fulicarius*	Red Phalarope				S3M	5	46.7 ± 0.0	NB
A	*Bucephala albeola*	Bufflehead				S3N	123	6.8 ± 64.0	NB
A	*Calidris maritima*	Purple Sandpiper				S3N	102	22.5 ± 1.0	NB
A	*Uria lomvia*	Thick-billed Murre				S3N,S3M	2	76.2 ± 0.0	NS
A	*Perisoreus canadensis*	Canada Jay				S3S4	562	1.7 ± 0.0	NB
A	*Poecile hudsonicus*	Boreal Chickadee				S3S4	441	4.0 ± 7.0	NB
A	*Eptesicus fuscus*	Big Brown Bat				S3S4	11	5.3 ± 10.0	NB
A	*Synaptomys cooperi*	Southern Bog Lemming				S3S4	89	43.7 ± 1.0	NB
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B	616	2.3 ± 2.0	NB
A	*Vireo gilvus*	Warbling Vireo				S3S4B	86	6.1 ± 7.0	NB
A	*Actitis macularius*	Spotted Sandpiper				S3S4B,S4M	984	2.3 ± 2.0	NB
A	*Melospiza lincolnii*	Lincoln's Sparrow				S3S4B,S4M	401	11.1 ± 7.0	NB
A	*Gallinago delicata*	Wilson's Snipe				S3S4B,S5M	1166	4.0 ± 7.0	NB
A	*Setophaga striata*	Blackpoll Warbler				S3S4B,S5M	69	16.0 ± 7.0	NB
A	*Pluvialis squatarola*	Black-bellied Plover				S3S4M	2072	9.0 ± 0.0	NB
A	*Morus bassanus*	Northern Gannet				SHB	184	19.9 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
I	*Bombus bohemicus*	Ashton Cuckoo Bumble Bee	Endangered	Endangered		S1	6	9.5 ± 5.0	NB
I	*Danaus plexippus*	Monarch	Endangered	Special Concern	Special Concern	S2S3?B	228	6.1 ± 0.0	NB
I	*Gomphurus ventricosus*	Skillet Clubtail	Special Concern	Endangered	Endangered	S2	5	62.2 ± 0.0	NB
I	*Cicindela marginipennis*	Cobblestone Tiger Beetle	Special Concern	Endangered	Endangered	S2S3	49	97.4 ± 0.0	NB
I	*Ophiogomphus howei*	Pygmy Snaketail	Special Concern	Special Concern	Special Concern	S2S3	6	86.1 ± 0.0	NB
I	*Alasmidonta varicosa*	Brook Floater	Special Concern	Special Concern	Special Concern	S3	34	23.1 ± 0.0	NB
I	*Lampsilis cariosa*	Yellow Lampmussel	Special Concern	Special Concern	Special Concern	S3	23	72.7 ± 0.0	NB
I	*Bombus terricola*	Yellow-banded Bumble Bee	Special Concern	Special Concern		S4	160	25.6 ± 0.0	NB
I	*Coccinella transversoguttata richardsoni*	Transverse Lady Beetle	Special Concern			SH	31	4.9 ± 1.0	NB
I	*Appalachina sayana sayana*	Spike-lip Crater Snail	Not At Risk			S3?	1	88.2 ± 1.0	NB
I	*Erora laeta*	Early Hairstreak				S1	1	8.6 ± 1.0	NB
I	*Leucorrhinia patricia*	Canada Whiteface				S1	10	75.1 ± 1.0	NB
I	*Icaricia saepiolus*	Greenish Blue				S1S2	2	34.4 ± 7.0	NB
I	*Cicindela ancocisconensis*	Appalachian Tiger Beetle				S2	2	78.6 ± 0.0	NB
I	*Strymon melinus*	Gray Hairstreak				S2	2	19.7 ± 2.0	NB
I	*Somatochlora brevicincta*	Quebec Emerald				S2	2	19.9 ± 0.0	NB
I	*Chrysops delicatulus*	Delicate Deer Fly				S2S3	1	89.8 ± 1.0	NB
I	*Psyrassa unicolor*	Unicoloured Long-horned Beetle				S3	1	29.3 ± 0.0	NB
I	*Elaphrus americanus*	Boreal Elaphrus Beetle				S3	1	48.3 ± 0.0	NB
I	*Agonum crenistriatum*	Scalloped Harp Ground Beetle				S3	1	4.9 ± 1.0	NB
I	*Agonum consimile*	Consimile Ground Beetle				S3	1	4.9 ± 1.0	NB
I	*Lachnocrepis parallela*	Swamp Harp Ground Beetle				S3	1	45.6 ± 0.0	NB
I	*Dyschirius setosus*	Bristly Pedunculate Ground Beetle				S3	3	45.6 ± 0.0	NB
I	*Harpalus fulvilabris*	Fulvia Harpaline Beetle				S3	1	47.8 ± 0.0	NB
I	*Olisthopus parmatus*	Tawny-bordered Harp Ground Beetle				S3	1	35.0 ± 0.0	NB
I	*Amara pallipes*	Pale-footed Sun Beetle				S3	2	4.9 ± 1.0	NB
I	*Carabus maeander*	Meander Ground Beetle				S3	1	4.9 ± 1.0	NB
I	*Carabus serratus*	Serrated Ground Beetle				S3	1	10.9 ± 1.0	NB
I	*Hippodamia parenthesis*	Parenthesis Lady Beetle				S3	14	4.9 ± 1.0	NB
I	*Xylotrechus undulatus*	Spruce Zebra Beetle				S3	2	20.6 ± 1.0	NB
I	*Calathus gregarius*	Gregarious Harp Ground Beetle				S3	1	62.6 ± 1.0	NB
I	*Gonioctena americana*	American Aspen Beetle				S3	1	46.4 ± 0.0	NB
I	*Naemia seriata*	Seaside Lady Beetle				S3	9	38.0 ± 0.0	NB
I	*Beckerus appressus*	Compressed Click Beetle				S3	1	63.2 ± 0.0	NB
I	*Saperda lateralis*	Red-edged Long-horned Beetle				S3	1	58.0 ± 0.0	NS
I	*Trachysida aspera*	Rough Flower Longhorn Beetle				S3	1	52.8 ± 0.0	NB
I	*Dicerca caudata*	Tailed Jewel Borer				S3	1	46.4 ± 0.0	NB
I	*Enoclerus muttkowskii*	Muttkowski's Checkered Beetle				S3	2	17.4 ± 0.0	NB
I	*Epargyreus clarus*	Silver-spotted Skipper				S3	1	23.1 ± 0.0	NB
I	*Hesperia sassacus*	Indian Skipper				S3	3	49.1 ± 0.0	NB
I	*Euphyes bimacula*	Two-spotted Skipper				S3	18	0.8 ± 1.0	NB
I	*Papilio brevicauda bretonensis*	Short-tailed Swallowtail				S3	14	38.5 ± 0.0	NB
I	*Tharsalea dospassosi*	Maritime Copper				S3	118	20.1 ± 0.0	NB
I	*Satyrium acadica*	Acadian Hairstreak				S3	19	5.4 ± 0.0	NB
I	*Plebejus idas*	Northern Blue				S3	6	74.8 ± 0.0	NS
I	*Plebejus idas empetri*	Crowberry Blue				S3	26	41.0 ± 7.0	NB
I	*Argynnis aphrodite*	Aphrodite Fritillary				S3	18	5.2 ± 0.0	NB
I	*Boloria bellona*	Meadow Fritillary				S3	2	96.7 ± 1.0	NB

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I	*Boloria chariclea*	Arctic Fritillary				S3	9	32.6 ± 7.0	NB
I	*Nymphalis l-album*	Compton Tortoiseshell				S3	8	5.3 ± 10.0	NB
I	*Gomphurus vastus*	Cobra Clubtail				S3	1	99.9 ± 0.0	NB
I	*Ladona exusta*	White Corporal				S3	1	62.1 ± 0.0	NB
I	*Arigomphus furcifer*	Lilypad Clubtail				S3	1	99.7 ± 0.0	NB
I	*Alasmidonta undulata*	Triangle Floater				S3	48	25.3 ± 1.0	NB
I	*Atlanticoncha ochracea*	Tidewater Mucket				S3	52	36.2 ± 1.0	NB
I	*Neohelix albolabris*	Whitelip Snail				S3	1	92.5 ± 0.0	NB
I	*Pantala hymenaea*	Spot-Winged Glider				S3B	6	21.4 ± 0.0	NB
I	*Collops vittatus*	Banded Soft-winged Flower Beetle				S3S4	1	18.9 ± 3.0	NB
I	*Hemicrepidius memnonius*	Memnon's Click Beetle				S3S4	3	29.3 ± 0.0	NB
I	*Bolitophagus corticola*	Corticolous Darkling Beetle				S3S4	1	29.3 ± 0.0	NB
I	*Bombus griseocollis*	Brown-belted Bumble Bee				S3S4	4	6.5 ± 0.0	NB
I	*Lanthus vernalis*	Southern Pygmy Clubtail				S3S4	1	53.3 ± 0.0	NB
I	*Somatochlora forcipata*	Forcipate Emerald				S3S4	9	29.4 ± 0.0	NB
I	*Somatochlora tenebrosa*	Clamp-Tipped Emerald				S3S4	8	18.6 ± 1.0	NB
N	*Erioderma mollissimum*	Graceful Felt Lichen	Endangered	Endangered	Endangered	SH	2	71.5 ± 1.0	NB
N	*Erioderma pedicellatum (Atlantic pop.)*	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	SH	2	85.2 ± 0.0	NS
N	*Pannaria lurida*	Wrinkled Shingle Lichen	Threatened	Threatened		S1?	28	25.0 ± 1.0	NB
N	*Anzia colpodes*	Black-foam Lichen	Threatened	Threatened		S1S2	16	27.7 ± 0.0	NB
N	*Fuscopannaria leucosticta*	White-rimmed Shingle Lichen	Threatened			S2	67	57.1 ± 0.0	NB
N	*Peltigera hydrothyria*	Eastern Waterfan	Threatened	Threatened		S2S3	806	30.5 ± 0.0	NB
N	*Pectenia plumbea*	Blue Felt Lichen	Special Concern	Special Concern	Special Concern	S1	16	72.8 ± 0.0	PE
N	*Pseudevernia cladonia*	Ghost Antler Lichen	Not At Risk			S2S3	13	62.8 ± 0.0	NB
N	*Aloina rigida*	Aloe-Like Rigid Screw Moss				S1	1	46.7 ± 0.0	NB
N	*Arrhenopterum heterostichum*	One-sided Groove Moss				S1	1	79.2 ± 0.0	NB
N	*Campylostelium saxicola*	a Moss				S1	1	81.6 ± 0.0	NB
N	*Dicranoweisia crispula*	Mountain Thatch Moss				S1	1	61.9 ± 0.0	NB
N	*Didymodon rigidulus var. gracilis*	a moss				S1	1	69.3 ± 1.0	NB
N	*Sphagnum macrophyllum*	Sphagnum				S1	4	76.0 ± 0.0	NB
N	*Zygodon viridissimus var. viridissimus*	a Moss				S1	1	80.3 ± 0.0	NB
N	*Syntrichia ruralis*	a Moss				S1	1	73.0 ± 0.0	NB
N	*Sticta fuliginosa*	Peppered Moon Lichen				S1	12	85.1 ± 0.0	NS
N	*Cladonia straminea*	Reptilian Pixie-cup Lichen				S1	5	55.3 ± 1.0	NB
N	*Coccocarpia palmicola*	Salted Shell Lichen				S1	1	55.3 ± 1.0	NB
N	*Peltigera malacea*	Veinless Pelt Lichen				S1	2	67.3 ± 1.0	NB
N	*Bryoria bicolor*	Electrified Horsehair Lichen				S1	1	67.3 ± 1.0	NB
N	*Hygrobiella laxifolia*	Lax Notchwort				S1?	1	68.3 ± 1.0	NB
N	*Bartramia ithyphylla*	Straight-leaved Apple Moss				S1?	2	62.8 ± 1.0	NB
N	*Dicranum condensatum*	Condensed Broom Moss				S1?	3	62.0 ± 0.0	NB
N	*Entodon brevisetus*	a Moss				S1?	1	63.2 ± 10.0	NB
N	*Oxyrrhynchium hians*	Light Beaked Moss				S1?	1	76.0 ± 0.0	NB
N	*Homomallium adnatum*	Adnate Hairy-gray Moss				S1?	4	40.0 ± 1.0	NB
N	*Plagiothecium latebricola*	Alder Silk Moss				S1?	3	68.5 ± 1.0	NB
N	*Rhytidium rugosum*	Wrinkle-leaved Moss				S1?	2	69.3 ± 1.0	NB
N	*Timmia megapolitana*	Metropolitan Timmia Moss				S1?	1	98.0 ± 1.0	NS
N	*Rhizomnium pseudopunctatum*	Felted Leafy Moss				S1?	1	77.3 ± 0.0	NB
N	*Enchylium tenax*	Soil Tarpaper Lichen				S1?	1	74.1 ± 0.0	PE
N	*Heterodermia squamulosa*	Scaly Fringe Lichen				S1?	78	85.7 ± 1.0	NS
N	*Pertusaria propinqua*	a Lichen				S1?	2	67.3 ± 1.0	NB
N	*Rhizocarpon umbilicatum*	a Lichen				S1?	2	55.0 ± 1.0	NB

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N	*Cephaloziella spinigera*	Spiny Threadwort				S1S2	2	57.3 ± 0.0	NB
N	*Odontoschisma francisci*	Holt's Notchwort				S1S2	4	53.0 ± 0.0	NB
N	*Harpanthus flotovianus*	Great Mountain Flapwort				S1S2	2	55.5 ± 1.0	NB
N	*Odontoschisma sphagni*	Bog-Moss Flapwort				S1S2	1	89.1 ± 0.0	NB
N	*Pallavicinia lyellii*	Lyell's Ribbonwort				S1S2	2	63.2 ± 1.0	NB
N	*Radula tenax*	Tenacious Scalewort				S1S2	1	64.2 ± 0.0	NB
N	*Reboulia hemisphaerica*	Purple-margined Liverwort				S1S2	1	69.4 ± 0.0	NB
N	*Solenostoma obovatum*	Egg Flapwort				S1S2	1	64.2 ± 0.0	NB
N	*Brachythecium acuminatum*	Acuminate Ragged Moss				S1S2	2	64.6 ± 2.0	NB
N	*Ptychostomum salinum*	Saltmarsh Bryum				S1S2	1	68.5 ± 1.0	NB
N	*Distichium inclinatum*	Inclined Iris Moss				S1S2	5	69.3 ± 1.0	NB
N	*Ditrichum pallidum*	Pale Cow-hair Moss				S1S2	1	62.4 ± 1.0	NB
N	*Drummondia prorepens*	a Moss				S1S2	1	81.6 ± 0.0	NB
N	*Timmia norvegica*	a moss				S1S2	3	69.5 ± 0.0	NB
N	*Timmia norvegica var. excurrens*	a moss				S1S2	1	69.5 ± 0.0	NB
N	*Tortella humilis*	Small Crisp Moss				S1S2	7	61.8 ± 1.0	NB
N	*Pseudotaxiphyllum distichaceum*	a Moss				S1S2	2	25.0 ± 1.0	NB
N	*Umbilicaria vellea*	Grizzled Rocktripe Lichen				S1S2	1	68.9 ± 1.0	NB
N	*Pilophorus cereolus*	Powdered Matchstick Lichen				S1S2	1	37.8 ± 5.0	NB
N	*Peltigera scabrosa*	Greater Toad Pelt Lichen				S1S2	4	53.6 ± 1.0	NB
N	*Tritomaria scitula*	Mountain Notchwort				S1S3	1	60.3 ± 1.0	NB
N	*Amphidium mougeotii*	a Moss				S2	11	59.1 ± 0.0	NB
N	*Anomodon viticulosus*	a Moss				S2	2	47.0 ± 10.0	NB
N	*Cirriphyllum piliferum*	Hair-pointed Moss				S2	4	44.4 ± 1.0	NB
N	*Dicranella palustris*	Drooping-Leaved Fork Moss				S2	8	55.5 ± 1.0	NB
N	*Didymodon ferrugineus*	Rusty Beard Moss				S2	1	69.1 ± 0.0	NB
N	*Anomodon tristis*	a Moss				S2	9	62.4 ± 10.0	NB
N	*Hygrohypnum bestii*	Best's Brook Moss				S2	5	60.8 ± 0.0	NB
N	*Hypnum pratense*	Meadow Plait Moss				S2	1	78.9 ± 0.0	PE
N	*Isothecium myosuroides*	Slender Mouse-tail Moss				S2	2	93.3 ± 3.0	NS
N	*Platydictya jungermannioides*	False Willow Moss				S2	4	34.8 ± 15.0	NB
N	*Pohlia elongata*	Long-necked Nodding Moss				S2	14	62.1 ± 0.0	NB
N	*Seligeria calcarea*	Chalk Brittle Moss				S2	2	55.5 ± 0.0	NB
N	*Seligeria recurvata*	a Moss				S2	3	34.8 ± 15.0	NB
N	*Seligeria brevifolia*	a Moss				S2	4	80.0 ± 0.0	NB
N	*Sphagnum flexuosum*	Flexuous Peatmoss				S2	4	53.9 ± 10.0	NB
N	*Tayloria serrata*	Serrate Trumpet Moss				S2	7	38.6 ± 100.0	NB
N	*Tetrodontium brownianum*	Little Georgia				S2	13	60.1 ± 0.0	NS
N	*Thamnobryum alleghaniense*	a Moss				S2	28	28.8 ± 0.0	NB
N	*Ulota phyllantha*	a Moss				S2	4	69.4 ± 0.0	NB
N	*Anomobryum julaceum*	Slender Silver Moss				S2	4	69.3 ± 1.0	NB
N	*Usnea ceratina*	Warty Beard Lichen				S2	3	72.7 ± 0.0	PE
N	*Cladonia macrophylla*	Fig-leaved Lichen				S2	3	61.4 ± 1.0	NB
N	*Leptogium milligranum*	Stretched Jellyskin Lichen				S2	36	22.8 ± 0.0	NB
N	*Nephroma laevigatum*	Mustard Kidney Lichen				S2	36	67.6 ± 0.0	PE
N	*Peltigera lepidophora*	Scaly Pelt Lichen				S2	1	75.2 ± 0.0	NB
N	*Anacamptodon splachnoides*	a Moss				S2?	3	57.1 ± 1.0	NB
N	*Andreaea rothii*	Dusky Rock Moss				S2?	5	59.1 ± 0.0	NB
N	*Anomodon minor*	Blunt-leaved Anomodon Moss				S2?	1	46.4 ± 1.0	NB
N	*Ptychostomum pallescens*	Tall Clustered Bryum				S2?	1	66.5 ± 100.0	NB
N	*Dichelyma capillaceum*	Hairlike Dichelyma Moss				S2?	1	63.0 ± 3.0	NB
N	*Hygrohypnum montanum*	a Moss				S2?	2	58.9 ± 1.0	NB
N	*Schistostega pennata*	Luminous Moss				S2?	1	97.0 ± 100.0	NB
N	*Seligeria diversifolia*	a Moss				S2?	1	98.9 ± 0.0	NB

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N	*Sphagnum angermanicum*	a Peatmoss				S2?	2	62.7 ± 10.0	NB
N	*Trichodon cylindricus*	Cylindric Hairy-teeth Moss				S2?	2	34.8 ± 15.0	NB
N	*Plagiomnium rostratum*	Long-beaked Leafy Moss				S2?	5	67.5 ± 0.0	NB
N	*Ramalina labiosorediata*	Chalky Ramalina Lichen				S2?	1	66.3 ± 1.0	NB
N	*Collema leptaleum*	Crumpled Bat's Wing Lichen				S2?	65	53.1 ± 0.0	NB
N	*Imshaugia placorodia*	Eyed Starburst Lichen				S2?	9	52.1 ± 0.0	NS
N	*Nephroma arcticum*	Arctic Kidney Lichen				S2?	2	65.5 ± 1.0	NB
N	*Ptychostomum cernuum*	Swamp Bryum				S2S3	1	69.4 ± 0.0	NB
N	*Buxbaumia aphylla*	Brown Shield Moss				S2S3	1	75.9 ± 0.0	NB
N	*Calliergonella cuspidata*	Common Large Wetland Moss				S2S3	4	48.9 ± 5.0	NB
N	*Drepanocladus polygamus*	Polygamous Hook Moss				S2S3	2	62.6 ± 0.0	NB
N	*Palustriella falcata*	Curled Hook Moss				S2S3	2	67.5 ± 0.0	NB
N	*Didymodon rigidulus*	Rigid Screw Moss				S2S3	8	64.6 ± 2.0	NB
N	*Ephemerum serratum*	a Moss				S2S3	3	71.8 ± 0.0	NB
N	*Isopterygiopsis pulchella*	Neat Silk Moss				S2S3	7	60.0 ± 1.0	NB
N	*Orthotrichum elegans*	Showy Bristle Moss				S2S3	2	42.7 ± 0.0	NB
N	*Pohlia proligera*	Cottony Nodding Moss				S2S3	13	34.8 ± 15.0	NB
N	*Codriophorus fascicularis*	Clustered Rock Moss				S2S3	3	61.9 ± 0.0	NB
N	*Bucklandiella affinis*	Lesser Rock Moss				S2S3	11	53.2 ± 0.0	NB
N	*Saelania glaucescens*	Blue Dew Moss				S2S3	2	61.9 ± 0.0	NB
N	*Sphagnum centrale*	Central Peat Moss				S2S3	8	56.2 ± 1.0	NB
N	*Sphagnum subfulvum*	a Peatmoss				S2S3	3	75.1 ± 0.0	NB
N	*Taxiphyllum deplanatum*	Imbricate Yew-leaved Moss				S2S3	2	64.3 ± 1.0	NB
N	*Zygodon viridissimus*	a Moss				S2S3	3	64.3 ± 1.0	NB
N	*Schistidium agassizii*	Elf Bloom Moss				S2S3	3	56.5 ± 1.0	NB
N	*Loeskeobryum brevirostre*	a Moss				S2S3	11	59.1 ± 0.0	NB
N	*Cyrtomnium hymenophylloides*	Short-pointed Lantern Moss				S2S3	7	55.7 ± 0.0	NB
N	*Sphaerophorus globosus*	Northern Coral Lichen				S2S3	13	54.6 ± 0.0	NB
N	*Cetrariella delisei*	Snowbed Icelandmoss Lichen				S2S3	2	47.8 ± 0.0	NB
N	*Cladonia acuminata*	Scantily Clad Pixie Lichen				S2S3	2	68.9 ± 1.0	NB
N	*Cladonia ramulosa*	Bran Lichen				S2S3	4	63.6 ± 1.0	NB
N	*Cladonia sulphurina*	Greater Sulphur-cup Lichen				S2S3	6	53.2 ± 1.0	NB
N	*Dendriscocaulon umhausense*	a lichen				S2S3	1	82.0 ± 0.0	NB
N	*Parmeliopsis ambigua*	Green Starburst Lichen				S2S3	1	72.4 ± 1.0	NB
N	*Polychidium muscicola*	Eyed Mossthorns Woollybear Lichen				S2S3	6	46.3 ± 0.0	NB
N	*Hypnum curvifolium*	Curved-leaved Plait Moss				S3	9	51.3 ± 0.0	NS
N	*Tortella fragilis*	Fragile Twisted Moss				S3	1	69.5 ± 0.0	NB
N	*Schistidium maritimum*	a Moss				S3	6	65.4 ± 0.0	NB
N	*Hymenostylium recurvirostrum*	Curve-beak Beardless Moss				S3	6	69.8 ± 1.0	NB
N	*Collema nigrescens*	Blistered Tarpaper Lichen				S3	19	69.2 ± 0.0	NB
N	*Solorina saccata*	Woodland Owl Lichen				S3	8	28.8 ± 0.0	NB
N	*Ahtiana aurescens*	Eastern Candlewax Lichen				S3	4	73.1 ± 0.0	PE
N	*Normandina pulchella*	Rimmed Elf-ear Lichen				S3	16	63.6 ± 1.0	NB
N	*Cladonia farinacea*	Farinose Pixie Lichen				S3	6	62.1 ± 1.0	NB
N	*Cladonia strepsilis*	Olive Cladonia Lichen				S3	1	34.4 ± 0.0	NB
N	*Hypotrachyna catawbiensis*	Powder-tipped Antler Lichen				S3	17	68.6 ± 0.0	NB
N	*Scytinium lichenoides*	Tattered Jellyskin Lichen				S3	14	68.9 ± 1.0	NB
N	*Nephroma bellum*	Naked Kidney Lichen				S3	5	61.0 ± 1.0	NB
N	*Peltigera degenii*	Lustrous Pelt Lichen				S3	13	45.7 ± 0.0	NB
N	*Leptogium laceroides*	Short-bearded Jellyskin Lichen				S3	25	18.4 ± 0.0	NB
N	*Peltigera membranacea*	Membranous Pelt Lichen				S3	56	28.8 ± 0.0	NB

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N	*Cladonia botrytes*	Wooden Soldiers Lichen				S3	14	49.0 ± 0.0	NB
N	*Cladonia carneola*	Crowned Pixie-cup Lichen				S3	2	62.7 ± 0.0	NB
N	*Cladonia deformis*	Lesser Sulphur-cup Lichen				S3	9	61.3 ± 0.0	NB
N	*Aulacomnium androgynum*	Little Groove Moss				S3?	10	34.8 ± 15.0	NB
N	*Ptychostomum inclinatum*	Blunt-tooth Thread Moss				S3?	3	69.1 ± 0.0	NB
N	*Dicranella rufescens*	Red Forklet Moss				S3?	1	69.5 ± 0.0	NB
N	*Rhytidiadelphus loreus*	Lanky Moss				S3?	3	69.3 ± 0.0	NB
N	*Sphagnum lescurii*	a Peatmoss				S3?	8	49.8 ± 0.0	NS
N	*Rostania occultata*	Crusted Tarpaper Lichen				S3?	5	68.7 ± 0.0	NB
N	*Scytinium subtile*	Appressed Jellyskin Lichen				S3?	27	24.1 ± 0.0	NB
N	*Peltigera neckeri*	Black-saddle Pelt Lichen				S3?	4	66.1 ± 5.0	NB
N	*Stereocaulon subcoralloides*	Coralloid Foam Lichen				S3?	1	66.3 ± 1.0	NB
N	*Barbula convoluta*	Lesser Bird's-claw Beard Moss				S3S4	1	54.6 ± 15.0	NB
N	*Brachytheciastrum velutinum*	Velvet Ragged Moss				S3S4	2	63.2 ± 1.0	NB
N	*Calliergon giganteum*	Giant Spear Moss				S3S4	1	75.3 ± 0.0	PE
N	*Dicranella cerviculata*	a Moss				S3S4	3	59.8 ± 2.0	NB
N	*Dicranella varia*	a Moss				S3S4	2	67.8 ± 0.0	PE
N	*Dicranum majus*	Greater Broom Moss				S3S4	23	55.7 ± 0.0	NB
N	*Dicranum leioneuron*	a Dicranum Moss				S3S4	2	21.3 ± 0.0	NB
N	*Encalypta ciliata*	Fringed Extinguisher Moss				S3S4	2	69.1 ± 0.0	NB
N	*Fissidens bryoides*	Lesser Pocket Moss				S3S4	4	55.7 ± 5.0	NB
N	*Elodium blandowii*	Blandow's Bog Moss				S3S4	1	74.1 ± 0.0	PE
N	*Heterocladium dimorphum*	Dimorphous Tangle Moss				S3S4	6	42.7 ± 0.0	NB
N	*Isopterygiopsis muelleriana*	a Moss				S3S4	19	55.7 ± 0.0	NB
N	*Myurella julacea*	Small Mouse-tail Moss				S3S4	2	69.5 ± 0.0	NB
N	*Orthotrichum speciosum*	Showy Bristle Moss				S3S4	6	58.5 ± 4.0	NB
N	*Physcomitrium pyriforme*	Pear-shaped Urn Moss				S3S4	3	36.6 ± 0.0	NB
N	*Pogonatum dentatum*	Mountain Hair Moss				S3S4	4	63.0 ± 0.0	NS
N	*Sphagnum compactum*	Compact Peat Moss				S3S4	6	36.0 ± 0.0	NB
N	*Sphagnum torreyanum*	a Peatmoss				S3S4	2	60.7 ± 0.0	NB
N	*Sphagnum austinii*	Austin's Peat Moss				S3S4	1	49.8 ± 0.0	NS
N	*Sphagnum contortum*	Twisted Peat Moss				S3S4	1	60.7 ± 0.0	NB
N	*Sphagnum quinquefarium*	Five-ranked Peat Moss				S3S4	2	42.7 ± 0.0	NB
N	*Tetraphis geniculata*	Geniculate Four-tooth Moss				S3S4	16	54.6 ± 15.0	NB
N	*Tetraplodon angustatus*	Toothed-leaved Nitrogen Moss				S3S4	3	49.1 ± 0.0	NS
N	*Weissia controversa*	Green-Cushioned Weissia				S3S4	1	69.8 ± 1.0	NB
N	*Abietinella abietina*	Wiry Fern Moss				S3S4	1	69.5 ± 0.0	NB
N	*Trichostomum tenuirostre*	Acid-Soil Moss				S3S4	4	61.9 ± 0.0	NB
N	*Rauiella scita*	Smaller Fern Moss				S3S4	1	74.6 ± 0.0	NB
N	*Pannaria rubiginosa*	Brown-eyed Shingle Lichen				S3S4	34	68.4 ± 0.0	NS
N	*Pseudocyphellaria holarctica*	Yellow Specklebelly Lichen				S3S4	140	15.8 ± 0.0	NB
N	*Ramalina thrausta*	Angelhair Ramalina Lichen				S3S4	13	53.6 ± 1.0	NB
N	*Hypogymnia vittata*	Slender Monk's Hood Lichen				S3S4	28	53.6 ± 1.0	NB
N	*Scytinium teretiusculum*	Curly Jellyskin Lichen				S3S4	18	29.1 ± 0.0	NB
N	*Montanelia panniformis*	Shingled Camouflage Lichen				S3S4	5	55.7 ± 1.0	NB
N	*Cladonia terrae-novae*	Newfoundland Reindeer Lichen				S3S4	1	34.3 ± 0.0	NB
N	*Cladonia floerkeana*	Gritty British Soldiers Lichen				S3S4	5	33.4 ± 0.0	NB
N	*Cladonia parasitica*	Fence-rail Lichen				S3S4	3	46.8 ± 0.0	NB
N	*Xylopsora friesii*	a Lichen				S3S4	1	68.9 ± 1.0	NB
N	*Nephroma parile*	Powdery Kidney Lichen				S3S4	27	28.8 ± 0.0	NB
N	*Nephroma resupinatum*	a lichen				S3S4	1	98.6 ± 0.0	NB
N	*Protopannaria pezizoides*	Brown-gray Moss-shingle Lichen				S3S4	45	28.8 ± 0.0	NB
N	*Parmelia fertilis*	Fertile Shield Lichen				S3S4	5	68.7 ± 0.0	NB
N	*Usnea strigosa*	Bushy Beard Lichen				S3S4	64	14.5 ± 0.0	NB

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N	*Stereocaulon condensatum*	Granular Soil Foam Lichen				S3S4	10	29.9 ± 0.0	NB
N	*Stereocaulon paschale*	Easter Foam Lichen				S3S4	1	38.1 ± 1.0	NB
N	*Pannaria conoplea*	Mealy-rimmed Shingle Lichen				S3S4	45	50.4 ± 0.0	NB
N	*Physcia tenella*	Fringed Rosette Lichen				S3S4	10	60.1 ± 0.0	PE
N	*Anaptychia palmulata*	Shaggy Fringed Lichen				S3S4	80	41.6 ± 0.0	NB
N	*Peltigera neopolydactyla*	Undulating Pelt Lichen				S3S4	12	47.4 ± 0.0	NB
N	*Cladonia cariosa*	Lesser Ribbed Pixie Lichen				S3S4	4	38.4 ± 0.0	NB
N	*Hypocenomyce scalaris*	Common Clam Lichen				S3S4	1	66.3 ± 1.0	NB
N	*Leucodon brachypus*	a Moss				SH	13	57.9 ± 1.0	NB
N	*Splachnum luteum*	Yellow Collar Moss				SH	1	66.5 ± 100.0	NB
N	*Cyrto-hypnum minutulum*	Tiny Cedar Moss				SH	3	68.6 ± 10.0	NB
P	*Juglans cinerea*	Butternut	Endangered	Endangered	Endangered	S1	43	45.7 ± 1.0	NB
P	*Symphyotrichum laurentianum*	Gulf of St Lawrence Aster	Threatened	Threatened	Endangered	S1	50	71.0 ± 0.0	NB
P	*Fraxinus nigra*	Black Ash	Threatened			S3S4	548	8.5 ± 0.0	NB
P	*Isoetes prototypus*	Prototype Quillwort	Special Concern	Special Concern	Endangered	S1	3	92.8 ± 0.0	NS
P	*Lechea maritima var. subcylindrica*	Beach Pinweed	Special Concern	Special Concern	Special Concern	S2	2675	37.3 ± 0.0	NB
P	*Symphyotrichum subulatum (Bathurst pop)*	Bathurst Aster - Bathurst pop.	Not At Risk		Endangered	S2	22	55.2 ± 0.0	NB
P	*Cryptotaenia canadensis*	Canada Honewort				S1	1	75.4 ± 1.0	NB
P	*Antennaria howellii ssp. petaloidea*	Pussy-Toes				S1	2	91.3 ± 5.0	PE
P	*Bidens discoidea*	Swamp Beggarticks				S1	1	89.1 ± 0.0	NB
P	*Pseudognaphalium obtusifolium*	Eastern Cudweed				S1	29	43.0 ± 5.0	NB
P	*Solidago multiradiata*	Multi-rayed Goldenrod				S1	19	30.8 ± 0.0	NB
P	*Symphyotrichum subulatum (non-Bathurst pop)*	Annual Saltmarsh Aster				S1	12	70.6 ± 0.0	NB
P	*Betula michauxii*	Michaux's Dwarf Birch				S1	3	95.2 ± 0.0	NB
P	*Barbarea orthoceras*	American Yellow Rocket				S1	1	84.5 ± 1.0	NB
P	*Cardamine parviflora*	Small-flowered Bittercress				S1	5	94.1 ± 0.0	NS
P	*Draba arabisans*	Rock Whitlow-Grass				S1	29	60.1 ± 0.0	NB
P	*Draba glabella*	Rock Whitlow-Grass				S1	5	69.2 ± 0.0	NB
P	*Stellaria crassifolia*	Fleshy Stitchwort				S1	3	19.1 ± 5.0	NB
P	*Chenopodiastrum simplex*	Maple-leaved Goosefoot				S1	6	40.7 ± 5.0	NB
P	*Suaeda rolandii*	Roland's Sea-Blite				S1	19	20.5 ± 0.0	NB
P	*Hypericum virginicum*	Virginia St. John's-wort				S1	1	52.7 ± 0.0	NS
P	*Corema conradii*	Broom Crowberry				S1	23	84.9 ± 0.0	PE
P	*Vaccinium boreale*	Northern Blueberry				S1	5	32.9 ± 1.0	NB
P	*Vaccinium corymbosum*	Highbush Blueberry				S1	1	54.2 ± 0.0	NS
P	*Vaccinium uliginosum*	Alpine Bilberry				S1	1	99.9 ± 1.0	PE
P	*Euphorbia polygonifolia*	Seaside Spurge				S1	17	64.7 ± 0.0	NB
P	*Proserpinaca pectinata*	Comb-leaved Mermaidweed				S1	2	76.3 ± 5.0	NS
P	*Utricularia ochroleuca*	Yellowish-white Bladderwort				S1	37	48.2 ± 0.0	NB
P	*Polygonum douglasii*	Douglas Knotweed				S1	1	72.9 ± 0.0	NB
P	*Primula laurentiana*	Laurentian Primrose				S1	24	63.0 ± 3.0	NB
P	*Amelanchier fernaldii*	Fernald's Serviceberry				S1	2	28.6 ± 1.0	NB
P	*Crataegus jonesiae*	Jones' Hawthorn				S1	1	77.4 ± 1.0	NB
P	*Dryas integrifolia*	Entire-leaved Mountain Avens				S1	15	30.2 ± 3.0	NB
P	*Potentilla canadensis*	Canada Cinquefoil				S1	1	88.4 ± 0.0	NB
P	*Rubus flagellaris*	Northern Dewberry				S1	3	45.7 ± 1.0	NB
P	*Salix myrtillifolia*	Blueberry Willow				S1	25	30.9 ± 0.0	NB
P	*Saxifraga paniculata ssp. laestadii*	Laestadius' Saxifrage				S1	42	67.5 ± 0.0	NB
P	*Viola sagittata var. ovata*	Arrow-Leaved Violet				S1	1	98.9 ± 2.0	NS

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P	*Carex annectens*	Yellow-Fruited Sedge				S1	3	26.5 ± 0.0	NB
P	*Carex atlantica ssp. atlantica*	Atlantic Sedge				S1	8	42.9 ± 0.0	NB
P	*Carex backii*	Rocky Mountain Sedge				S1	4	41.8 ± 0.0	NB
P	*Carex merritt-fernaldii*	Merritt Fernald's Sedge				S1	1	42.3 ± 0.0	NB
P	*Carex scirpoidea*	Scirpuslike Sedge				S1	6	76.6 ± 0.0	NB
P	*Carex sterilis*	Sterile Sedge				S1	1	45.9 ± 2.0	NB
P	*Carex grisea*	Inflated Narrow-leaved Sedge				S1	1	76.5 ± 5.0	NB
P	*Scirpus pendulus*	Hanging Bulrush				S1	10	46.0 ± 0.0	NB
P	*Sisyrinchium angustifolium*	Narrow-leaved Blue-eyed-grass				S1	1	64.2 ± 5.0	NS
P	*Juncus greenei*	Greene's Rush				S1	10	46.4 ± 0.0	NB
P	*Juncus stygius ssp. americanus*	Moor Rush				S1	79	48.1 ± 5.0	NB
P	*Goodyera pubescens*	Downy Rattlesnake-Plantain				S1	12	39.7 ± 0.0	NB
P	*Malaxis monophyllos var. brachypoda*	North American White Adder's-mouth				S1	6	39.0 ± 0.0	NB
P	*Platanthera flava var. herbiola*	Pale Green Orchid				S1	1	39.0 ± 0.0	NB
P	*Platanthera macrophylla*	Large Round-Leaved Orchid				S1	12	28.6 ± 0.0	NB
P	*Bromus pubescens*	Hairy Wood Brome Grass				S1	1	75.1 ± 0.0	NB
P	*Calamagrostis stricta ssp. inexpansa*	Slim-stemmed Reed Grass				S1	3	43.0 ± 1.0	NB
P	*Catabrosa aquatica*	Water Whorl Grass				S1	1	98.6 ± 5.0	PE
P	*Danthonia compressa*	Flattened Oat Grass				S1	24	31.9 ± 0.0	NB
P	*Potamogeton friesii*	Fries' Pondweed				S1	8	38.8 ± 0.0	NB
P	*Cystopteris laurentiana*	Laurentian Bladder Fern				S1	1	75.2 ± 1.0	NB
P	*Dryopteris filix-mas ssp. brittonii*	Britton's Male Fern				S1	2	32.6 ± 1.0	NB
P	*Selaginella rupestris*	Rock Spikemoss				S1	9	68.8 ± 1.0	NB
P	*Polygonum aviculare ssp. neglectum*	Narrow-leaved Knotweed				S1?	4	28.6 ± 0.0	NB
P	*Spiranthes ochroleuca*	Yellow Ladies'-tresses				S1S2	17	9.5 ± 0.0	NB
P	*Eriophorum russeolum ssp. albidum*	Smooth-fruited Russet Cottongrass				S1S3	17	23.8 ± 0.0	NB
P	*Spiranthes cernua*	Nodding Ladies'-Tresses				S1S3	22	24.2 ± 0.0	NB
P	*Spiranthes arcisepala*	Appalachian Ladies'-tresses				S1S3	12	24.2 ± 0.0	NB
P	*Spiranthes incurva*	Sphinx Ladies'-tresses				S1S3	1	15.9 ± 0.0	NB
P	*Neottia bifolia*	Southern Twayblade			Endangered	S2	50	21.3 ± 0.0	NB
P	*Hieracium robinsonii*	Robinson's Hawkweed				S2	14	56.1 ± 0.0	NB
P	*Atriplex glabriuscula var. franktonii*	Frankton's Saltbush				S2	6	27.8 ± 0.0	NB
P	*Hypericum x dissimulatum*	Disguised St. John's-wort				S2	7	49.7 ± 0.0	NS
P	*Viburnum dentatum*	Southern Arrow-Wood				S2	2	38.7 ± 0.0	NB
P	*Viburnum dentatum var. lucidum*	Northern Arrow-Wood				S2	1	30.8 ± 0.0	NB
P	*Quercus macrocarpa*	Bur Oak				S2	5	75.3 ± 0.0	NB
P	*Nuphar x rubrodisca*	Red-disk Yellow Pond-lily				S2	18	1.9 ± 0.0	NB
P	*Polygaloides paucifolia*	Fringed Milkwort				S2	8	69.5 ± 1.0	NB
P	*Persicaria amphibia var. emersa*	Long-root Smartweed				S2	2	60.3 ± 0.0	NS
P	*Anemone parviflora*	Small-flowered Anemone				S2	9	31.2 ± 0.0	NB
P	*Geum fragarioides*	Barren Strawberry				S2	1	42.5 ± 1.0	NB
P	*Scrophularia lanceolata*	Lance-leaved Figwort				S2	2	72.9 ± 1.0	NB
P	*Carex albicans var. emmonsii*	White-tinged Sedge				S2	10	18.6 ± 0.0	NB
P	*Galearis rotundifolia*	Small Round-leaved Orchid				S2	3	62.0 ± 0.0	NB
P	*Calypso bulbosa var.*	Calypso				S2	3	40.5 ± 5.0	NB

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	americana								
P	*Coeloglossum viride*	Long-bracted Frog Orchid				S2	5	29.8 ± 10.0	NB
P	*Cypripedium parviflorum var. makasin*	Small Yellow Lady's-Slipper				S2	2	32.0 ± 0.0	NB
P	*Platanthera huronensis*	Fragrant Green Orchid				S2	4	63.7 ± 0.0	NB
P	*Festuca subverticillata*	Nodding Fescue				S2	7	86.7 ± 0.0	NS
P	*Puccinellia nutkaensis*	Alaska Alkaligrass				S2	2	24.9 ± 1.0	NB
P	*Diphasiastrum sitchense*	Sitka Ground-cedar				S2	4	30.7 ± 0.0	NB
P	*Schizaea pusilla*	Little Curlygrass Fern				S2	9	62.9 ± 0.0	NB
P	*Coryphopteris simulata*	Bog Fern				S2	10	45.6 ± 0.0	NB
P	*Toxicodendron radicans var. radicans*	Eastern Poison Ivy				S2?	6	37.8 ± 0.0	NB
P	*Symphyotrichum novi-belgii var. crenifolium*	New York Aster				S2?	5	52.6 ± 0.0	NB
P	*Humulus lupulus var. lupuloides*	Common Hop				S2?	2	53.7 ± 5.0	NB
P	*Crataegus macrosperma*	Big-Fruit Hawthorn				S2?	2	8.5 ± 0.0	NB
P	*Rubus x recurvicaulis*	arching dewberry				S2?	5	21.6 ± 1.0	NB
P	*Osmorhiza longistylis*	Smooth Sweet Cicely				S2S3	6	72.7 ± 1.0	NS
P	*Bidens heterodoxa*	Connecticut Beggar-Ticks				S2S3	6	84.3 ± 0.0	NB
P	*Symphyotrichum racemosum*	Small White Aster				S2S3	2	89.1 ± 0.0	NB
P	*Cuscuta cephalanthi*	Buttonbush Dodder				S2S3	6	20.7 ± 0.0	NB
P	*Gentiana linearis*	Narrow-Leaved Gentian				S2S3	1	50.9 ± 50.0	NB
P	*Hedeoma pulegioides*	American False Pennyroyal				S2S3	5	72.3 ± 0.0	NB
P	*Aphyllon uniflorum*	One-flowered Broomrape				S2S3	1	98.5 ± 0.0	NS
P	*Persicaria careyi*	Carey's Smartweed				S2S3	7	29.4 ± 2.0	NB
P	*Hepatica americana*	Round-lobed Hepatica				S2S3	1	91.1 ± 1.0	NB
P	*Ranunculus sceleratus*	Cursed Buttercup				S2S3	1	97.4 ± 100.0	NB
P	*Galium obtusum*	Blunt-leaved Bedstraw				S2S3	9	27.7 ± 10.0	NB
P	*Euphrasia randii*	Rand's Eyebright				S2S3	7	71.0 ± 0.0	NB
P	*Dirca palustris*	Eastern Leatherwood				S2S3	1	20.7 ± 1.0	NB
P	*Carex comosa*	Bearded Sedge				S2S3	7	42.8 ± 0.0	NB
P	*Carex rostrata*	Narrow-leaved Beaked Sedge				S2S3	2	60.1 ± 5.0	NB
P	*Carex vacillans*	Estuarine Sedge				S2S3	4	43.7 ± 0.0	NB
P	*Scirpus atrovirens*	Dark-green Bulrush				S2S3	4	17.5 ± 0.0	NB
P	*Juncus ranarius*	Seaside Rush				S2S3	6	85.9 ± 0.0	NB
P	*Allium tricoccum*	Wild Leek				S2S3	21	35.9 ± 0.0	NB
P	*Corallorhiza maculata var. occidentalis*	Spotted Coralroot				S2S3	14	11.7 ± 10.0	NB
P	*Corallorhiza maculata var. maculata*	Spotted Coralroot				S2S3	5	63.8 ± 0.0	NB
P	*Elymus canadensis*	Canada Wild Rye				S2S3	1	14.1 ± 1.0	NB
P	*Piptatheropsis canadensis*	Canada Ricegrass				S2S3	4	20.9 ± 10.0	NB
P	*Puccinellia phryganodes ssp. neoarctica*	Creeping Alkali Grass				S2S3	2	35.9 ± 1.0	NB
P	*Poa glauca*	Glaucous Blue Grass				S2S3	16	65.2 ± 0.0	NB
P	*Piptatheropsis pungens*	Slender Ricegrass				S2S3	5	41.5 ± 0.0	NB
P	*Potamogeton vaseyi*	Vasey's Pondweed				S2S3	1	62.6 ± 0.0	PE
P	*Panax trifolius*	Dwarf Ginseng				S3	34	15.8 ± 0.0	NB
P	*Artemisia campestris ssp. caudata*	Tall Wormwood				S3	39	55.9 ± 0.0	NB
P	*Artemisia campestris*	Field Wormwood				S3	4	71.0 ± 0.0	NB
P	*Nabalus racemosus*	Glaucous Rattlesnakeroot				S3	8	89.4 ± 0.0	NB
P	*Ionactis linariifolia*	Flax-leaved Aster				S3	1	69.6 ± 5.0	NB
P	*Pseudognaphalium macounii*	Macoun's Cudweed				S3	41	40.0 ± 5.0	NB
P	*Impatiens pallida*	Pale Jewelweed				S3	4	76.3 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Turritis glabra*	Tower Mustard				S3	1	80.1 ± 0.0	NB
P	*Arabis pycnocarpa*	Cream-flowered Rockcress				S3	13	19.8 ± 0.0	NB
P	*Cardamine maxima*	Large Toothwort				S3	10	80.2 ± 0.0	NB
P	*Boechera stricta*	Drummond's Rockcress				S3	14	41.5 ± 0.0	NB
P	*Sagina nodosa*	Knotted Pearlwort				S3	2	88.2 ± 0.0	PE
P	*Sagina nodosa ssp. borealis*	Knotted Pearlwort				S3	2	87.7 ± 0.0	PE
P	*Stellaria humifusa*	Saltmarsh Starwort				S3	19	19.2 ± 5.0	NB
P	*Stellaria longifolia*	Long-leaved Starwort				S3	10	29.4 ± 2.0	NB
P	*Oxybasis rubra*	Red Goosefoot				S3	14	24.9 ± 0.0	NB
P	*Hudsonia tomentosa*	Woolly Beach-heath				S3	558	30.8 ± 0.0	NB
P	*Cornus obliqua*	Silky Dogwood				S3	55	62.0 ± 0.0	NB
P	*Triosteum aurantiacum*	Orange-fruited Tinker's Weed				S3	7	32.5 ± 0.0	NB
P	*Viburnum lentago*	Nannyberry				S3	1	62.3 ± 0.0	NB
P	*Rhodiola rosea*	Roseroot				S3	86	59.6 ± 0.0	NB
P	*Shepherdia canadensis*	Soapberry				S3	42	26.3 ± 0.0	NB
P	*Oxytropis campestris var. johannensis*	Field Locoweed				S3	27	92.9 ± 1.0	NS
P	*Bartonia paniculata*	Branched Bartonia				S3	2	60.9 ± 0.0	NS
P	*Bartonia paniculata ssp. iodandra*	Branched Bartonia				S3	26	48.3 ± 0.0	NB
P	*Geranium bicknellii*	Bicknell's Crane's-bill				S3	27	0.4 ± 0.0	NB
P	*Myriophyllum farwellii*	Farwell's Water Milfoil				S3	9	44.3 ± 1.0	NB
P	*Myriophyllum humile*	Low Water Milfoil				S3	1	60.4 ± 1.0	NB
P	*Proserpinaca palustris*	Marsh Mermaidweed				S3	1	91.1 ± 0.0	NB
P	*Fraxinus pennsylvanica*	Red Ash				S3	20	15.2 ± 0.0	NB
P	*Rumex pallidus*	Seabeach Dock				S3	7	49.2 ± 0.0	NB
P	*Pyrola minor*	Lesser Pyrola				S3	9	52.1 ± 0.0	NS
P	*Clematis occidentalis*	Purple Clematis				S3	16	41.0 ± 0.0	NB
P	*Ranunculus flabellaris*	Yellow Water Buttercup				S3	1	30.1 ± 0.0	NB
P	*Amelanchier canadensis*	Canada Serviceberry				S3	20	21.0 ± 0.0	NB
P	*Crataegus scabrida*	Rough Hawthorn				S3	6	40.8 ± 1.0	NB
P	*Rubus occidentalis*	Black Raspberry				S3	1	38.2 ± 0.0	NB
P	*Salix myricoides*	Bayberry Willow				S3	2	30.9 ± 1.0	NB
P	*Salix nigra*	Black Willow				S3	32	73.6 ± 0.0	NB
P	*Salix interior*	Sandbar Willow				S3	1	27.3 ± 1.0	NB
P	*Comandra umbellata*	Bastard's Toadflax				S3	54	20.4 ± 0.0	NB
P	*Agalinis purpurea var. parviflora*	Small-flowered Purple False Foxglove				S3	63	19.3 ± 0.0	NB
P	*Viola adunca*	Hooked Violet				S3	8	42.2 ± 0.0	NB
P	*Sagittaria montevidensis ssp. spongiosa*	Spongy Arrowhead				S3	80	45.9 ± 0.0	NB
P	*Symplocarpus foetidus*	Eastern Skunk Cabbage				S3	130	45.4 ± 18.0	NB
P	*Carex adusta*	Lesser Brown Sedge				S3	10	0.4 ± 0.0	NB
P	*Carex arcta*	Northern Clustered Sedge				S3	10	39.8 ± 20.0	NB
P	*Carex conoidea*	Field Sedge				S3	10	26.6 ± 0.0	NB
P	*Carex garberi*	Garber's Sedge				S3	1	24.6 ± 0.0	NB
P	*Carex granularis*	Limestone Meadow Sedge				S3	11	26.6 ± 0.0	NB
P	*Carex gynocrates*	Northern Bog Sedge				S3	1	72.9 ± 1.0	NB
P	*Carex hirtifolia*	Pubescent Sedge				S3	7	32.6 ± 0.0	NB
P	*Carex livida*	Livid Sedge				S3	36	48.3 ± 0.0	NB
P	*Carex ormostachya*	Necklace Spike Sedge				S3	5	31.1 ± 1.0	NB
P	*Carex plantaginea*	Plantain-Leaved Sedge				S3	3	70.5 ± 0.0	NB
P	*Carex rosea*	Rosy Sedge				S3	13	70.0 ± 0.0	NB
P	*Carex sprengelii*	Longbeak Sedge				S3	2	79.9 ± 0.0	NB
P	*Carex tenuiflora*	Sparse-Flowered Sedge				S3	9	43.2 ± 10.0	NB
P	*Cyperus esculentus var. leptostachyus*	Perennial Yellow Nutsedge				S3	7	50.7 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Cyperus squarrosus*	Awned Flatsedge				S3	1	97.3 ± 0.0	NB
P	*Eriophorum gracile*	Slender Cottongrass				S3	57	21.8 ± 0.0	NB
P	*Blysmopsis rufa*	Red Bulrush				S3	32	61.0 ± 0.0	NB
P	*Juncus vaseyi*	Vasey Rush				S3	12	4.5 ± 0.0	NB
P	*Cypripedium reginae*	Showy Lady's-Slipper				S3	44	18.6 ± 0.0	NB
P	*Goodyera oblongifolia*	Menzies' Rattlesnake-plantain				S3	2	75.8 ± 0.0	PE
P	*Neottia auriculata*	Auricled Twayblade				S3	1	67.4 ± 0.0	NB
P	*Platanthera grandiflora*	Large Purple Fringed Orchid				S3	54	18.6 ± 1.0	NB
P	*Platanthera orbiculata*	Small Round-leaved Orchid				S3	21	30.1 ± 0.0	NB
P	*Spiranthes lucida*	Shining Ladies'-Tresses				S3	2	40.8 ± 1.0	NB
P	*Bromus latiglumis*	Broad-Glumed Brome				S3	24	26.8 ± 0.0	NB
P	*Dichanthelium linearifolium*	Narrow-leaved Panic Grass				S3	1	84.6 ± 0.0	NB
P	*Schizachyrium scoparium*	Little Bluestem				S3	25	89.8 ± 0.0	NB
P	*Zizania aquatica*	Southern Wild Rice				S3	1	37.5 ± 0.0	NB
P	*Zizania aquatica var. aquatica*	Eastern Wild Rice				S3	5	51.0 ± 0.0	NB
P	*Adiantum pedatum*	Northern Maidenhair Fern				S3	1	91.1 ± 1.0	NB
P	*Asplenium trichomanes*	Maidenhair Spleenwort				S3	14	42.0 ± 1.0	NB
P	*Anchistea virginica*	Virginia chain fern				S3	32	52.1 ± 0.0	NS
P	*Woodsia alpina*	Alpine Cliff Fern				S3	6	56.3 ± 0.0	NB
P	*Woodsia glabella*	Smooth Cliff Fern				S3	67	55.0 ± 0.0	NB
P	*Isoetes tuckermanii ssp. tuckermanii*	Tuckerman's Quillwort				S3	3	59.4 ± 0.0	NB
P	*Diphasiastrum x sabinifolium*	Savin-leaved Ground-cedar				S3	16	29.1 ± 0.0	NB
P	*Huperzia appressa*	Mountain Firmoss				S3	45	67.4 ± 0.0	NB
P	*Sceptridium dissectum*	Dissected Moonwort				S3	8	29.3 ± 2.0	NB
P	*Botrychium lanceolatum ssp. angustisegmentum*	Narrow Triangle Moonwort				S3	17	30.2 ± 0.0	NB
P	*Botrychium simplex*	Least Moonwort				S3	6	38.2 ± 0.0	NB
P	*Ophioglossum pusillum*	Northern Adder's-tongue				S3	5	53.6 ± 0.0	NS
P	*Selaginella selaginoides*	Low Spikemoss				S3	8	65.3 ± 0.0	NB
P	*Crataegus succulenta*	Fleshy Hawthorn				S3?	2	68.4 ± 0.0	PE
P	*Platanthera hookeri*	Hooker's Orchid				S3?	41	11.1 ± 0.0	NB
P	*Bidens hyperborea*	Estuary Beggarticks				S3S4	40	27.7 ± 1.0	NB
P	*Solidago altissima*	Tall Goldenrod				S3S4	6	7.0 ± 0.0	NB
P	*Symphyotrichum boreale*	Boreal Aster				S3S4	14	33.1 ± 0.0	NB
P	*Betula pumila*	Bog Birch				S3S4	121	22.7 ± 0.0	NB
P	*Mertensia maritima*	Sea Lungwort				S3S4	9	46.7 ± 0.0	NB
P	*Subularia aquatica ssp. americana*	American Water Awlwort				S3S4	2	61.4 ± 0.0	NB
P	*Callitriche hermaphroditica*	Northern Water-starwort				S3S4	8	41.5 ± 0.0	NB
P	*Viburnum edule*	Squashberry				S3S4	14	53.0 ± 0.0	NB
P	*Crassula aquatica*	Water Pygmyweed				S3S4	5	50.3 ± 0.0	NB
P	*Penthorum sedoides*	Ditch Stonecrop				S3S4	27	29.5 ± 0.0	NB
P	*Elatine americana*	American Waterwort				S3S4	6	43.0 ± 0.0	NB
P	*Fagus grandifolia*	American Beech				S3S4	211	16.0 ± 0.0	NB
P	*Geranium robertianum*	Herb Robert				S3S4	86	52.8 ± 0.0	NB
P	*Teucrium canadense*	Canada Germander				S3S4	152	21.0 ± 0.0	NB
P	*Utricularia gibba*	Humped Bladderwort				S3S4	6	37.7 ± 0.0	NB
P	*Fraxinus americana*	White Ash				S3S4	265	8.9 ± 0.0	NB
P	*Epilobium strictum*	Downy Willowherb				S3S4	38	16.4 ± 0.0	NB
P	*Fallopia scandens*	Climbing False Buckwheat				S3S4	70	26.9 ± 0.0	NB
P	*Rumex persicarioides*	Peach-leaved Dock				S3S4	17	10.0 ± 1.0	NB
P	*Samolus parviflorus*	Seaside Brookweed				S3S4	154	15.6 ± 0.0	NB
P	*Thalictrum confine*	Northern Meadow-rue				S3S4	1	93.4 ± 0.0	NB
P	*Rosa palustris*	Swamp Rose				S3S4	7	42.7 ± 0.0	NB
P	*Rubus pensilvanicus*	Pennsylvania Blackberry				S3S4	41	28.6 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Sanguisorba canadensis*	Canada Burnet				S3S4	20	62.2 ± 0.0	NB
P	*Galium boreale*	Northern Bedstraw				S3S4	6	60.7 ± 5.0	NS
P	*Galium labradoricum*	Labrador Bedstraw				S3S4	15	33.2 ± 0.0	NB
P	*Salix pedicellaris*	Bog Willow				S3S4	68	15.5 ± 0.0	NB
P	*Geocaulon lividum*	Northern Comandra				S3S4	49	9.5 ± 0.0	NB
P	*Agalinis neoscotica*	Nova Scotia Agalinis				S3S4	10	24.2 ± 0.0	NB
P	*Limosella australis*	Southern Mudwort				S3S4	85	15.6 ± 0.0	NB
P	*Ulmus americana*	White Elm				S3S4	349	8.9 ± 0.0	NB
P	*Juniperus horizontalis*	Creeping Juniper				S3S4	25	29.0 ± 1.0	NB
P	*Carex capillaris*	Hairlike Sedge				S3S4	20	60.6 ± 0.0	NS
P	*Carex eburnea*	Bristle-leaved Sedge				S3S4	18	38.6 ± 100.0	NB
P	*Carex exilis*	Coastal Sedge				S3S4	7	66.3 ± 0.0	NS
P	*Carex haydenii*	Hayden's Sedge				S3S4	8	14.5 ± 0.0	NB
P	*Carex lupulina*	Hop Sedge				S3S4	21	29.5 ± 0.0	NB
P	*Carex tenera*	Tender Sedge				S3S4	15	5.5 ± 0.0	NB
P	*Carex wiegandii*	Wiegand's Sedge				S3S4	221	6.3 ± 0.0	NB
P	*Carex recta*	Estuary Sedge				S3S4	17	19.7 ± 0.0	NB
P	*Carex atratiformis*	Scabrous Black Sedge				S3S4	3	87.0 ± 0.0	NS
P	*Cladium mariscoides*	Smooth Twigrush				S3S4	8	38.9 ± 1.0	NB
P	*Cyperus dentatus*	Toothed Flatsedge				S3S4	88	51.4 ± 1.0	NB
P	*Rhynchospora capitellata*	Small-headed Beakrush				S3S4	2	81.4 ± 0.0	NB
P	*Trichophorum clintonii*	Clinton's Clubrush				S3S4	25	66.7 ± 0.0	NB
P	*Bolboschoenus fluviatilis*	River Bulrush				S3S4	4	22.9 ± 1.0	NB
P	*Triglochin gaspensis*	Gasp ├ Arrowgrass				S3S4	71	27.4 ± 0.0	NB
P	*Lilium canadense*	Canada Lily				S3S4	38	8.0 ± 0.0	NB
P	*Corallorhiza maculata*	Spotted Coralroot				S3S4	24	30.9 ± 10.0	NB
P	*Liparis loeselii*	Loesel's Twayblade				S3S4	33	10.7 ± 0.0	NB
P	*Neottia cordata*	Heart-leaved Twayblade				S3S4	18	11.7 ± 10.0	NB
P	*Platanthera obtusata*	Blunt-leaved Orchid				S3S4	24	40.6 ± 2.0	NB
P	*Calamagrostis pickeringii*	Pickering's Reed Grass				S3S4	49	25.0 ± 0.0	NB
P	*Calamagrostis stricta*	Slim-stemmed Reed Grass				S3S4	33	18.3 ± 2.0	NB
P	*Calamagrostis stricta ssp. stricta*	Slim-stemmed Reed Grass				S3S4	16	45.9 ± 0.0	NB
P	*Eragrostis pectinacea*	Tufted Love Grass				S3S4	6	4.2 ± 0.0	NB
P	*Stuckenia filiformis*	Thread-leaved Pondweed				S3S4	2	25.7 ± 1.0	NB
P	*Potamogeton praelongus*	White-stemmed Pondweed				S3S4	11	49.0 ± 0.0	NS
P	*Potamogeton richardsonii*	Richardson's Pondweed				S3S4	2	50.7 ± 0.0	NS
P	*Xyris montana*	Northern Yellow-Eyed-Grass				S3S4	328	17.4 ± 0.0	NB
P	*Cryptogramma stelleri*	Steller's Rockbrake				S3S4	2	76.1 ± 0.0	NB
P	*Asplenium viride*	Green Spleenwort				S3S4	18	41.9 ± 1.0	NB
P	*Dryopteris fragrans*	Fragrant Wood Fern				S3S4	79	34.5 ± 0.0	NB
P	*Equisetum palustre*	Marsh Horsetail				S3S4	2	69.1 ± 0.0	PE
P	*Polypodium appalachianum*	Appalachian Polypody				S3S4	28	32.8 ± 1.0	NB
P	*Montia fontana*	Water Blinks				SH	4	18.3 ± 1.0	NB
P	*Brachyelytrum erectum*	Bearded Shorthusk				SH	2	29.4 ± 2.0	NB
P	*Agalinis maritima*	Saltmarsh Agalinis				SX	2	66.1 ± 50.0	NB

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The recipient of these data shall acknowledge the AC CDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

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118	McAlpine, D.F. 1998. NBM Science Collections databases to 1998. New Brunswick Museum, Saint John NB, 241 recs.
116	Bagnell, B.A. 2001. New Brunswick Bryophyte Occurrences. B&B Botanical, Sussex, 478 recs.
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109	Stewart, J.I. 2010. Peregrine Falcon Surveys in New Brunswick, 2002-09. Canadian Wildlife Service, Sackville, 58 recs.
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100	Sollows, M.C,. 2008. NBM Science Collections databases: mammals. New Brunswick Museum, Saint John NB, download Jan. 2008, 4983 recs.
94	Tremblay, E. 2006. Kouchibouguac National Park Digital Database. Parks Canada, 105 recs.
91	Churchill, J.L. 2018. Atlantic Canada Conservation Data Centre Fieldwork 2018. Atlantic Canada Conservation Data Centre, 907 recs.
89	Mazerolle, D.M. 2018. Atlantic Canada Conservation Data Centre botanical fieldwork 2018. Atlantic Canada Conservation Data Centre, 13515 recs.
87	Newell, R.E. 2000. E.C. Smith Herbarium Database. Acadia University, Wolfville NS, 7139 recs.
83	Glen, W. 1991. 1991 Prince Edward Island Forest Biomass Inventory Data. PEI Dept of Energy and Forestry, 10059 recs.
77	Sollows, M.C,. 2009. NBM Science Collections databases: molluscs. New Brunswick Museum, Saint John NB, download Jan. 2009, 6951 recs (2957 in Atlantic Canada).
75	Scott, Fred W. 1998. Updated Status Report on the Cougar (Puma Concolor couguar) [Eastern population]. Committee on the Status of Endangered Wildlife in Canada, 298 recs.
73	Mazerolle, D.M. 2005. Bouctouche Irving Eco-Centre rare coastal plant fieldwork results 2004-05. Irving Eco-centre, la Dune du Bouctouche, 174 recs.
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71	Churchill, J.L.; Walker, J. 2017. Species at Risk Surveys at Correctional Services Canada Properties in Nova Scotia and New Brunswick. Atlantic Canada Conservation Data Centre.
71	Neily, T.H. 2017. Maritmes Lichen and Bryophyte records. Atlantic Canada Conservation Data Centre, 1015 recs.
68	Blaney, C.S.; Mazerolle, D.M.; Oberndorfer, E. 2007. Fieldwork 2007. Atlantic Canada Conservation Data Centre. Sackville NB, 13770 recs.
63	Benjamin, L.K. (compiler). 2007. Significant Habitat & Species Database. Nova Scotia Dept Natural Resources, 8439 recs.
63	Mazerolle, David. 2020. Botanical fieldwork 2020. Parks Canada.
63	Richardson, Leif. 2018. Maritimes Bombus records from various sources. Richardson, Leif.
62	Island Nature Trust. 2016. Farmland birds project. Mader, Shannon (ed.) .
60	Honeyman, K. 2019. Unique Areas Database, 2018. J.D. Irving Ltd.
58	MacDonald, M. 2008. PEI Power Corridor Floral Surveys, 2004-08. Jacques Whitford Ltd, 2238 recs (979 rare).
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56	Hinds, H.R. 1986. Notes on New Brunswick plant collections. Connell Memorial Herbarium, unpubl, 739 recs.
55	Neily, Tom. 2020. Lichen surveys for PEI Forested Landscapes Priority Place. Chapman, C.J. (ed.) Atlantic Canada Conservation Data Centre, 158 records.
54	Haughian, S.R. 2018. Description of Fuscopannaria leucosticta field work in 2017. New Brunswick Museum, 314 recs.
54	Klymko, J. 2016. Atlantic Canada Conservation Data Centre Fieldwork 2016. Atlantic Canada Conservation Data Centre.
53	Canadian Wildlife Service, Dartmouth. 2010. Piping Plover censuses 2007-09, 304 recs.
53	Klymko, John. 2022. Atlantic Canada Conservation Data Centre zoological fieldwork 2021. Atlantic Canada Conservation Data Centre.
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51	Blaney, C.S. 2000. Fieldwork 2000. Atlantic Canada Conservation Data Centre. Sackville NB, 1265 recs.
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51	Klymko, J.J.D. 2016. 2015 field data. Atlantic Canada Conservation Data Centre.
49	Erskine, A.J. 1999. Maritime Nest Records Scheme (MNRS) 1937-1999. Canadian Wildlife Service, Sackville, 313 recs.
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45	Askanas, H. 2016. New Brunswick Wood Turtle Database. New Brunswick Department of Energy and Resource Development.
45	Patrick, Allison. 2021. Animal and plant records from NCC properties from 2019 and 2020. Nature Conservancy Canada.
44	e-Butterfly. 2016. Export of Maritimes records and photos. Maxim Larrivee, Sambo Zhang (ed.) e-butterfly.org.
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44	Nussey, Pat & NCC staff. 2019. AEI tracked species records, 2016-2019. Chapman, C.J. (ed.) Atlantic Canada Conservation Data Centre, 333.
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39	Majka, C. 2009. Université de Moncton Insect Collection: Carabidae, Cerambycidae, Coccinellidae. Université de Moncton, 540 recs.
38	Thomas, P. 2018. CSC Dorchester Bobolink Survey. Environment Canada, Canadian Wildlife Service.
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34	Benedict, B. Connell Herbarium Specimen Database Download 2004. Connell Memorial Herbarium, University of New Brunswick. 2004.
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34	Scott, F.W. 2002. Nova Scotia Herpetofauna Atlas Database. Acadia University, Wolfville NS, 8856 recs.
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31	Jobin, C. & Clow, A., Van Dijk, J. 2019. Eastern Waterfan data, Mount Allison Fundy Field Camp 2019. Chapman, C.J. (ed.) Fundy National Park and Mount Allison University, 31 recs.
30	Blaney, C.S.; Mazerolle, D.M.; Belliveau, A.B. 2014. Atlantic Canada Conservation Data Centre Fieldwork 2014. Atlantic Canada Conservation Data Centre, # recs.
30	Cowie, F. 2007. Electrofishing Population Estimates 1979-98. Canadian Rivers Institute, 2698 recs.
29	Churchill, J.L., Klymko, J.D.D. 2016. Atlantic Canada Conservation Data Centre Fieldwork 2016. Atlantic Canada Conservation Data Centre.
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28	Goltz, J.P. 2012. Field Notes, 1989-2005. , 1091 recs.
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26	Pronych, G. & Wilson, A. 1993. Atlas of Rare Vascular Plants in Nova Scotia. Nova Scotia Museum, Halifax NS, I:1-168, II:169-331. 1446 recs.
24	Bateman, M.C. 2001. Coastal Waterfowl Surveys Database, 1965-2001. Canadian Wildlife Service, Sackville, 667 recs.
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24	Clayden, S.R. 2007. NBM Science Collections databases: vascular plants. New Brunswick Museum, Saint John NB, download Mar. 2007, 6914 recs.
24	Coursol, F. 2005. Dataset from New Brunswick fieldwork for Eriocaulon parkeri COSEWIC report. Coursol, Pers. comm. to C.S. Blaney, Aug 26. 110 recs.
24	Klymko, J. 2020. Atlantic Canada Conservation Data Centre zoological fieldwork 2019. Atlantic Canada Conservation Data Centre.
24	Klymko, J.J.D.; Robinson, S.L. 2014. 2013 field data. Atlantic Canada Conservation Data Centre.
23	Brunelle, P.-M. (compiler). 2009. ADIP/MDDS Odonata Database: data to 2006 inclusive. Atlantic Dragonfly Inventory Program (ADIP), 24200 recs.
23	Donell, R. 2008. Rare plant records from rare coastal plant project. Bouctouche Dune Irving Eco-centre. Pers. comm. to D.M. Mazerolle, 50 recs.
23	Epworth, W. 2013. Species at Risk records, 2013. Fort Folly Habitat Recovery Program, 27 recs.
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22	Chiasson, R. 2018. Breeding bird observations from NBWTF project. pers. comm. to S. Blaney.
22	Hinds, H.R. 1999. Connell Herbarium Database. University New Brunswick, Fredericton, 131 recs.
20	Beardmore, T. 2017. 2017 Butternut observations. Natural Resources Canada.
20	Kouchibouguac National Park, Natural Resource Conservation Sec. 1988. The Resources of Kouchibouguac National Park. Beach, H. (ed.) , 90 recs.
20	Mazerolle, M.J., Drolet, B., & Desrochers, A. 2001. Small Mammal Responses to Peat Mining of Southeastern Canadian Bogs. Can. J. Zool., 79:296-302. 21 recs.
20	Pike, E., Tingley, S. & Christie, D.S. 2000. Nature NB Listserve. University of New Brunswick, listserv.unb.ca/archives/naturenb. 68 recs.
20	Tingley, S. (compiler). 2001. Butterflies of New Brunswick. , Web site: www.geocities.com/Yosemite/8425/buttrfly. 142 recs.
19	Blaney, C.S.; Spicer, C.D.; Popma, T.M.; Hanel, C. 2002. Fieldwork 2002. Atlantic Canada Conservation Data Centre. Sackville NB, 2252 recs.
19	Godbout, V. 2002. SAR Inventory: Birds in Fort Beauséjour NHS. Parks Canada, Atlantic, SARINV02-01. 202 recs.
18	Doucet, D.A. 2007. Lepidopteran Records, 1988-2006. Doucet, 700 recs.
18	McMullin, R.T. 2015. Prince Edward Island's lichen biodiversity and proposed conservation status in a report prepared for the province of PEI. Biodiversity Institute of Ontario Herbarium, University of Guelph, 776 records.
18	Sabine, D.L. 2005. 2001 Freshwater Mussel Surveys. New Brunswick Dept of Natural Resources & Energy, 590 recs.
17	Belliveau, A.G. 2021. E.C. Smith Herbarium and Atlantic Canada Conservation Data Centre Fieldwork 2021. E.C. Smith Herbarium.
17	Blaney, C.S.; Spicer, C.D. 2001. Fieldwork 2001. Atlantic Canada Conservation Data Centre. Sackville NB, 981 recs.
17	Mazerolle, D. 2003. Assessment of Seaside Pinweed (Lechea maritima var. subcylindrica) in Southeastern New Brunswick. Irving Eco-centre, la Dune du Bouctouche, 18 recs.
17	Walker, J. 2017. Bird inventories at French River, NS, and Memramcook, NB, for Nature Conservancy of Canada. Pers. comm. to AC CDC.
17	Wilhelm, S.I. et al. 2019. Colonial Waterbird Database. Canadian Wildlife Service.
16	Allen, K. 2012. Rare plant spatial data from Pleasant Ridge cranberry farm. NB Deparment of Environment, Environmental Assessment Section, 39 recs.
16	Arsenault, M. 2019. Cormorant colony nest counts. PE Department of Communities, Land, and Environment.
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15	Belland, R.J. 1992. The Bryophytes of Kouchibouguac National Park. Parks Canada, Kouchibouguac NP, 101 pp. + map.
15	Caissie, A. Herbarium Records. Fundy National Park, Alma NB. 1961-1993.
15	Manthorne, A. 2019. Incidental aerial insectivore observations. Birds Canada.
14	Chapman, C.J. 2018. Atlantic Canada Conservation Data Centre botanical fieldwork 2018. Atlantic Canada Conservation Data Centre, 11171 recs.
14	Gagnon, J. 2004. Specimen data from 2002 visit to Prince Edward Island. , 104 recs.
14	Morton, L.D. & Savoie, M. 1983. The Mammals of Kouchibouguac National Park. Parks Canada Report prep. by Canadian Wildlife Service, Sackville, NB, Vols 1-4. 14 recs.
14	Roland, A.E. & Smith, E.C. 1969. The Flora of Nova Scotia, 1st Ed. Nova Scotia Museum, Halifax, 743pp.
13	Plissner, J.H. & Haig, S.M. 1997. 1996 International piping plover census. US Geological Survey, Corvallis OR, 231 pp.
13	Thomas, A.W. 1996. A preliminary atlas of the butterflies of New Brunswick. New Brunswick Museum.
12	Manthorne, A. 2014. MaritimesSwiftwatch Project database 2013-2014. Bird Studies Canada, Sackville NB, 326 recs.
12	McAlpine, D.F. 1983. Status & Conservation of Solution Caves in New Brunswick. New Brunswick Museum, Publications in Natural Science, no. 1, 28pp.
12	Munro, Marian K. Tracked lichen specimens, Nova Scotia Provincial Museum of Natural History Herbarium. Atlantic Canada Conservation Data Centre. 2019.
12	Wood Turtle (Glyptemys insculpta) Miramichi Watershed Synopsis 2013 Compiled by: Vladimir King Trajkovic, EPt Miramichi River Environmental Assessment Committee
12	Zinck, M. & Roland, A.E. 1998. Roland's Flora of Nova Scotia. Nova Scotia Museum, 3rd ed., rev. M. Zinck; 2 Vol., 1297 pp.
11	Canadian Wildlife Service, Atlantic Region. 2010. Piping Plover censuses 2006-09. , 35 recs.
11	Curley, F.R. 2005. PEF&W Collection 2003-04. PEI Fish & Wildlife Div., 716 recs.
11	Eaton, S. 2014. Nova Scotia Wood Turtle Database. Environment and Climate Change Canada, 4843 recs.
11	Edsall, J. 2001. Lepidopteran records in New Brunswick, 1997-99. , Pers. comm. to K.A. Bredin. 91 recs.
11	Holder, M.L.; Kingsley, A.L. 2000. Kinglsey and Holder observations from 2000 field work.
11	Klymko, J. Dataset of butterfly records at the New Brunswick Museum not yet accessioned by the museum. Atlantic Canada Conservation Data Centre. 2016.
11	Sollows, M.C. 2008. NBM Science Collections databases: herpetiles. New Brunswick Museum, Saint John NB, download Jan. 2008, 8636 recs.
11	Wissink, R. 2000. Rare Plants of Fundy: maps. Parks Canada, 20 recs.
10	Bateman, M.C. 2000. Waterfowl Brood Surveys Database, 1990-2000 . Canadian Wildlife Service, Sackville, unpublished data. 149 recs.

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10	Hall, R.A. 2003. NS Freshwater Mussel Fieldwork. Nova Scotia Dept Natural Resources, 189 recs.
10	Hinds, H.R. 1997. Vascular Plants of Cocagne Island. Connell Herbarium, UNB.
10	Klymko, J.J.D. 2018. 2017 field data. Atlantic Canada Conservation Data Centre.
10	Richardson, D., Anderson, F., Cameron, R, McMullin, T., Clayden, S. 2014. Field Work Report on Black Foam Lichen (Anzia colpodes). COSEWIC.
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10	Tremblay, E. 2001. Kouchibouguacis River Freshwater Mussel Data. Parks Canada, Kouchibouguac NP, 45 recs.
9	Amirault, D.L. 2000. Piping Plover Surveys, 1983-2000. Canadian Wildlife Service, Sackville, unpublished data. 70 recs.
9	Blaxley, Megan; Vinson, Neil. 2020. Peltigera hydrothyria records from a tributary of Lake Brook, Fundy National Park. Chapman-Lam, Colin J. (ed.) Fundy National Park, 9.
9	Downes, C. 1998-2000. Breeding Bird Survey Data. Canadian Wildlife Service, Ottawa, 111 recs.
9	Hall, R.A. 2001. S.. NS Freshwater Mussel Fieldwork. Nova Scotia Dept Natural Resources, 178 recs.
9	Klymko, J.J.D. 2016. 2014 field data. Atlantic Canada Conservation Data Centre.
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9	NatureServe Canada. 2018. iNaturalist Butterfly Data Export . iNaturalist.org and iNaturalist.ca.
9	Shortt, R. UNB specimen data for various tracked species formerly considered secure. Connell Memorial Herbarium, UNB, Fredericton NB. 2019.
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9	Webster, R.P. 2004. Lepidopteran Records for National Wildlife Areas in New Brunswick. Webster, 1101 recs.
9	Westwood, A., Staicer, C. 2016. Nova Scotia landbird Species at Risk observations. Dalhousie University.
8	Blaney, C.S. Miscellaneous specimens received by ACCDC (botany). Various persons. 2001-08.
8	Cowie, Faye. 2007. Surveyed Lakes in New Brunswick. Canadian Rivers Institute, 781 recs.
8	Harris, P. 2004. Plant records from 1997-2003. Island Nature Trust, Charlottetown PE, 71 recs.
8	Hinds, H.R. 1992. Rare Vascular Plants of Fundy National Park. , 10 recs.
8	Native Council of Prince Edward Island. 2019. Bat species and Bank Swallow observations at St. Chrysostome Wildlife Management Area, PEI. Native Council of Prince Edward Island.
8	Nature Trust of New Brunswick. 2021. Nature Trust of New Brunswick site inventory data submitted in April 2021. Nature Trust of New Brunswick, 2189 records.
8	Staicer, C. & Bliss, S.; Achenbach, L. 2017. Occurrences of tracked breeding birds in forested wetlands. , 303 records.
8	Trajkovic, V.K. 2017. Wood turtles inventroy miramichi watershed 2017. Miramichi River Environmental Action Committee, 22 records.
7	Kennedy, Joseph. 2010. New Brunswick Peregrine records, 2009. New Brunswick Dept Natural Resources, 19 recs (14 active).
7	LaPaix, R.W.; Crowell, M.J.; MacDonald, M.; Neily, T.D.; Quinn, G. 2017. Stantec Nova Scotia rare plant records, 2012-2016. Stantec Consulting.
7	Shortt, R. Connell Herbarium Black Ash specimens. University New Brunswick, Fredericton. 2019.
6	Atlantic Canada Bank Swallow Working Group. 2022. 2021 Bank Swallow colony records. Birds Canada.
6	Belliveau, A.G. 2018. E.C. Smith Herbarium and Atlantic Canada Conservation Data Centre Fieldwork 2018. E.C. Smith Herbarium, 6226 recs.
6	Benedict, B. Connell Herbarium Specimens, Digital photos. University New Brunswick, Fredericton. 2005.
6	Burns, L. 2013. Personal communication concerning bat occurrence on PEI. Winter 2013. Pers. comm.
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6	Elward, D. 2017. 2015-2016 Freshwater Mussel Inventories in the Bouctouche Watershed. Southeastern Anglers Association, 6 recs.
6	Gowan, S. 1980. The Lichens of Kouchibouguac National Park, Parts I (Macrolichens) & II (Microlichens). National Museum of Natural Sciences. Ottawa, ON, 7 recs.
6	Munro, Marian K. Nova Scotia Provincial Museum of Natural History Herbarium Database. Nova Scotia Provincial Museum of Natural History, Halifax, Nova Scotia. 2014.
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6	Oldham, M.J. 2000. Oldham database records from Maritime provinces. Oldham, M.J; ONHIC, 487 recs.
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5	Basquill, S.P. 2003. Fieldwork 2003. Atlantic Canada Conservation Data Centre, Sackville NB, 69 recs.
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5	Bastien, D. 2017. Rare Peatland plant observations. Pers. comm. to H. Askanas, New Brunswick Department of Energy and Resource Development.
5	Benedict, B. Connell Herbarium Specimens. University New Brunswick, Fredericton. 2000.
5	Carter, Jeff; Churchill, J.; Churchill, I.; Churchill, L. 2020. Bank Swallow colony Scots Bay, NS. Atlantic Canada Conservation Data Centre.
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5	Layberry, R.A. & Hall, P.W., LaFontaine, J.D. 1998. The Butterflies of Canada. University of Toronto Press. 280 pp+plates.
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5	Sabine, D.L. 2013. Dwaine Sabine butterfly records, 2009 and earlier.
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4	Daury, R.W. & Bateman, M.C. 1996. The Barrow's Goldeneye (Bucephala islandica) in the Atlantic Provinces and Maine. Canadian Wildlife Service, Sackville, 47pp.
4	Dept of Fisheries & Oceans. 1999. Status of Wild Striped Bass, & Interaction between Wild & Cultured Striped Bass in the Maritime Provinces. , Science Stock Status Report D3-22. 13 recs.
4	Doucet, D.A. & Edsall, J.; Brunelle, P.-M. 2007. Miramichi Watershed Rare Odonata Survey. New Brunswick ETF & WTF Report, 1211 recs.
4	Gravel, Mireille. 2010. Coordonnées des tortues des bois Salmon River Road, 2005. Kouchibouguac National Park, 4 recs.
4	Hicklin, P.W. 1995. The Maritime Shorebird Survey Newsletter. Calidris, No. 3. 6 recs.
4	King, Amelia. 2020. Belleisle Watershed Coalition Turtle Watch Data. Belleisle Watershed Coalition.

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4	NS DNR. 2017. Black Ash records from NS DNR Permanent Sample Plots (PSPs), 1965-2016. NS Dept of Natural Resources.
4	Olsen, R. Herbarium Specimens. Nova Scotia Agricultural College, Truro. 2003.
4	Phillips, B. 2017. Emails to John Klymko regarding Eastern Waterfan (Peltigera hydrothyria) occurrences in Fundy National Park. Fundy Biosphere Reserve, 3 recs.
4	Popma, K. 2001. Phalarope & other bird observations in Westmorland Co. , Pers. comm. to K.A. Bredin. 5 recs.
4	Powell, B.C. 1967. Female sexual cycles of Chrysemy spicta & Clemmys insculpta in Nova Scotia. Can. Field-Nat., 81:134-139. 26 recs.
4	Toms, B. 2018. Bat Species data from www.batconservation.ca for Nova Scotia. Mersey Tobeatic Research Institute, 547 Records.
4	Wisniowski, C. & Dowding, A. 2020. NB species occurrence data for 2020. Nature Trust of New Brunswick.
3	Basquill, S.P., Porter, C. 2019. Bryophyte and lichen specimens submitted to the E.C. Smith Herbarium. NS Department of Lands and Forestry.
3	Curley, F.R. 2007. PEF&W Collection. PEI Fish & Wildlife Div., 199 recs.
3	e-Butterfly. 2019. Export of Maritimes records and photos. McFarland, K. (ed.) e-butterfly.org.
3	eBird. 2021. eBird Basic Dataset. Version: EBD_relOct-2020. Ithaca, New York. Oct 2020, Prince Edward Island Bird SAR subset. Cornell Lab of Ornithology.
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3	Godbout, Valerié. 2010. Étude de l'Aster du Saint-Laurent dans le parc national Kouchibouguac, 2000-04. Parks Canada, 3 recs.
3	Golder Associates. 2018. Dorchester wind turbine bat detections. Owens, Luke, Firman, Mitch, Melcher, Heather (ed.) Golder Associates Ltd.
3	Goltz, J.P. & Bishop, G. 2005. Confidential supplement to Status Report on Prototype Quillwort (Isoetes prototypus). Committee on the Status of Endangered Wildlife in Canada, 111 recs.
3	Grondin, P. & Blouin, J-L., Bouchard, D.; et al. 1981. Description et cartographie de la vegetation du cordon littoral. Parc National de Kouchibouguac. Le Groupe Dryade, 57 pp.
3	Kennedy, Joseph. 2010. New Brunswick Peregrine records, 2010. New Brunswick Dept Natural Resources, 16 recs (11 active).
3	Klymko, J.J.D. 2012. Insect field work & submissions. Atlantic Canada Conservation Data Centre, 852 recs.
3	Neily, T.H. Tom Neily NS Sphagnum records (2009-2014). T.H. Neily, Atlantic Canada Conservation Data Centre. 2019.
3	Nye, T. 2002. Wood Turtle observations in Westmorland, Queens Cos. , Pers. com. to S.H. Gerriets, Dec. 3. 3 recs.
3	Ogden, K. Nova Scotia Museum butterfly specimen database. Nova Scotia Museum. 2017.
3	Richardson, D., Anderson, F., Cameron, R, Pepper, C., Clayden, S. 2015. Field Work Report on the Wrinkled Shingle lichen (Pannaria lurida). COSEWIC.
3	Sabine, M. 2016. Black Ash records from NB DNR permanent forest sampling Plots. New Brunswick Department of Natural Resources, 39 recs.
3	Sabine, M. 2016. Black Ash records from the NB DNR Forest Development Survey. New Brunswick Department of Natural Resources.
3	Sabine, M. 2016. NB DNR staff incidental Black Ash observations. New Brunswick Department of Natural Resources.
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