MORRISON HERSHFIELD

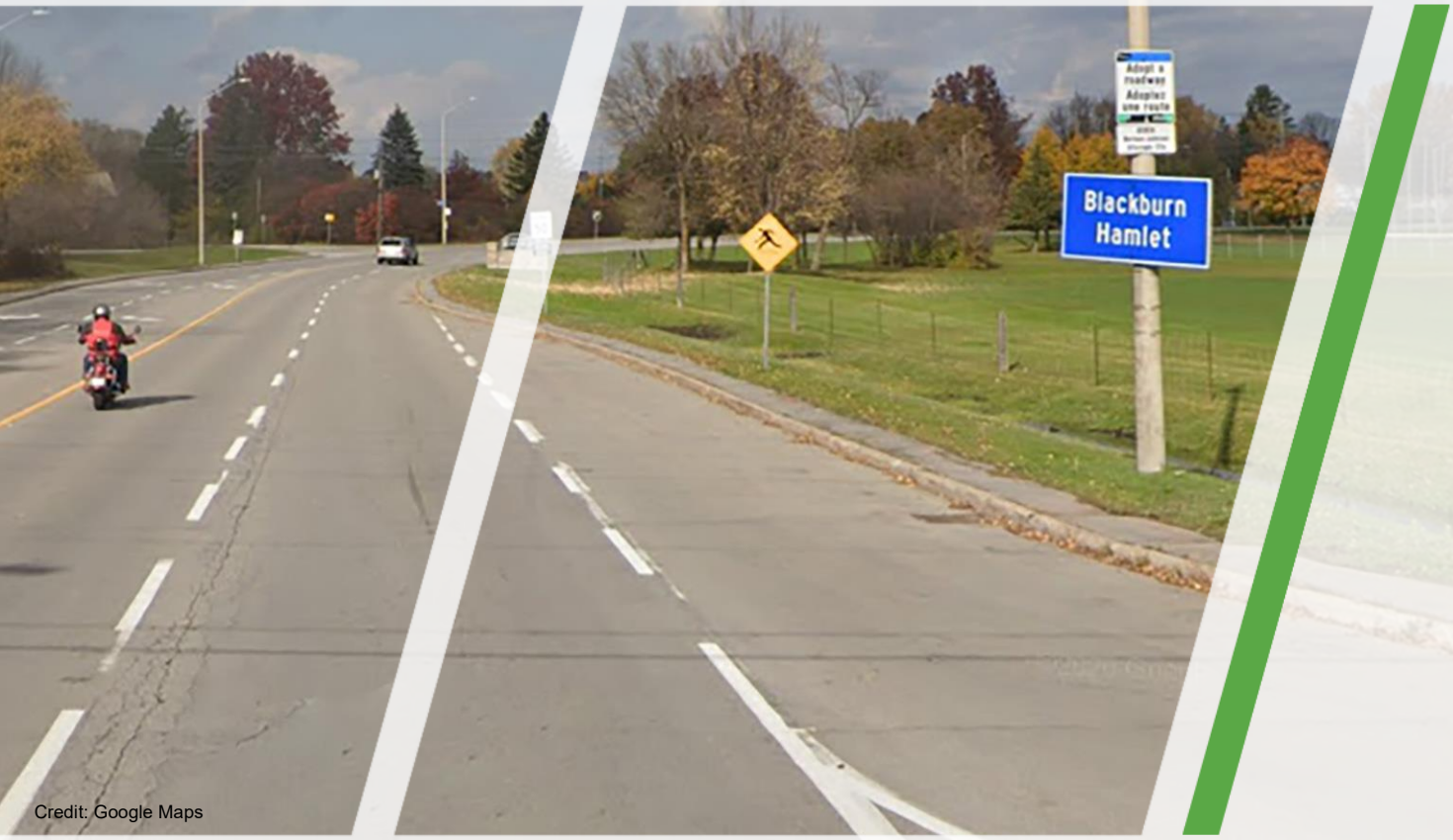
FINAL REPORT

Blackburn Hamlet Bypass & Innes Road Transit Priority Measures (Navan Road to Blair Road) Environmental Assessment Study

ENVIRONMENTAL STUDY REPORT

Presented to:

City of Ottawa
110 Laurier Avenue West
Ottawa, Ontario K1P 1J1



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Report No.: 2170355.01
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EXECUTIVE SUMMARY

The overall project objective is to undertake a Schedule "C' Municipal Class Environmental Assessment (EA) study to examine alternate solutions for the Blackburn Hamlet Bypass/Innes Road (Navan Road to Blair Road) Transit Priority corridor. This study considers the City of Ottawa's 2013 Transportation Master Plan (TMP) Affordable Network Plans.

The City of Ottawa has also undertaken a separate Schedule C Municipal Class EA study to examine alternate corridors for the Brian Coburn Boulevard Extension (BCBE) and Cumberland Transitway Westerly (CTW), considering the City of Ottawa's 2013 TMP Network Concept Plans (expected to be for post 2031 longer-term planning horizons), for both roads and transit. The 2013 Transportation Master Plan (TMP) identifies Blair Road, from the Blair Light Rail Transit (LRT) Station to Innes Road, as a transit priority corridor in the 2031 Affordable Network. An environmental assessment for the Blair Road transit priority corridor had been included in the Brian Coburn Boulevard Extension and Cumberland Transitway Environmental Assessment (BCBE/CTW EA). The Transit Priority measures undertaken for this EA were taken into consideration with regards to the BCBE and CTW project and can serve to facility Transit Priority (TP) measures in the near term quicker.

The study area for both EAs is illustrated in **Figure 0-1**.

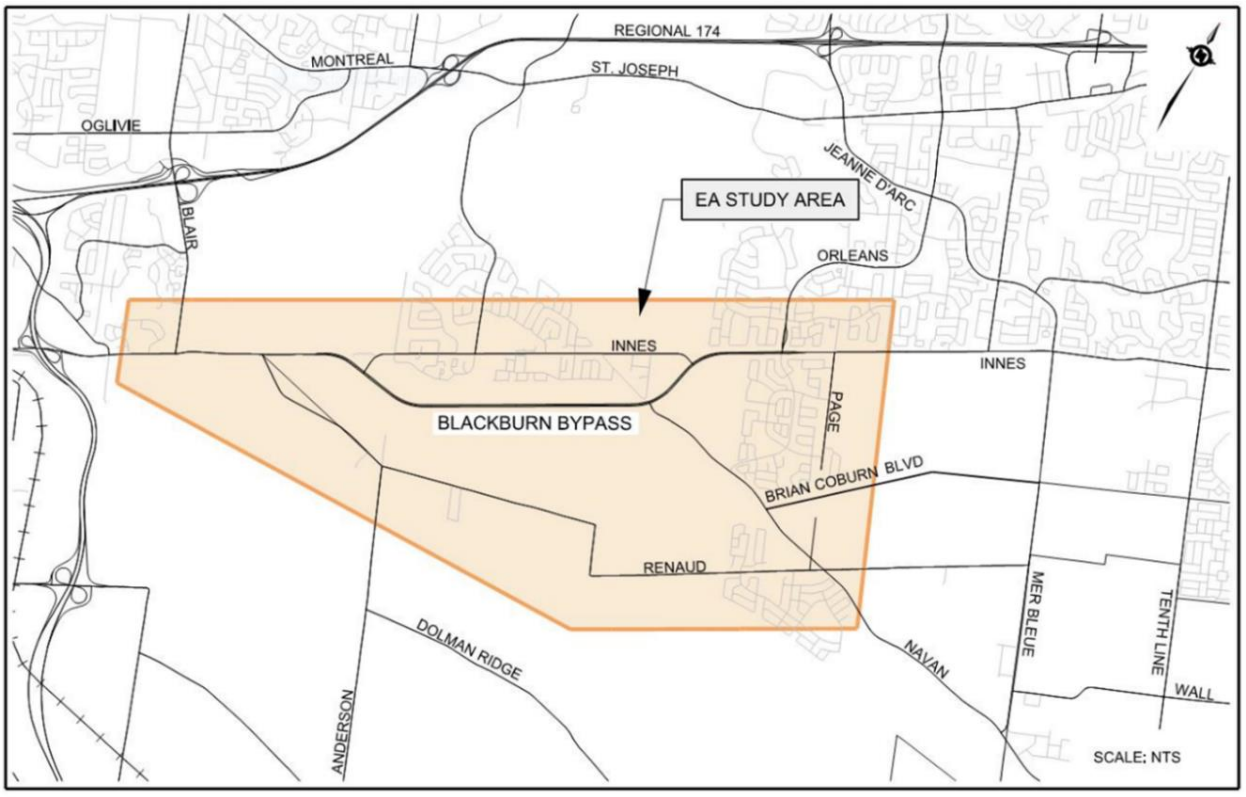

Figure 0-1: Study Area

Study Process

The study was undertaken in accordance with Schedule C of the Municipal Class EA, which is an approved process under the Ontario *Environmental Assessment Act* (1990). The process involved developing, assessing, and evaluating alternatives, leading to a Recommended Plan.

Consultation

Consultation included three rounds of meetings with the Agency Consultation Group (National Capital Commission; Ontario Ministry of Environment, Conservation and Parks; Ontario Ministry of Natural Resources and Forestry; Ontario Ministry of Heritage, Sport, Tourism and Culture Industries; Rideau Valley Conservation Authority; Hydro Ottawa; Hydro One; Transport Action Canada; Ottawa Police and various City Departments), and the combined Business and Public Consultation Group (landowners, businesses, community associations, interest groups). Additionally, three public open houses were held along with focused consultation with the National Capital Commission (NCC) due to the potential impacts to and requirement for NCC Greenbelt lands.

Indigenous peoples were also consulted in the form of email notices at various times during the study. The Mohawk Council of Akwesasne provided a verbal response that they did not have a need to participate in this study, and no further responses were received. Notices and information were sent. Indigenous peoples that were contacted throughout the study.

Project Need & Opportunity

The communities at the eastern limits of the City of Ottawa are projected to experience continued growth in both population and employment over the next several decades (City of Ottawa, 2003a). This growth will require appropriate and targeted transportation infrastructure for transit, auto and active transportation modes to accommodate this projected growth. The existing road network is currently at capacity, and it was determined that this condition will deteriorate unless improvements are made.

A re-examination of the need and a confirmation of the preferred alternative solution was undertaken as part of this study providing verification of the 2013 TMP assumptions and conclusions. The analysis supports the need for additional roadway capacity within the study area, as described in **Section 4**.

Localized Transit Priority measures are proposed to improve transit travel time and reliability and encourage a transit modal shift. **Figure 0-2** provides an overview of the two areas proposed for localized Transit Priority improvements which include widening of Innes Road for shared Transit Priority and High Occupancy Vehicle (HOV) lanes from the Blackburn Hamlet Bypass (BHBP) to Blair Road, approximately 2 km. The Transit Priority/HOV lanes also support carpooling, which is part of the City's transportation demand management strategy. New multi-use pathways (MUPs) are also included within the improvement areas to provide active transportation connectivity.

Typical Cross-Section

The typical cross-section for the Recommended Plan is shown facing east and just east of Mud Creek (**Figure 0-3**). The existing urban cross-section of Innes Road is maintained by keeping the existing raised median and lanes intact with proposed widening to the outside. Some property frontage is required to accommodate the north side MUP and grading.

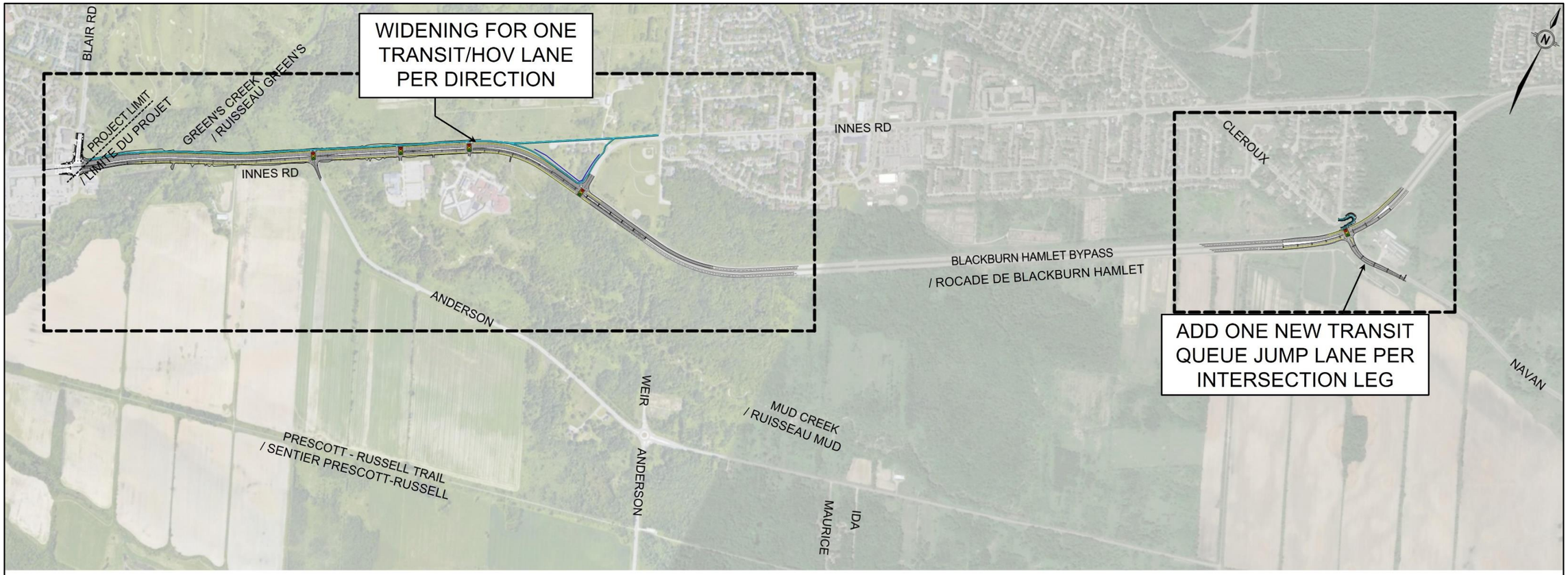

Figure 0-2: Recommended Plan Overview

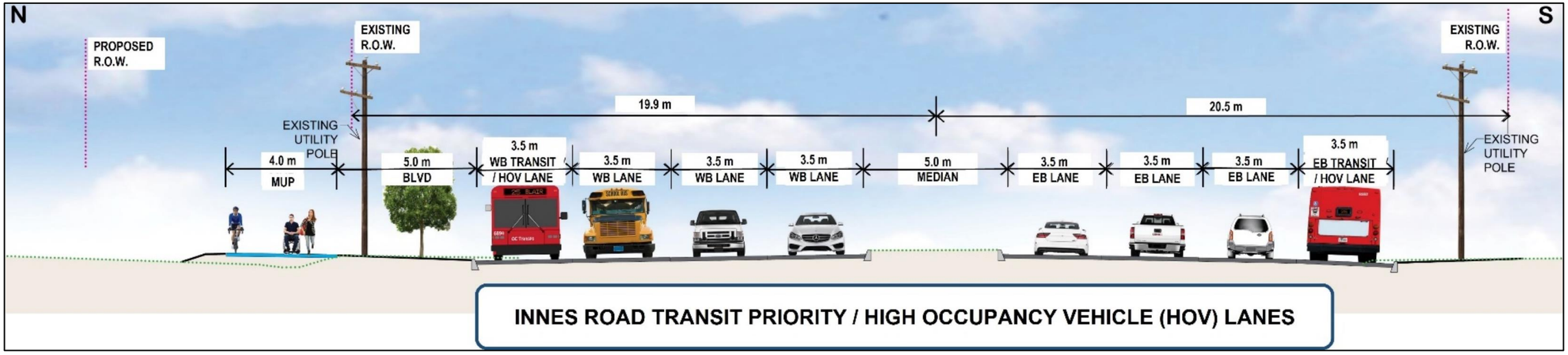

Figure 0-3: Recommended Plan Typical Cross-Section along Innes Road

Blackburn Hamlet Bypass & Navan Road Intersection

The Recommended Plan proposes new transit only queue-jump lanes on each leg of the Navan Road and BHBP intersection to help buses avoid congestion at these locations. A new MUP is proposed between the intersection and Cleroux Crescent to provide connectivity between the Blackburn Hamlet community and Navan Road towards the Chapel Hill transit station and beyond (**Figure 0-4**).

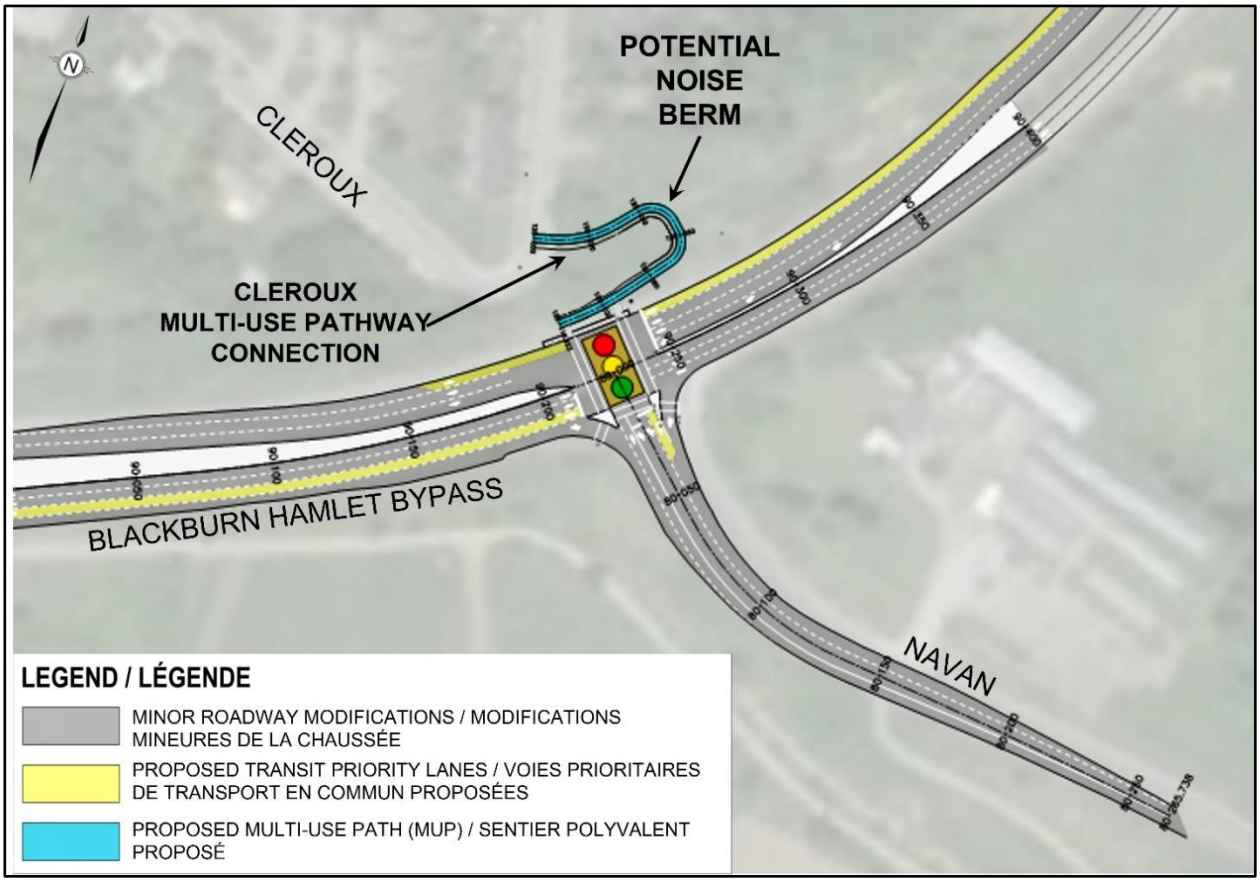

Figure 0-4: Recommended Plan - Blackburn Hamlet Bypass & Navan Road Intersection

Innes Road Between Blair Road & the Blackburn Hamlet Bypass

Between Blair Road and the BHBP, within the limits of the proposed shared Transit Priority and HOV lanes, the existing on-road cycling lanes along Innes Road will be replaced by a new north side 4 m MUP to accommodate Active Transportation users and serve as a bi-directional cycling facility (**Figure 0-5**). This new MUP will extend from Blair Road, connecting to Pepin Court and eventually to the Tauvette Street/Glen Park Drive/Innes Road intersection to provide connectivity to the Blackburn Hamlet community and a planned NCC pathway to the north. The MUP will also extend along Innes Road to the intersection at the BHBP and north along Innes Road.

A 3.0 m high noise wall is proposed along the south side of the residences located on the south side of Pepin Court. To provide safe access to the church property on Innes Road, new traffic control signals are proposed.

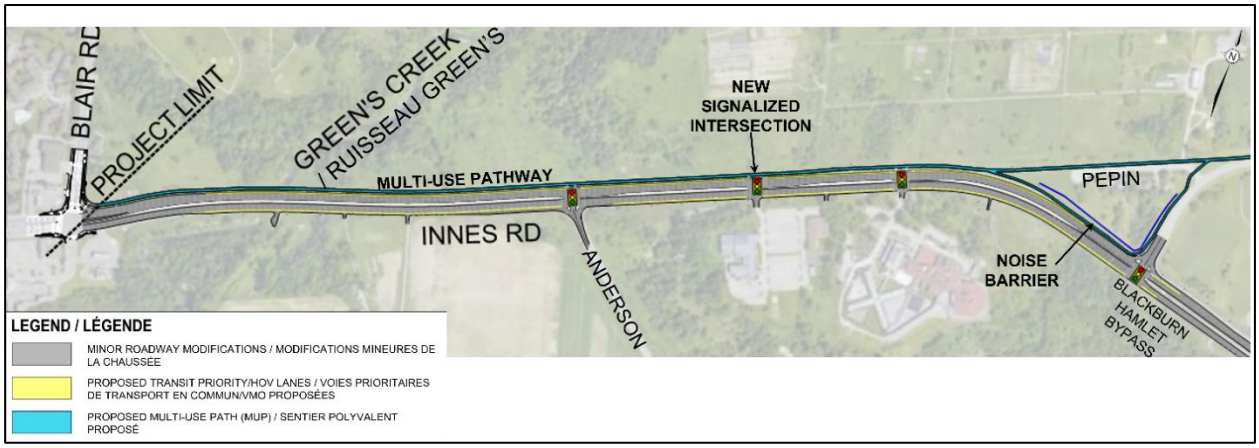

Figure 0-5: Recommended Plan Between Blair Road & Innes Road

Environmental Impacts

This project will be designed and implemented with the benefit of current planning, engineering, and environmental management practices with regard for the legislation, policies, regulations, guidelines, and best practices of the day. Mitigation measures will be prescribed in the construction contract documents and specifications. A summary of key environmental impacts and proposed mitigation measures is provided below.

Surface Water – Stormwater Management

This project will increase the impervious surfaces and will lead to recurring increases in stormwater runoff peak and volume following rain events with enough rainfall to generate runoff into adjacent watercourses. Runoff quality treatment and quantity control is proposed through one or more of: new perforated storm sewer systems under the widened sections of Innes Road; conversion of the median area to a Low Impact Development (LID) feature such as a rain garden or infiltration trench; oil and grit separators; and/or grass swales with rock check dams that will outlet from roadside catchbasins where the identified right-of-way allows.

Property Requirements

New road and transit right-of-way to accommodate the recommended plan will require property from federal landowners. Approximately 1.0 ha of land is required from the NCC for widening along Innes Road. Acquisition of NCC property will be negotiated by the City by means of land purchase, land exchange or land lease. Federal Land Use, Design and Transaction Approval (FLUDTA) will be required for NCC lands. A federal environmental impact assessment will also be required. Discussions will need to occur and be in accordance with the land uses at the time of planned construction.

Noise & Vibration

The Recommended Plan will result in increased noise levels within noise sensitive areas. Noise attenuating berms, walls, or a combination thereof, will be required and have been incorporated into the design.

A 3 m high barrier wall will be required to reduce noise levels at 2354 Pepin Court by 6 dBA.

Vibration levels are not expected to exceed the level commonly considered perceptible by most building occupants. Future vibration would also be negligible with respect to the risk of structural damages or cosmetic damages to building finishes.

Climate Change Mitigation & Adaptation

In December 2017, the Ministry of the Environment and Climate Change (MOECC) released guidelines titled “Considering Climate Change in the Environmental Assessment Process” which lay out the Ministry’s expectations for project proponents to consider including the potential effects of a project on climate change, and the potential effects of climate change on a project. The City of Ottawa’s Climate Change Master Plan lays out a framework to reduce greenhouse gas (GHG) emissions in accordance with Council’s reduction targets and respond to the current and future effects of climate change.

This EA considered the project’s potential impact on GHG emissions; assessed the resiliency or vulnerability of the project to changing climate conditions; and, identified potential climate change adaptations and future monitoring requirements based on regional climate and severe weather projections to 2050 and beyond.

Climate change presents both challenges and opportunities, particularly in relation to infrastructure design, implementation, and operations/maintenance. There are two categories of response to climate change risk, namely:

1. Mitigation refers to human interventions to reduce GHG emissions, and,

2. Adaptation refers to any activity designed to reduce the negative impacts of climate change and/or take advantage of new opportunities.

The recommended design provides new infrastructure for sustainable modes of active transportation and transit, while encouraging carpooling through HOV lanes, thus reducing greenhouse gas emissions. The landscaping plan will include offsetting of any loss of existing trees and vegetation, which will ensure that study area planting continues to provide a carbon sink.

Some of the potential hazards identified for this project include extreme rain impacts to the roadway/transitway, bridges, and culverts; freezing rain impacts to overhead wires, roadways, and walkways; extreme heat impacts to public health; and extreme wind impacts to landscaping, and emergency access routes. To mitigate these impacts, adaptation options for the project may include engineering and technological solutions, as well as policy, planning, management, and maintenance approaches.

Examples of potential climate related hazards and risk treatment options for the project include: more frequent severe storm events with increased runoff of roadway drainage may require larger roadside ditches and/or storm sewers; more frequent severe storm events may affect creek/channel erosion and slope stability requiring additional protection measures, monitoring and maintenance; and, increased frequency of extreme heat days may require additional shading and/or landscaping protection at bus stops along Innes Road.

It is recommended that additional climate lens assessment be undertaken and that climate change adaptation measures be considered during detail design including those related to flood design, stormwater management, selection of plant species for landscaping and erosion

protection. To account for increases in rainfall intensities due to climate change the design of culverts should be based on projected future rainfall events and the design of storm sewers should be checked against the 100-year storm plus 20%.

It is also proposed that sustainable design principles be followed including consideration of low carbon material selection and sourcing which should be based on a GHG emissions assessment of the project based on the City's carbon calculator or similar tool.

Future Commitments

This Environmental Study Report under the *Ontario Environmental Assessment Act, R.S.O. 1990* does not constitute approval under other legislation required to construct the project. Additional federal, provincial, and municipal project specific approvals will be required for components of the project moving forward.

Although this EA study is following the *Ontario Environmental Assessment Act, R.S.O. 1990* and NCC approval is not required for this legislated process, NCC approval will be required during implementation of the Recommended Plan since it is subject to the "*Federal Land Use, Design and Transaction Approval Process"* and the Canadian *Impact Assessment Act.*

Financial Considerations

Project costs were developed in accordance with the Council-approved Project Delivery Review and Cost Estimating process for implementing capital projects. Cost for design, construction, property, public art, and contingencies in 2023 dollars is estimated at $25M for the recommended plan.

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LIST OF ACRONYMS

Acronym	Definition
ACG	Agency Consultation Group
AODA	Accessibility for Ontarians with Disabilities Act
BCBE	Brian Coburn Boulevard Extension
BHBP	Blackburn Hamlet Bypass
BHBPE	Blackburn Hamlet Bypass Extension
CTW	Cumberland Transitway Westerly
DFO	Department of Fisheries and Oceans Canada
EA	Environmental Assessment
EA Act	*Ontario Environmental Assessment Act* Revised Statute of Ontario (R.S.O.) 1990
ECCC	Environment and Climate Change Canada
ELC	Ecological Land Classification
ERIS	Environmental Risk Information Services/Environmental Risk Limited Partnership
ESA	*Endangered Species Act*
ESR	Environmental Study Report
EUC	East Urban Community
FLUDTA	Federal Land Use, Design and Transaction Approval
FOD7	Fresh Moist Lowland Deciduous Forest classification in the Ecological Land Classification system
GCL-1	Golf Course classification in the Ecological Land Classification system
GCMs	Global Climate Models
GIS	Geographic Information System
GWE	Gradient Wind Engineers and Scientists
GMP	Greenbelt Master Plan
HLUI	Historic Land Use Inventory
HOV	High Occupancy Vehicle
IAA	*Impact Assessment Act*
IDF	Intensity Duration Frequency
IPCC	Intergovernmental Panel on Climate Change
JTBES	JTB Environmental Systems Inc.
LIO	Land Information Ontario
LRT	Light Rail Transit
MASM1-1	Mineral Shallow Marsh Classification in the ELC System
MASM1-12	Common Reed Mineral Shallow Marsh Classification in the ELC System

Acronym	Definition
MBCA	Migratory Birds Convention Act
MCEA	Municipal Class Environmental Assessment
MECP	Ministry of the Environment, Conservation and Parks
MEM	Mixed Meadow classification in the Ecological Land Classification system
MH	Morrison Hershfield Limited
MHSTCI	Ontario Ministry of Heritage, Sport, Tourism and Culture Industries
MECP	Ontario Ministry of Environment, Conservation and Parks (Formerly Ministry of the Environment/Ministry of the Environment and Climate Change (MOECC)
MTC	Ontario Ministry of Tourism and Culture (also see MHSTCI)
MUP	Multi-Use Pathway
NCC	National Capital Commission
NCR	National Capital Region
n.d.	No date
MNRF	Ontario Ministry of Natural Resources and Forestry
NHIC	Natural Heritage Information Centre
NPC	Noise Pollution Control
NSSP	Non-Standard Special Provision
OCP	Ottawa Cycling Plan
O.Reg.	Ontario Regulation
OMAFRA	Ontario Ministry of Agriculture, Food and Rural Affairs
OP	Official Plan
OPA	Official Plan Amendment
OPSD	Ontario Provincial Specification Division
OPSS	Ontario Provincial Standard Specification
OR	Ottawa Road
P/BCG	Public and Business Consultation Group
PFCC	Plan for Canada’s Capital
PoE	Pathways of Effects
PPS	Provincial Policy Statement
PSW	Provincially Significant Wetland
PVD SHLD	Paved Shoulder
RCP	Representative Concentration Pathway
ROW	Right-of-Way
RSC/R.S.C.	Revised Statutes of Canada
RSI	Risk Sciences International

Acronym	Definition
RSO/R.S.O.	Revised Statutes of Ontario
RVCA	Rideau Valley Conservation Authority
S/W	Sidewalk
SAR	Species at Risk (Canada)
SARA	*Species at Risk Act*
SN	Structure Number
SOP	Standard Operating Practice
SWLK	Sidewalk
TDM	Travel Demand Management
THD	Deciduous Thicket Classification in the Ecological Land Classification System
TMP	Transportation Master Plan
TOD	Transit-Oriented Development
TPAP	Transit Project Assessment Process
TSM	Transportation System Management
TSSA	Technical Standards and Safety Authority
UNA	Urban Natural Areas
UNC	Ultimate Network Concept
WEF	Wildlife Exclusion Fencing

1. INTRODUCTION

1.1 Purpose of the Project

The overall project objective is to undertake a Schedule "C' Municipal Class Environmental Assessment (EA) study to examine alternate Transit Priority solutions for the Blackburn Hamlet Bypass/Innes Road (Navan Road to Blair Road) corridor. This EA was considered in parallel with the larger Brian Colburn EA study. This study considers the City of Ottawa's 2013 Transportation Master Plan (TMP) Affordable Network and Concept Plans. The study process has included both stakeholder and public consultation.

This Transit Priority EA study was undertaken in conjunction with a separate City of Ottawa Schedule "C" Municipal Class EA study to examine alternate corridors for the Brian Coburn Boulevard Extension (BCBE) and Cumberland Transitway Westerly (CTW), considering the City of Ottawa's 2013 TMP Network Concept Plans (expected to be for post 2031 longer-term planning horizons), for both roads and transit.

1.2 Project Background

The EA for the four-lane Blackburn Hamlet Bypass Extension (BHBPE) from the Blackburn Hamlet Bypass (BHBP) to Trim Road was completed and approved in 1999. The BHBPE east of Navan Road has been renamed to Brian Coburn Boulevard and a two-lane road is already built east of Navan Road. The 2013 TMP identified the section from Navan Road to the Blackburn Hamlet Bypass as a Phase 2 project (2020-2025) with retention of its original name (BHBPE). This section of new roadway is now referred to as the Brian Coburn Boulevard Extension (BCBE).

A recent geotechnical analysis concluded that the soil conditions are very poor in the vicinity of the originally planned BHBPE (Blackburn Hamlet Bypass to Navan Road). To construct the roadway as planned would require a quadrupling of the existing budget envelope from $17.5M to $70M. This planned roadway corridor is no longer considered affordable within the 2031 planning horizon and therefore a more cost-effective alternate corridor was needed with further consideration of affordable near-term alternatives. Similarly, an alternate corridor for the Cumberland Transitway in this vicinity needed to be developed because a change in the location of the roadway has ramifications for the location of the future Transitway corridor. In response, the City's Transportation Committee (February 2017) approved the undertaking of an EA, referred to as the *Brian Coburn Boulevard Extension and Cumberland Transitway Westerly Alternate Corridor EA Study (the BCBE/CTW EA Study)*, following Schedule C of the Municipal Class Environmental Assessment. Also included in the overall scope was a review of low-cost Transit Priority Measures, for earlier implementation, subject to the City's future capital budget priorities and affordability, which is the subject of this EA study.

While a separate Environmental Study Report has been prepared for the BCBE/CTW EA Study, much of the documentation included in the Blackburn Hamlet Bypass/Innes Road (Navan Road to Blair Road) Transit Priority Measures EA Study is shared with the BCBE/CTW EA Study as the work was conducted concurrently for both sets of improvements.

The overall study limits for both the BCBE/CTW EA Study and the review of Transit Priority Measures extend from Blair Road at Innes Road in the west, to east of Brian Coburn Boulevard at Navan Road and south to Anderson Road/Renaud Road to allow for a full range of alternatives to be examined (Figure 1-1).

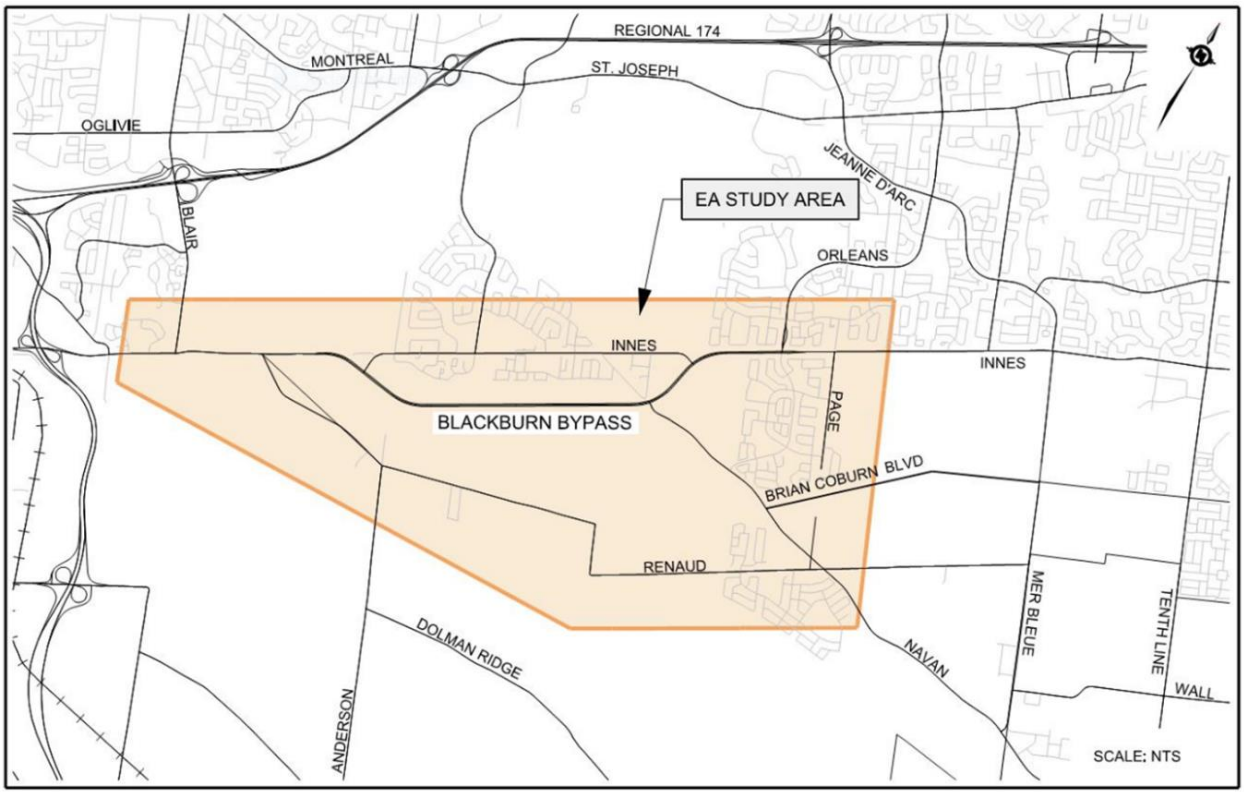

Figure 1-1: Study Area

1.3 Previous Environmental Assessments

1.3.1 Blackburn Hamlet Bypass Extension Environmental Assessment (1999)

The original Class Environmental Assessment for the four-lane Blackburn Hamlet Bypass Extension from the Blackburn Hamlet Bypass to Trim Road was completed and approved in 1999 (**Figure 1-2**). Similar to the Cumberland Transitway (Delcan, 1999b), the rationale for this project was to address the future transportation issues that would arise as a result of development of the East Urban Community Expansion Area and to identify land and corridor opportunities that may not be available in the future due to development. The benefits of protecting land at that time for future transportation uses was to provide for a multi-modal transportation spine through the East Urban Community and to release future development lands that were being held for appropriate transportation infrastructure to serve the developing community.

Key background studies were carried out which determined the need for the BHBPE to meet projected travel demand and transportation system capacity issues related to the East Urban Community.

As part of the 1999 EA, the recommended design of the BHBPE started from the eastern end of the Blackburn Hamlet Bypass and extended east along the base of the Navan Road Escarpment within NCC Greenbelt lands. Orléans Boulevard was also extended west and south going over the transitway before connecting with the BHBPE. The BHBPE corridor then continued southeasterly across the hydro corridor, following the existing hydro-corridor to the east. The EA also included the section of the Brian Coburn Boulevard recently built between Navan Road and Trim Road.

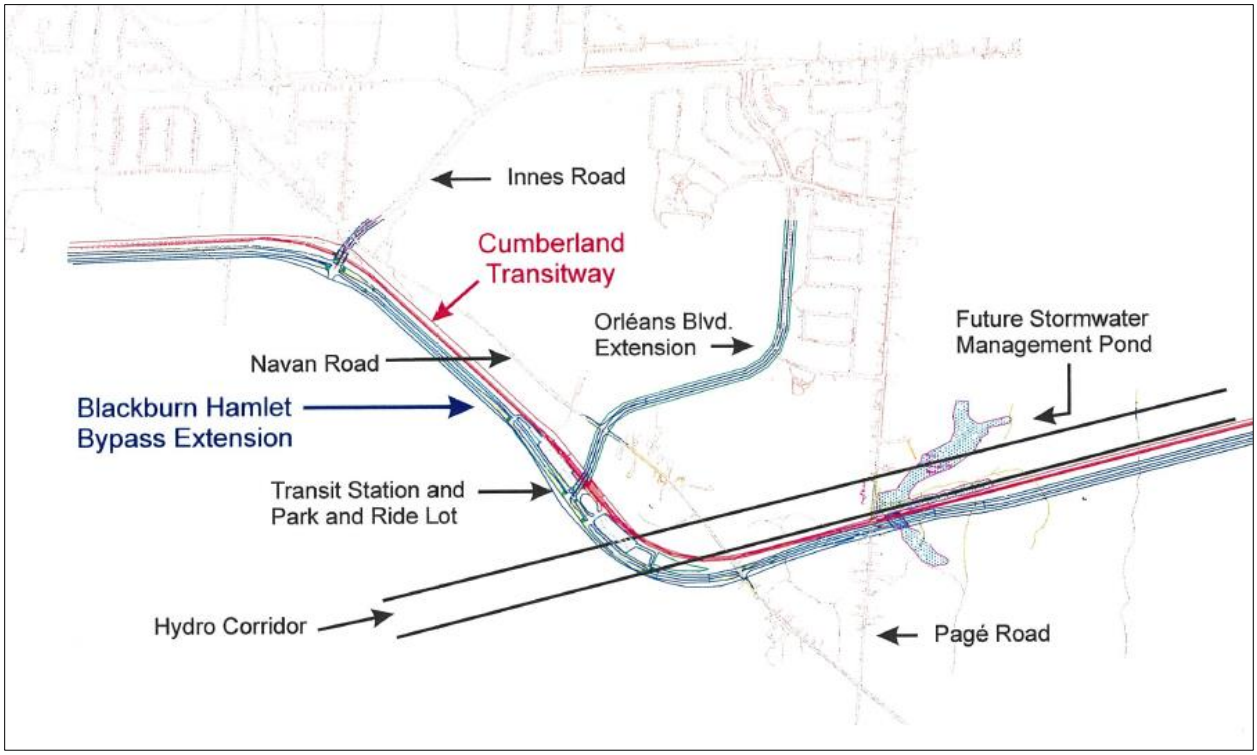

Figure 1-2: BHBPE/Cumberland Transitway Plans (1999)

1.3.2 Cumberland Transitway Environmental Assessment (1999)

In 1999, an Environmental Assessment study was approved for the Cumberland Transitway from the Blackburn Hamlet Bypass to Frank Kenny Road, following an Individual EA process. The EA for Cumberland Transitway was undertaken at the same time as the Blackburn Hamlet Bypass Extension EA because of its similar alignment, which runs adjacent and parallel to the Bypass (**Figure 1-2**).

The rationale for the 1999 Cumberland Transitway EA Study was to identify land required and corridor opportunities that would not be available in upcoming years due to future development pressures and to solve a projected future transportation issue. The Cumberland Transitway objective was to address the future transit needs of the East Urban Community Expansion Area, which was projected to have an additional 38,000 – 40,000 residential units by 2011. Two concurrent EA studies carried out in the late 1990s identified the future travel demand and transportation system capacity in the East Urban Community and determined that there was a significant need for improved transportation infrastructure in this location. The Cumberland Transitway was planned to address and alleviate this future transit need and encourage increased ridership.

1.3.3 Innes – Walkley – Hunt Club Connection & Hunt Club Road/Highway 417 Interchange Environmental Assessment Study (2008)

The harmonized federal/provincial EA Study for the Innes-Walkley-Hunt Club Connection and the Hunt Club Road/Highway 417 Interchange was completed in 2008 (**Figure 1-3**). The Innes-Walkley-Hunt Club Connection is a future roadway through the National Capital Commission (NCC) Greenbelt linking the City of Ottawa's East Urban Community to the South Urban Community with a new interchange accessing Highway 417 at an extension of Hunt Club Road and a new intersection on Innes Road east of Blair Road.

The Hunt Club Road Extension to and interchange with Highway 417 has been constructed. The City of Ottawa's 2013 TMP shows the Innes-Walkley-Hunt Club connection as part of the City's Road Network Concept Plan with implementation post 2031. The TMP gives the rationale for this project as providing a bypass of the congested section of Innes Road as well as a direct connection between Orléans and Hunt Club.

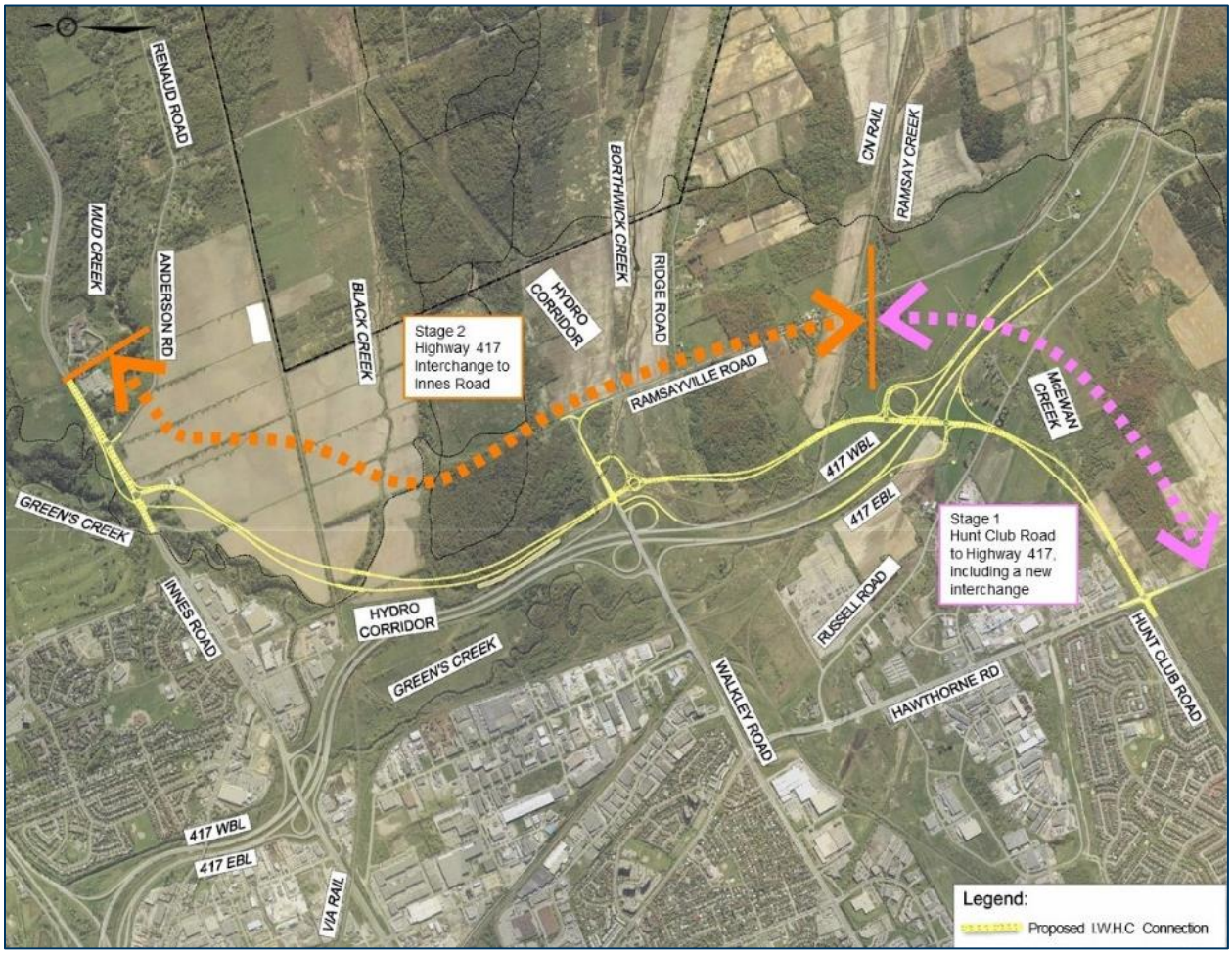

Figure 1-3: Recommended Plan for Innes-Walkley-Hunt Club Connection (2008)

1.3.4 Hospital Link & Cumberland Transitway Westerly Environmental Assessment Study (2011)

The City of Ottawa initiated an EA Study for the Hospital Link and Cumberland Transitway Westerly in 2009. The EA Study (completed in 2011) included the western portion of the Cumberland Transitway from Blair Station at Ottawa Road (OR) 174 to west of Navan Road (**Figure 1-4** to **Figure 1-6**).

Figure 1-4: Recommended Plan Cumberland Transitway Westerly, Blair Road - Innes Road to Blair Station (2011)

Figure 1-5: Recommended Plan Cumberland Transitway Westerly, Blair Road to Blackburn Hamlet Bypass (2011)

Figure 1-6: Recommended Plan Cumberland Transitway Westerly, Blackburn Hamlet Bypass (2011)

1.3.5 Blair Road Transit Priority (Innes Road to Blair LRT Station) Environmental Assessment (2011)

The 2013 Transportation Master Plan (TMP) identifies Blair Road, from the Blair Light Rail Transit (LRT) Station to Innes Road, as a transit priority corridor in the 2031 Affordable Network. An environmental assessment for the Blair Road transit priority corridor had been included in the ongoing Brian Coburn Boulevard Extension and Cumberland Transitway Environmental Assessment (BCE/CTW EA) study due to the proximity and transit system continuity. As the BCE/CTW EA study had become increasingly more complex, on April 22, 2020, the City of Ottawa Council approved a motion to separate out the Blair Road portion from the BCE/CTW EA study as a stand-alone project. This approximately two-kilometre section of Blair Road is shown in (**Figure 1-7**).

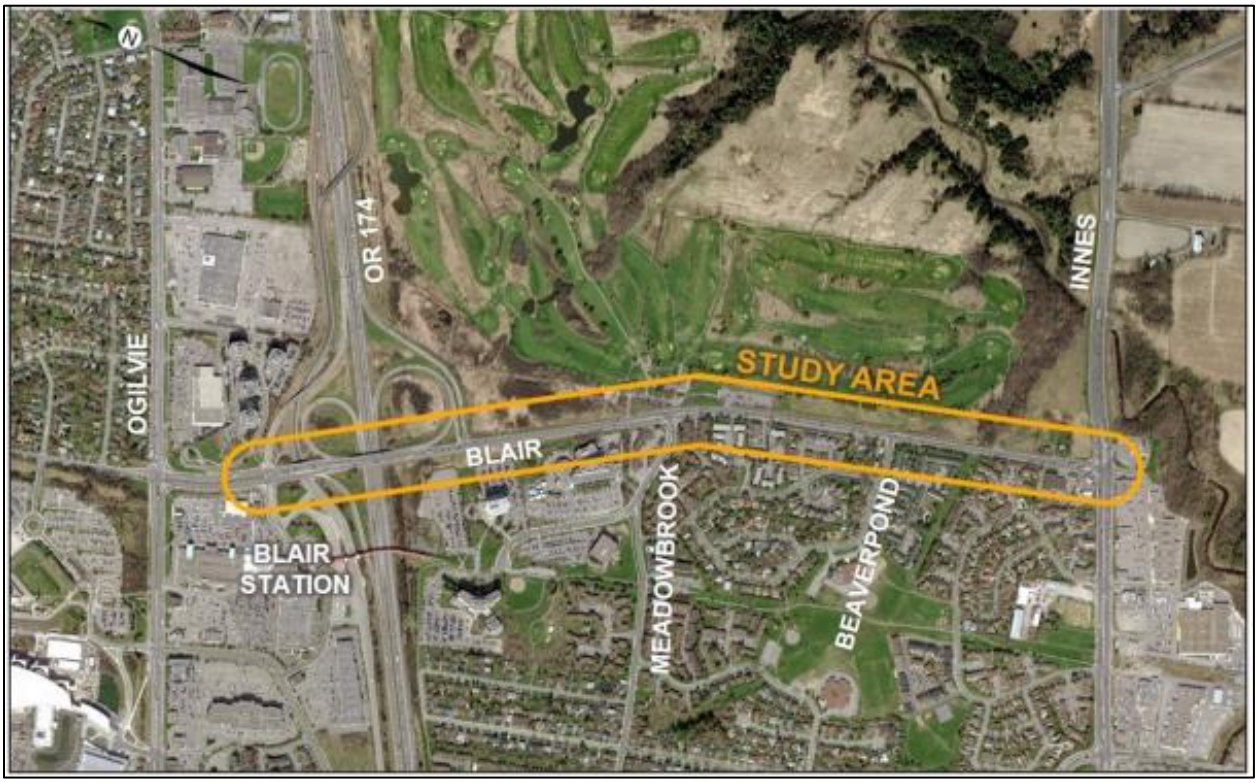

Figure 1-7: Blair Road Transit Priority EA Study Area (2021)

The study was undertaken in accordance with Schedule C of the Municipal Class Environmental Assessment (MCEA), which is an approved process under the Ontario Environmental Assessment Act. The process involved developing, assessing, and evaluating alternatives, leading to a Recommended Plan. Consultation included two rounds of meetings with an Agency Consultation Group and a combined Business and Public Consultation Group. Additionally, two public open houses were held along with focused consultation with the NCC because of the impacts to and requirement for NCC Greenbelt lands.

The southern extent of the Blair Road EA study limits overlaps with the northwestern extent of the Blackburn Hamlet Bypass/Innes Road (Navan Road to Blair Road) Transit Priority Environmental Assessment Study.

1.4 Report Organization

The remainder of this report is organized as follows:

Section 2: Study Process: Describes the legislative and planning processes that provide an outline for the study including the necessary consultation to gather comments from the general public, and stakeholders throughout the Study.

Section 3: Consultation: Documents the consultation undertaken for the Study in accordance with the requirements for a Schedule C Project under the Municipal Class Environmental Assessment (MCEA) Process.

Section 4: Project Need & Opportunities: Describes the development opportunities as they relate to the City of Ottawa Official Plan and Transportation Master Plan. This review examines the future roadway needs associated with the TMP's Affordable Network and Network Road Concept scenarios. The project needs are summarized based on current and projected travel demands within the study area and associated screenlines.

Section 5: Existing Environmental Conditions: Describes the existing environmental setting within the study area, including an overview of the existing environment conditions: natural, social, cultural, built, and economic.

Section 6: Identification & Evaluation of Alternative Solutions: highlights the City of Ottawa Vision and Policies, goals of the project, and planning principles and design criteria. Additionally, a description of the alternative corridors and their evaluation process, is detailed.

Section 7: Identification & Evaluation of Alternative Designs: outlines the process for the development of the alternative designs and an assessment of their transportation performance and effects on the components of the environment. The evaluation process for the selection of the preliminary preferred design alternative is described as well as any refinements undertaken.

Section 8: Recommended Plan: describes the recommended plan for the Blackburn Hamlet Bypass/Innes Road (Navan Road to Blair Road at Innes Road) Transit Priority Corridor. The Recommended Plan documents the horizontal and vertical alignment of the roadway and documents other relevant elements such as development connections, and pedestrian and cycling routes.

Section 9: Assessment & Evaluation of Impacts: Identifies municipal, provincial, and federal approvals or permits that may be required for implementation of the Blackburn Hamlet Bypass/ Innes Road (Navan Road to Blair Road) Transit Priority Environmental Assessment Study. Additionally, potential mechanisms for modifying the Recommended Plan for the transit project are provided. Follow-up and monitoring requirements are also detailed in this section.

Section 10: Future Commitments: Outlines the next steps committed to, including finalizing needed property acquisitions; construction and implementation timing; developing design details; completing a road safety audit; and securing federal, provincial, and municipal permit approvals.

Section 11: Conclusions: Provides a concise overview of the scope of the project.

2. STUDY PROCESS

2.1 Ontario Environmental Assessment Act, R.S.O. 1990

The purpose of the *Ontario Environmental Assessment Act RSO 1990 (*EA Act*)* is to help protect and conserve Ontario's environment by ensuring that projects subject to the Act follow a planning process leading to environmentally sound decision-making. An environmental assessment involves identifying and planning for environmental issues and effects prior to implementing a project. The process allows for opportunities for public involvement in the decision-making process of the project. The planning and assessment process is summarized in an Environmental Study Report (ESR) prepared by the proponent of the project and is subject to review by the public and government agencies.

This Study followed a Schedule C Municipal Class EA process (**Figure 2-1**), with thorough stakeholder consultation: Public, Agency, Business Consultation Groups; Public Open Houses; and Indigenous peoples contacts. Deliverables include environmental and engineering technical studies, consultation materials, EA documents, recommended plans and capital cost of the project. During the study, the Municipal Class EA was updated (2023). The update conditionally exempts certain low-risk, routine municipal road, water, and wastewater projects from requiring an environmental assessment to better align assessment requirements with potential environmental impacts. These exemptions were intended to reduce duplication and streamline the process for municipal projects, while maintaining strong environmental oversight and protection. The changes do not affect the planning and assessment for this project and the process has been undertaken and documented to address the requirements for a Schedule C project.

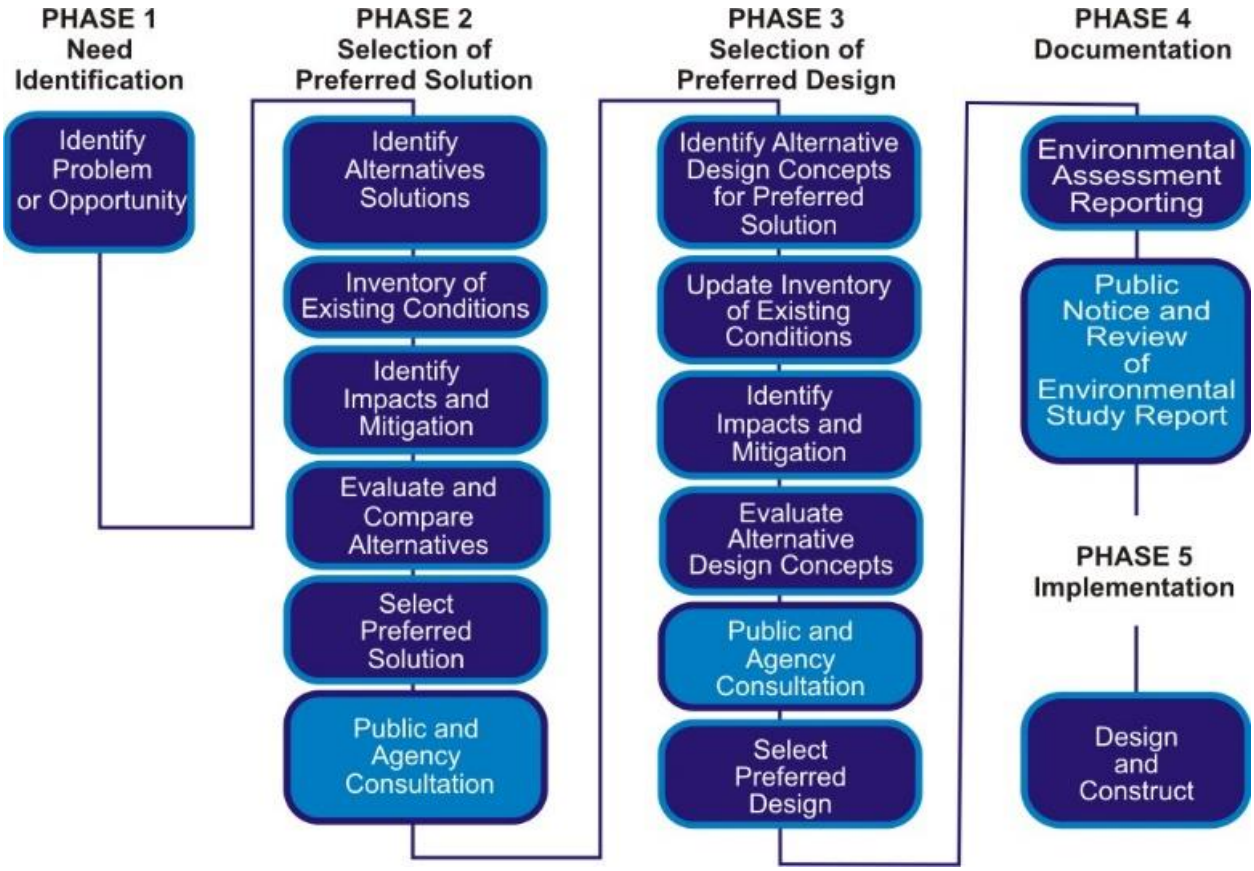

Figure 2-1: Municipal Class EA Process

As part of Phase 4 of the Municipal Class Schedule C Process, the EA study results have been documented via this Environmental Study Report. The report has been made available for public review. During the final review period, there will be an opportunity for an individual or group to provide a written submission to the Minister of the Environment, Conservation and Parks. A request for a Part II Order requiring a higher level of study (i.e., requiring an individual/ comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies), may be made to the Ministry of the Environment, Conservation and Parks but only on the grounds that the requested Order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered.

2.2 Impact Assessment Act, 2019

The purpose of the *Impact Assessment Act, 2019* is to provide a process for assessing the environmental, health, social and economic effects of designated projects with a view to preventing certain adverse effects and fostering sustainability. Additionally, the Act serves to:

- Promote cooperation and coordinated action between federal and provincial governments with respect to environmental assessments,
- Ensure that impact assessments of designated projects take into account all effects, both positive and adverse, that may be caused by the carrying out of designated projects, and
- To promote communication and cooperation with Indigenous Peoples of Canada with respect to impact assessments, amongst others

Under Section 82 of the *Impact Assessment Act (IAA),* 2019:

> "An authority must not carry out a project on federal lands, exercise any power or perform any duty or function conferred on it under any Act of Parliament other than this Act that could permit a project to be carried out, in whole or in part, on federal lands or provide financial assistance to any person for the purpose of enabling that project to be carried out, in whole or in part, on federal lands, unless (a) the authority determines that the carrying out of the project is not likely to cause significant adverse environmental effects; or (b) the authority determines that the carrying out of the project is likely to cause significant adverse environmental effects and the Governor in Council decides, under subsection 90(3), that those effects are justified in the circumstances."

As federal lands may be required for various phases of project completion, an Environmental Effects Analysis of all the physical activities proposed on federal lands is required, under Section 82 of the IAA, 2019. No approvals from the NCC under the *National Capital Act* can be issued before these obligations are fulfilled. An Environmental Effects Analysis of a proposed project will determine the need to eliminate or mitigate adverse effects, to modify the project or to recommend further assessment requirements based on detailed design.

Section 84 of the Act notes that an authority's determination regarding whether the carrying out of the project is likely to cause significant adverse environmental effects must consider the following factors:

a) Any adverse impact that the project may have on the rights of the Indigenous peoples of Canada recognized and affirmed by section 35 of the *Constitution Act, 1982,*

b) Indigenous knowledge provided with respect to the project,
c) Community knowledge provided with respect to the project,
d) Comments received from the public under subsection 86(1), and
e) The mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project that the authority is satisfied will be implemented.

The proposed project will also require approval through the Federal Land Use, Design and Transaction Approvals (FLUDTA) process under the *National Capital Act*. In addition to the NCC other federal authorities that may have an interest in the project include Fisheries and Oceans Canada (DFO) and Environment and Climate Change Canada (ECCC). This EA was prepared in consultation with the NCC and is intended to form the basis for the Impact Assessment when the Federal EA requirements are undertaken. In October of 2023 the current "designated projects" identified in the IAA were deemed to be beyond the legislative authority of the federal government and therefore unconstitutional. That section of the Act does not apply to this project, however, the federal EA approval requirements will be determined by the "involved authorities" in the future closer to the time of construction.

3. CONSULTATION

This Section of the Report documents the consultation undertaken for the Project in accordance with the requirements for a Schedule C Project under the MCEA Process. Consultation for the Blackburn Hamlet Bypass/Innes Road (Navan Road to Blair Road) Transit Priority EA Study was included as part of three Public Consultation Opportunities for the Brian Coburn Boulevard Extension/Cumberland Transitway Westerly (Blair Road to Navan Road) (BCBE/CTW) Environmental Assessment Study. A full account of the combined BCBE/CTW EA and BHBP/ Innes Road EA Public Open House is provided with the record of the consultation program for this project. It is noted that consultation for the Blair Road Transit Priority (Innes Road to Blair LRT Station) EA was also included in the consultation program.

The project Study Team involved in consultation included personnel from the City of Ottawa and technical representatives from Morrison Hershfield, Momentum Planning and Communications, Alta Planning and Design, Golder Associates Ltd., Gradient Wind Engineering Inc. (GWE), CH2M (now known as Jacobs Engineering Group) and CSW Landscape Architects.

Consultation involved stakeholders, City Advisory Committees, community groups, property owners, businesses, approval agencies, Indigenous peoples, and special interest groups. Early in the study process, stakeholders were identified through consultation with Ward Councilors. The consultation strategy consisted of meetings with key stakeholders through an Agency Consultation Group (ACG), a combined Public and Business Consultation Group (P/BCG), and the general public.

3.1 Consultation Groups

3.1.1 Agency Consultation Group

An ACG was formed to address a range of technical issues and to comment on all the special studies required to fully assess the various alternatives for the project. The ACG has also ensured that the City followed the agencies' procedures, legislation and has addressed

appropriate policies. Members included City staff, representatives from government agencies and approval bodies. The ACG met at key stages throughout the study. Direct one-on-one consultation with other Agency groups occurred as necessary as related to specific issues that arose during the study. As one of the key landowners affected, additional meetings were held with the NCC. ACG meetings and member details are available in **APPENDIX B**.

3.1.2 Public/Business Consultation Group

A combined P/BCG was formed to enable community groups, special interest groups, the City's Advisory Committees, Ward Councilors, and businesses to provide direct input to the study, advising and commenting on local issues and concerns. The P/BCG met at key stages throughout the study. P/BCG meeting and member details are available in **APPENDIX B**.

3.2 National Capital Commission

Collaboration between the NCC and City of Ottawa was and continues to be needed for the NCC-owned Greenbelt lands required for the Project. Additional meetings with the NCC were held in follow-up to materials introduced and presented at the ACG meetings. Meeting notes and documentation related to the NCC specific meetings and correspondence are available in the project Consultation Report in **APPENDIX A**.

3.3 Indigenous Peoples Consultation

The Study Team ensured appropriate coordination and consultation with Indigenous peoples in accordance with the requirements of the MCEA and City of Ottawa policies and procedures.

As part of this project, Indigenous groups were contacted to provide information on the project and opportunities for input. Outreach occurred by email at four key points in relation to the Innes Road/Blackburn Hamlet Bypass (Blair Road to Navan Road) Transit Priority EA Study and the Brian Coburn Boulevard Extension/Cumberland Transitway Extension (Blair Road to Navan Road) Environmental Assessment Study. Details of this outreach are available in **APPENDIX A**.

3.4 Project Website

A proactive and flexible approach to public consultation was adopted to ensure the interests of stakeholders and the community were taken into consideration. Consultation and the exchange of information was undertaken throughout the EA process using a variety of consultation and engagement methods.

To enhance the community engagement program, the City created a project specific webpage to facilitate communication of key project milestones. Notification of Public Open Houses were posted on the City of Ottawa's website. Materials posted as described in (**APPENDIX B**). Project communications were available online (Brian Coburn Extension EA Study). The web information conforms to the *Accessibility for Ontarians with Disabilities Act*.

3.5 Public Consultation

In addition to the specific stakeholder groups noted above, the varied interests of the surrounding community have been considered through the study processes and have assisted

in verifying the existing conditions; the development of design alternatives; and the refinement of the preferred design.

Three specific public consultation opportunities were organized at key points in the study process as described in the Sections below and detailed in the Consultation Report for the project.

3.5.1 Public Consultation Opportunity No. 1

The first Public Open House was held on May 17, 2018, in the gymnasium at Rendez-vous des aînés francophones d'Ottawa (3349 Navan Road, Orléans). The Public Open House was held to provide the public with an opportunity to review and comment on the public consultation process, existing conditions, project objectives, alternative designs, and next steps. It is estimated that over 100 people attended the Public Open House that consisted of a formal presentation and informal display board viewing and discussion. A total of nine comment sheets were received with an additional, 60 plus emails/letters/telephone correspondence received after the event, including questions and answers related to considered alternatives that utilize and are in proximity to Innes Road and the BHBP.

3.5.2 Public Consultation Opportunity No. 2

The second Public Open House was held on November 19, 2019, in the gymnasium at Rendez-vous des aînés francophones d'Ottawa (3349 Navan Road, Orléans). In addition to providing an update on the BCBE study, the second Public Open House provided preliminary information on the Blair Road Transit Priority Corridor EA study. Over 80 people signed into the Public Open House that consisted of a formal presentation and informal display board viewing and discussion. In addition, a large map of the study area offered attendees a visual aid to point to areas of concern and identify where they may like to see changes. Thirteen comments were documented in the mapping exercise and a further ten (10) comment sheets were received at the Public Open House. Comments and questions included consideration for components of the Innes Road and BHBP Transit Priority EA, particularly as they relate to the potential transit ridership associated with the proximity to the Blackburn Hamlet community and requested consideration of High Occupancy Vehicle (HOV) lanes.

In addition, over 100 emails/letters/telephone correspondence were received after the event.

3.5.3 Public Consultation Opportunity No. 3

Due to public health guidelines for the COVID-19 pandemic, the third and final public consultation involved a PowerPoint video recorded presentation made available in English and French on the City of Ottawa webpages (Brian Coburn Extension EA Study) and (Etude Dee Du Boulevard Brian Coburnautre) respectively. The recorded presentations were made available online for a period of three weeks, from Monday, June 28 to Friday, July 16, 2021. The final public consultation period presented the technically preferred ultimate design for the Brian Coburn Boulevard Extension/Cumberland Transitway Extension (Blair Road to Navan Road) and the recommended Transit Priority Measures, as documented, and presented in this ESR. The potential effects of the Transit Priority Measures and the mitigation to manage the impacts were also presented.

The Study Team measured public engagement online through the Facebook and Twitter advertisements, views of the recorded presentation on YouTube, and online survey

submissions. Details of the engagement presentations, metrics, survey results and comments received are available in **APPENDIX B**.

3.6 City of Ottawa Transportation Committee

A presentation was made to the City's Transportation Committee on Wednesday, March 2, 2022. The Committee received both the Blackburn Hamlet Bypass and Innes Road Transit Priority Measures (Navan Road to Blair Road) EA Study and the Brian Cobourn Boulevard Extension/Cumberland Transitway Environmental Study Report during this presentation.

When in-person meetings cannot be held, the meeting may be broadcast live on YouTube for the public (YouTubePresentation). All contacts maintained on the project's contact list were notified of the meeting by email, mail, or phone call.

The outcomes of the meeting included:

- Approval of the functional design for the Brian Coburn Boulevard Extension/Cumberland Transitway Westerly Extension (Navan Road to Blair Road at Innes Road) for the Ultimate Road and Transitway Plan, Option 7, as outlined in the report:
- Approval of the functional design for the Blackburn Hamlet Bypass/Innes Road (Navan Road to Blair Road) Interim Transit Priority Measures, as outlined in the report:
- Deferral in finalizing the Environmental Study Reports for both projects until after the 100-day review period (as noted below) has been completed.
- Approval of the Motions:
  - The Minister Responsible for the National Capital Commission be requested to direct the NCC to strike a joint committee with the City to try and resolve the impasse on the BCBE EA, with a deadline to report back to the Minister and the Mayor within 100 days.
  - Planning Staff be directed to convene a summit with the Greater Ottawa Home Builders Association (GOHBA) and major developers in Orléans to discuss strategies for mitigating the impact of development approvals while the impasse remains.
  - Planning, Real Estate & Economic Development (PRED) staff be directed to bring a report to Planning and Transportation Committees outlining options for short term solutions.
  - Staff be directed to fund any Professional services from accounts: 910610 2022 Rapid Transit EA Studies and 908210 2016 EA Arterial Road Studies.

3.7 City of Ottawa Council Meeting

The Council meeting of Wednesday, March 23, 2022, confirms the amended list of recommendations from the March 2, 2022, Transportation Committee meeting with all recommendations being carried.

4. PROJECT NEED & OPPORTUNITIES

Phase 1 of the Municipal Class EA Planning and Design Process requires the identification and description of the existing and/or projected problems or opportunities related to a proposed undertaking. This section of the report will focus on the undertaking as identified in the

Transportation Master Plan, as well as the project need and ability to address opportunities in the study area. Supporting documents are provided in **APPENDIX C**.

4.1 Transportation Master Plan

The City of Ottawa's 2013 Transportation Master Plan (TMP) identified the new four lane Brian Coburn Boulevard section from Navan Road to the Blackburn Hamlet Bypass (listed in the TMP as the Blackburn Hamlet Bypass Extension) as part of the *2031 Affordable Road Network* (**Figure 4-1**).

Other roadway projects are included in the TMP's *2031 Road Network Concept* (**Figure 4-2**) but not in the *2031 Affordable Road Network*. These include Blackburn Hamlet Bypass widening from 4 to 6 lanes, the new Innes-Walkley-Hunt Club Link (4 lane road with initial 2 lane phase), OR 174 widening to 6 lanes, and Navan Road widening south of Brian Coburn Blvd. to 4 lanes.

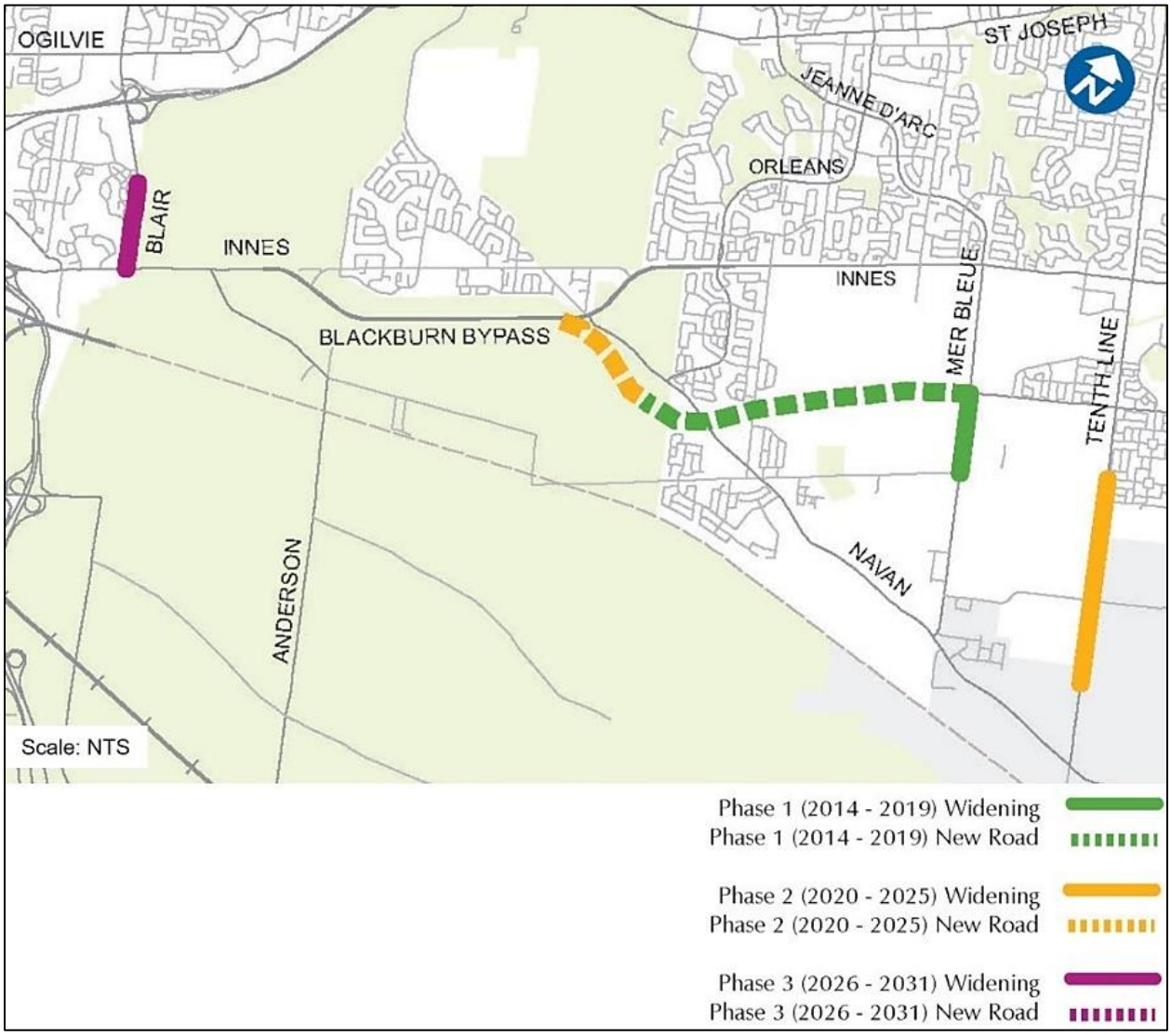

Figure 4-1: 2031 Affordable Road Network (City of Ottawa 2013) TMP

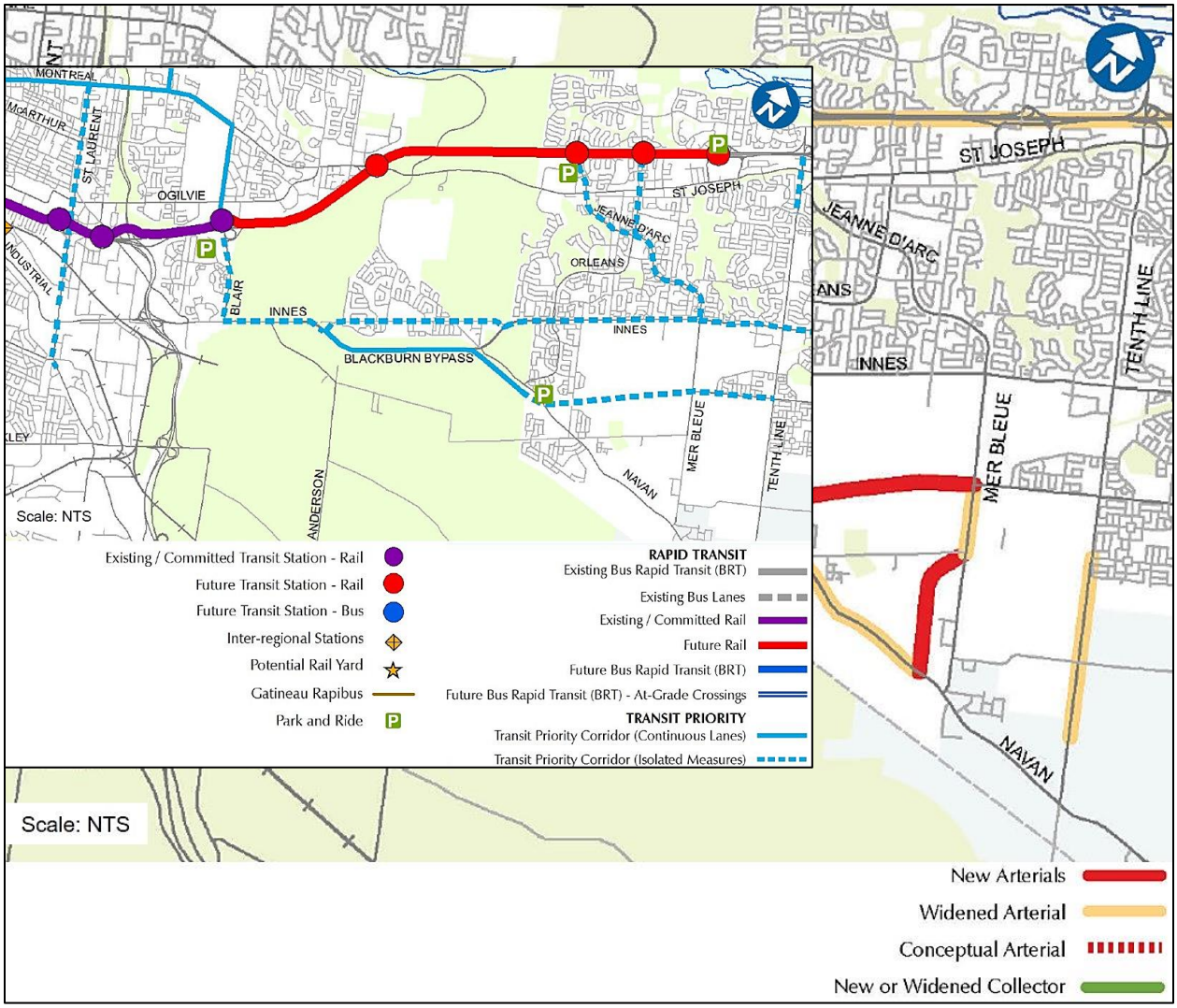

Figure 4-2: 2031 Road Network Concept (City of Ottawa 2013) TMP

The 2013 TMP includes the Cumberland Transitway as a fully exclusive transitway between Blair Station and Frank Kenny Road as part of the *2031 Transit Network Concept* (**Figure 4-3**) but not as part of the *2031 Affordable Transit Network* (**Figure 4-4**) which indicates that it is expected to be constructed beyond the 2031 horizon.

Other transportation improvements planned to serve the east urban area outside the Greenbelt include the expansion of Ottawa's Light Rail Transit (LRT). Originally, the TMP included an LRT extension from Blair Station to Orléans Town Centre, however, recent planning and funding opportunities have enabled the City to extend the LRT to Trim Road as part of the Stage 2 LRT system, scheduled for operation by 2025. The *2031 Affordable Transit Network* also includes Transit Priority Corridors (either Continuous Lanes or Isolated Measures) on Blair Road, Innes Road, the BHBP, Brian Coburn Blvd. and the BCBE (BHBP to Navan) within the study area.

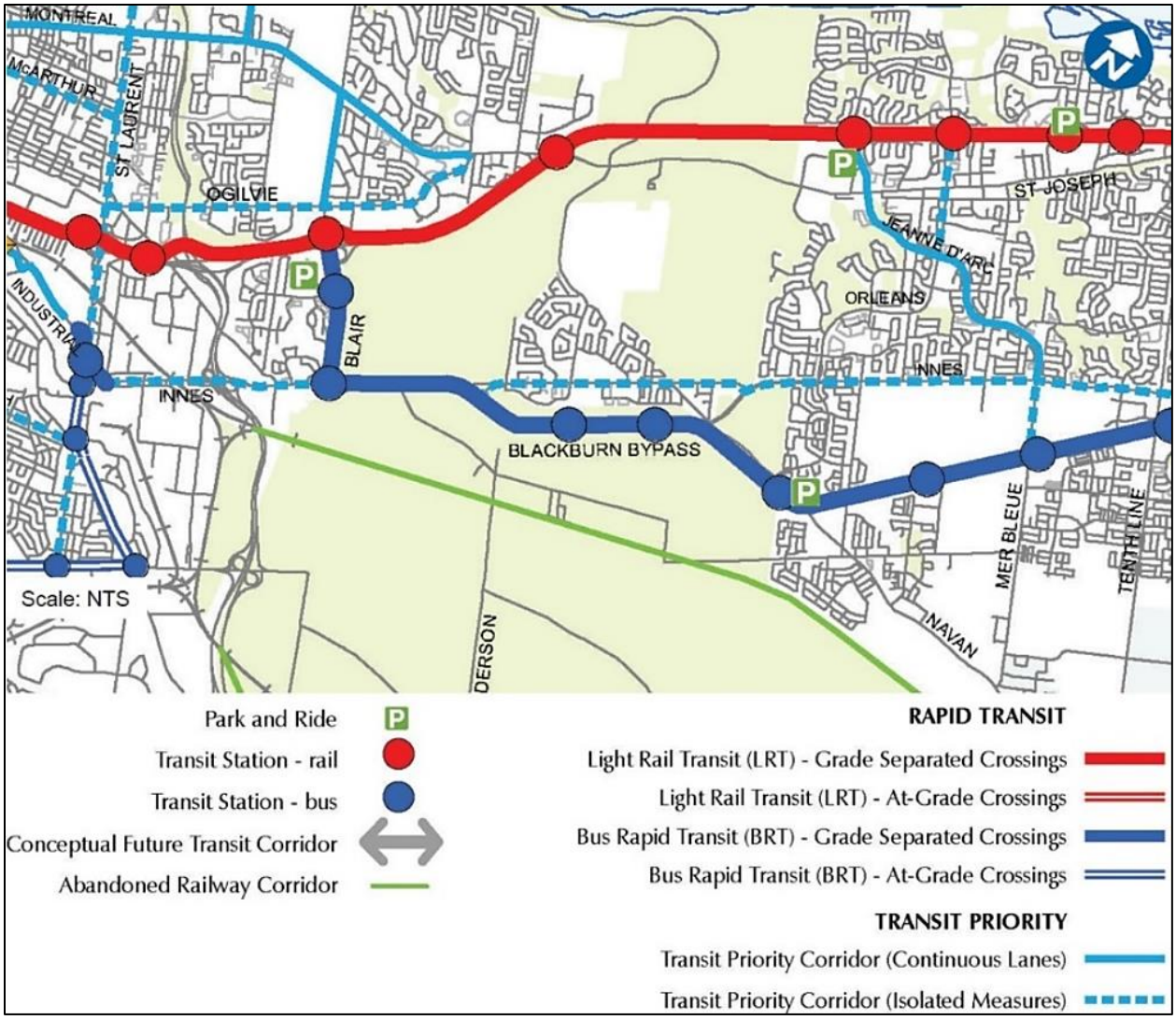

Figure 4-3: 2031 Network Transit Concept (City of Ottawa 2013) TMP

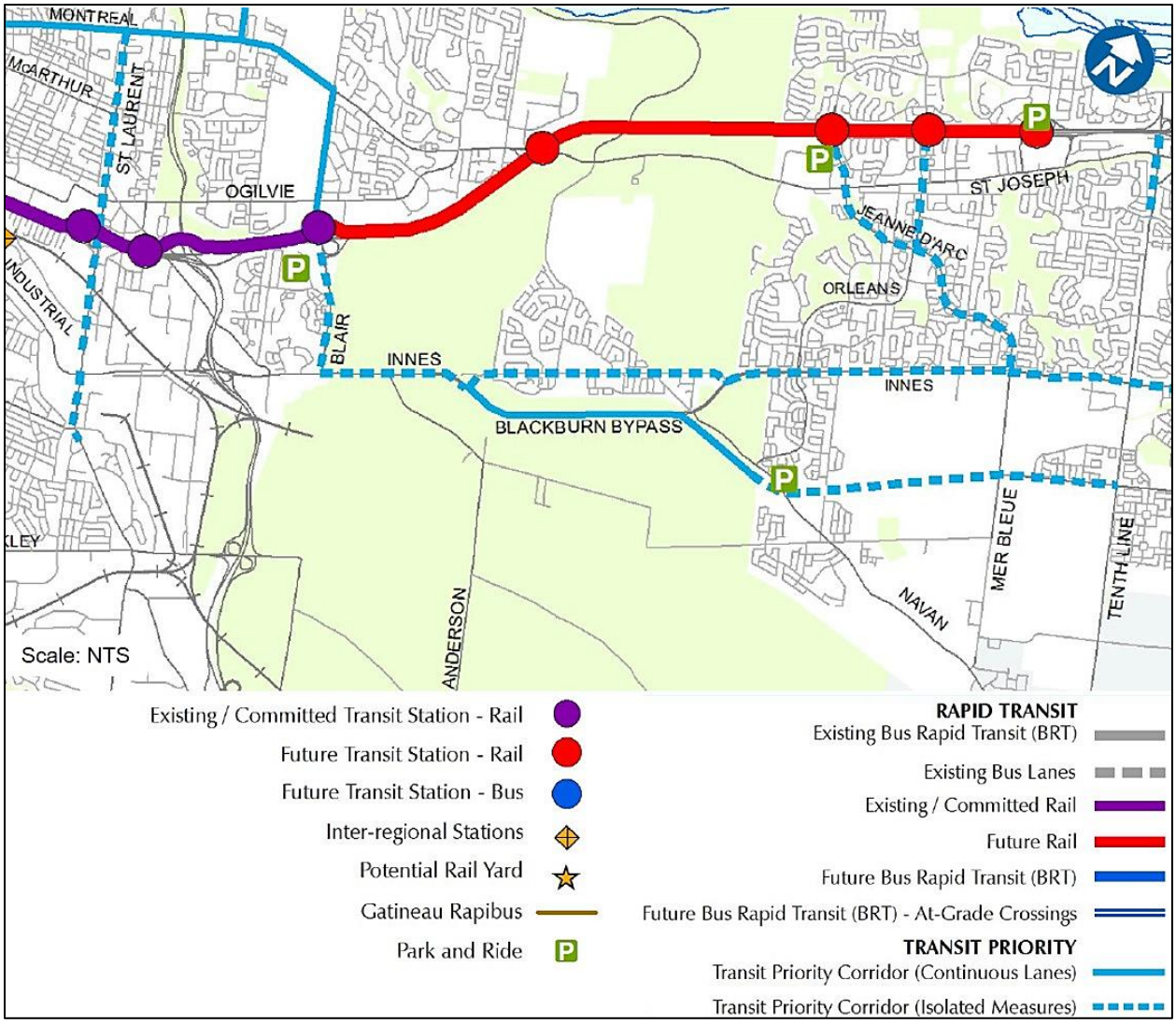

Figure 4-4: 2031 Affordable Transit Network (City of Ottawa 2013) TMP

4.2 Need for the Project

A re-examination of the need and a confirmation of the preferred alternative solution was undertaken as part of this study to confirm the 2013 TMP assumptions and conclusions. Supporting documents for the study are provided in **APPENDIX C**. The review examines the future transportation needs associated with the TMP's Affordable Network scenario and includes the following key mobility improvements in the study area:

Affordable Road and Transit Networks:

- The widening of Blair Road to 4 lanes (Innes to Meadowbrook)
  - Transit priority measures throughout the study area
  - Completion of Stage 2 LRT easterly extension
- Network Concept Road and Transit Networks:
  - The widening of Navan Road to 4 lanes (south of Brian Coburn Boulevard)

- The Innes-Walkley-Hunt Club Road link
- The widening of OR 174 to 6 lanes
- Completion of Stage 2 LRT easterly extension

- Completion of the Cumberland Transitway BRT

4.2.1 Travel Demand

An efficient transportation network accommodates all modes of travel including transit, active transportation (AT) modes (cyclists and pedestrians), automobiles and large/heavy vehicles.

The City of Ottawa employs the EMME travel demand model to assist in the determination of the need for transportation infrastructure. The EMME model uses specific inputs related to population and employment, land use, modal share values and other factors to assist in the identification of existing and future traffic demands. A key metric in the EMME model relates to the population and employment projections in various areas across the City. The 2013 TMP Update indicated the following 2011 and 2031 population and employment values across the City (**Table 4-1**).

Table 4-1: Population & Employment: 2011 and 2031

	POPULATION			EMPLOYMENT		
AREA	**2011**	**2031**	**Growth & Distribution**	**2011**	**2031**	**Growth & Distribution**
Inner Area	97,200	116,400	19,200 (9%)	170,600	201,800	31,200 (23%)
Inner Suburbs	432,500	459,300	26,800 (13%)	287,400	355,300	67,900 (49%)
Kanata/Stittsville	105,200	162,000	56,800 (27%)	51,300	62,500	11,200 (8%)
Barrhaven	71,200	107,400	36,200 (17%)	11,100	21,800	10,700 (8%)
Riverside South/Leitrim	15,900	35,800	19,900 (9%)	4,000	7,800	3,800 (3%)
Orléans	***108,200***	***143,400***	***35,200 (16%)***	***20,600***	***33,000***	***12,400 (9%)***
Rural Ottawa	91,400	111,700	20,300 (9%)	20,000	20,900	900 (1%)
Total	***922,000***	***1,135,900***	***213,900 (100%)***	***564,900***	***703,200***	***138,100 (100%)***

Table 4-1 indicates that population in the city will increase by a total of 213,900 persons while employment will increase by 138,100 jobs. The Orleans area (highlighted) is projected to add 35,200 persons and 12,400 jobs; these values respectively represent 16% and 9% of the projected population and employment growth in the entire City of Ottawa.

Table 4-2: 2011 & 2031 Transit Mode Shares (AM Peak/2013 TMP)

Trips from ↓ / Trips to →		Inner Area	Inner Suburbs	Orléans	Riverside South/ Leitrim	Barrhaven	Kanata/ Stittsville	Rural Ottawa	Gatineau	*All Areas*
Inner Area	2011	15%	28%	28%	9%	5%	31%	1%	29%	***20%***
	2031	20%	35%	30%	15%	15%	35%	2%	32%	***22%***
Inner Suburbs	2011	49%	16%	12%	5%	8%	13%	1%	30%	***24%***
	2031	54%	22%	16%	18%	12%	15%	2%	33%	***28%***
Orléans	***2011***	***61%***	***19%***	***8%***	***4%***	***10%***	***6%***	***0%***	***27%***	***24%***
	2031	***65%***	***22%***	***11%***	***7%***	***12%***	***7%***	***0%***	***30%***	***26%***
Riverside S./Leitrim	2011	36%	7%	0%	0%	0%	0%	0%	0%	***9%***
	2031	40%	16%	2%	10%	10%	5%	2%	13%	***16%***
Barrhaven	2011	62%	16%	5%	0%	5%	1%	0%	53%	***20%***
	2031	70%	20%	7%	5%	10%	6%	2%	55%	***26%***
Kanata/Stittsville	2011	53%	12%	6%	0%	3%	5%	2%	36%	***15%***
	2031	56%	20%	6%	4%	4%	10%	2%	40%	***21%***
Rural Ottawa	2011	31%	4%	3%	0%	2%	1%	1%	7%	***6%***
	2031	39%	8%	10%	2%	3%	3%	1%	8%	***11%***
Gatineau	2011	47%	13%	0%	0%	0%	3%	0%	-	***32%***
	2031	50%	14%	7%	3%	5%	7%	1%		***33%***
All Areas	***2011***	***42%***	***16%***	***9%***	***2%***	***6%***	***6%***	***1%***	***31%***	
	2031	***44%***	***21%***	***13%***	***9%***	***11%***	***11%***	***2%***	***32%***	

4.3 Project Opportunity

The communities at the eastern limits of the city are projected to experience continued growth in both population and employment over the next several decades (City of Ottawa, 2003a). This growth will require appropriate and targeted transportation infrastructure (for transit, auto and active transit modes) to accommodate this projected growth. The existing road network is currently at capacity and this condition will deteriorate unless improvements are made (see discussion of projected demands in the following section).

There are opportunities for the following multi-modal elements:

- Development of a staged transit system including near-term measures such as on-road transit lanes and transit priority measures.
- Ultimately, the transit network should consist of a fully separate, dedicated Bus Rapid Transit (BRT) system with potential links to the future light rail transit (LRT) along Ottawa Road (OR) 174.
- In conjunction with the network improvements identified in this EA, the provision of appropriate AT facilities which encourage non-auto modes of travel.
- The provision of appropriate connectivity between the various modes of travel including effective and convenient access to the transit service.
- The development of roadway and transit options should consider, where feasible, opportunities to mitigate or eliminate existing neighbourhood traffic issues (e.g., Chapel Hill South, Bradley Estates).

Consistent with the City's TMP and OP, the transportation analysis, and the development of solutions for the study area will address the following key objectives as listed in the City's TMP:

- Reduce automobile dependence - give priority to public transit in accommodating future travel demand:
  - Make walking and cycling more attractive than driving for short trips.
  - Motivate sustainable travel choices through education, promotion, incentives, and automobile disincentives.
  - Encourage shorter trips and travel alternatives like telework.
- Meet mobility needs:
  - Provide an integrated system of multimodal facilities and services.
  - Aim to provide an acceptable level of service for each mode.
  - Balance mobility and accessibility needs in higher and lower density areas.
  - Balance the needs of public transit customers, pedestrians, cyclists, and motor vehicle users when resolving conflicts.
  - Provide barrier-free transportation facilities and services.
- Integrate transportation and land use:
  - Build communities that are accessible by active transportation.
  - Provide rapid transit and other quality transit services to community cores and employment areas.
  - Foster transit-oriented development in transit nodes and corridors.

- Support intensification where transit, walking and cycling can be made most attractive.

The City's TMP and OP place considerable emphasis on transit. The TMP states that enhanced transit service elements will be provided as early as possible. These may take the form of surface transit routes with accelerated frequencies, accompanied by transit priority measures. While the City is protecting the eventual opportunity for complete grade-separation of all elements of the rapid transit network (i.e., intersections where rapid transit corridors intersect with streets, or pedestrian crossings at rapid transit stations), where practical, it will defer the costs of grade-separation by using transit priority measures that reduce delay and improve service reliability by isolating transit from mixed traffic.

The TMP indicates that the majority of Ottawa's transit service is delivered on roads, where traffic congestion increases delay and reduces the reliability and efficiency of transit services. Transit priority can improve the competitiveness of transit by reducing travel times and improving service reliability, while allowing more transit service to be delivered with the same resources. Transit priority measures (e.g. dedicated bus lanes, transit signal priority treatments, bus queue jumps, special bus stop arrangements, and traffic management techniques such as queue relocation) are intended to eliminate delay to transit services caused by congestion, and to minimize delay caused by traffic signals. Equipping road corridors with a set of coordinated transit priority measures can substantially improve the quality of service enjoyed by transit customers without incurring the costs of a fully grade-separated rapid transit corridor" (City of Ottawa, 2013). As stated, the transportation analysis and the development of solutions will be undertaken in a manner that prioritizes the implementation of transit in the study area.

The 2013 TMP/OP also supports the increased use of other non-auto modes including walking and cycling:

Walking: The City of Ottawa's Pedestrian Charter establishes the vision, goals, and objectives for walking. The Charter articulates a commitment to creating a city where people walk because they want to and defines a series of guiding principles to create a supportive urban environment. The *Ottawa Pedestrian Plan* (2013) contains a number of policies and actions for the City to implement. They address land use, walking network development, street and pedestrian facility design, maintenance, safety programs, information, promotion, stakeholder engagement, interjurisdictional cooperation, and performance measurement.

Cycling: The *Ottawa Cycling Plan* (2013) contains a number of policies and actions to increase the safety, convenience and comfort of cycling in Ottawa. These include land use, cycling network development, street and cycling facility design, bicycle parking, cycling-transit integration, funding, maintenance, safety programs, wayfinding assistance, information, promotion, stakeholder engagement, inter-jurisdictional cooperation, and performance measurement.

The study area includes lands within the City and the National Capital Commission (NCC) Greenbelt. Appropriate pedestrian and cycling facilities will be provided along all new infrastructure in accordance with the City's planning documents and where appropriate, NCC policies and guidelines. This will include linkages with the existing pathway network (i.e., City and NCC pathways).

Table 4-2 indicates increased transit use in virtually all areas including Orléans. For example, it is projected that travel from Orléans to Ottawa's downtown will increase from 61% in 2011 to 65% by 2031. Transit improvements will be required to achieve this increase in modal share.

Using the population and employment data and the modal share values, roadway, and transit improvements (i.e., per the TMP Affordable Network) were identified in the 2013 TMP Update. Travel demands are typically assessed at screenlines[1]. Within the study area, there are three screenlines: Screenline 16 (SL16), Screenline 6 (SL6), and Blackburn Hamlet Screenline (**Figure 4-5**).

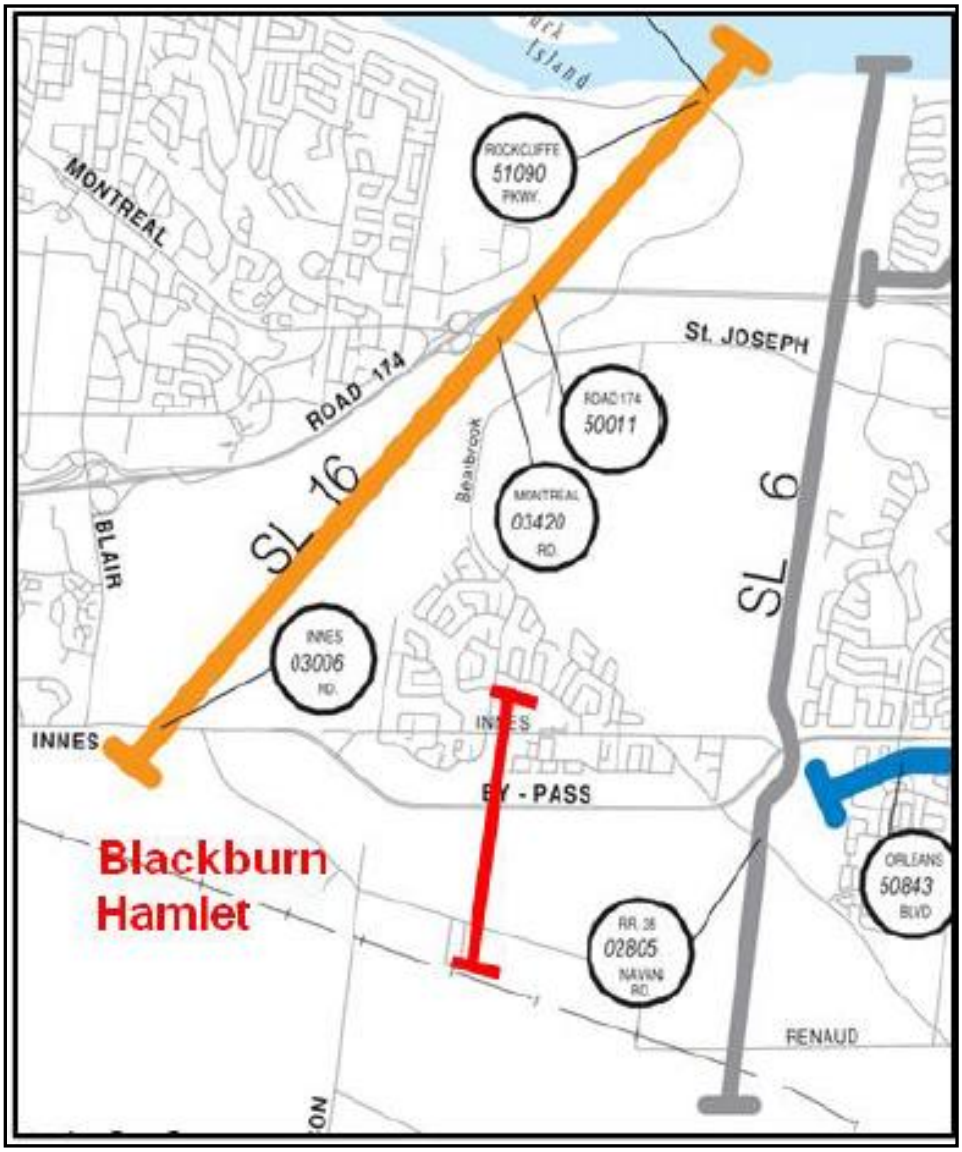

Figure 4-5: Study Area Screenlines

[1] A screenline is defined as an imaginary line that crosses all major transportation facilities in a corridor, typically drawn along a feature (such as a river or railway) having a limited number of crossing points (Annex 3: Glossary, City of Ottawa Transportation Master Plan, 2013d).

Screenline SL16 is located along the existing Greens Creek corridor while Screenline SL6 is located along the western periphery of the East Urban Community (i.e., abuts the NCC Greenbelt). The Blackburn Hamlet Screenline extends from the Village to south of Renaud Road. **Figure 4-5** illustrates the three screenlines.

The existing roadways in the study area which service east/west travel demands range from multi-lane, high speed freeways (e.g. OR 174) to arterial roadways (e.g. Innes Road) to single lane facilities (e.g. Sir George-Étienne Cartier Parkway and Renaud Road). Each facility has a finite capacity - the number of vehicles that can be serviced in a lane in a given hour. The current and projected traffic volumes are then applied to this capacity of the roadway and the quality of performance is determined. Roadway performance is typically expressed in terms of the Volume to Capacity (V/C) ratio, whereby a V/C ratio that exceeds 0.90 is typically considered "at or over capacity" and improvements are generally warranted. In terms of transit use, the 2011 transit (or non-auto) modal share is estimated at 37% at the Greens Creek Screenline (SL 16); the projected 2031 TMP modal share is 43% (i.e. value used in the EMME model).

The 2017 EMME update included the following adjustments (when compared to the original 2013 version):

- Updated 2031 land use projections
- Transit routes update (related to Stage 2 LRT)
- Road network modifications:
  - Highway 417 weaving section coding changes
  - Network assumptions fixed for Leitrim EA project
- Updated transit features including the extension of LRT to Trim Road by 2023

The 2011 and 2031 traffic demand values used for this study were developed consistent with updated City policies regarding the analysis of roadway performance.

4.3.1 Current (2011) Travel Demand

Table 4-3 illustrates the 2011 Peak Hour/Peak Direction Traffic Volume to Road Capacity (V/C) Ratio for the key network roads. Any volume/capacity levels that exceed "1.0" indicates a roadway that is exceeding its capacity.

Table 4-3: Roadway Capacity

	Volume	# Lanes (Per Direction)	Lane Capacity (Per Direction)	Total Capacity (Per Direction)	V/C Volume/ Capacity
Screenline 16					
Sir George-Étienne Cartier Parkway	580	1	800	800	0.72
OR 174	3608	2	1,800	3,600	***1.00***
St. Joseph Boulevard	1778	2	1,000	2,000	0.89

	Volume	# Lanes (Per Direction)	Lane Capacity (Per Direction)	Total Capacity (Per Direction)	V/C Volume/ Capacity
Innes Road (West of BHBP)	2620	3	800	2,400	***1.09***
SCREENLINE TOTAL	**8585**	**8**		**8,800**	**0.98**
Screenline 6					
OR 174	3608	2	1,800	3,600	***1.00***
St. Joseph Boulevard	1929	2	1,000	2,000	***0.96***
Innes Road (East of BHBP)	1673	2	800	1,600	***1.05***
Navan Road	663	1	800	800	0.83
Renaud Road	474	1	800	800	0.59
SCREENLINE TOTAL	**8,346**	**8**	**5,200**	**8,800**	**0.95**
Blackburn Hamlet Bypass Screenline					
Innes Road (in Blackburn Hamlet)	117	1	600	600	0.20
BHBP	1980	2	1,000	2,000	***0.99***
Renaud Road	474	1	800	800	0.59
SCREENLINE TOTAL (ALL)	**2,572**	**4**	**2,400**	**3,400**	**0.76**
SCREENLINE TOTAL (NO INNES)	**2,454**	**3**	**1,800**	**2,800**	**0.88**

Based on analysis, the following conclusion can be made:

- Numerous locations exhibit over-capacity conditions.
- Virtually all *major* arterial roads crossing screenlines sl6 and sl16 are functioning with a v/c ratio that exceeds 0.90.
- The overall v/c for screenlines sl6 and sl16 respectively exhibit values of 0.95 and 0.98 suggesting that the demand is nearing the available capacity.
- At the Blackburn hamlet screenline, the BHBP is essentially at capacity (i.e. V/c of 0.99).
- The remaining minor roads (Innes Road in the Village and Renaud Road) are under-capacity; however, these roads are less well suited for the movement of traffic (i.e., both are located in or pass through existing residential neighbourhoods).

4.3.2 Future (2031) Travel Demand

Table 4-4 illustrates the V/C for each key roadway at the three screenlines considering *average* 2031 peak direction auto volumes (am peak inbound), based on the Affordable Network. These volumes were generated by increasing the peak hour demand by 2.05 (to peak period) and dividing the peak period values by 2.5 to develop average peak hour. The values are based on

the City's EMME model and include updated transit routes commensurate with the introduction of Stage 1 LRT in early 2019 and Stage 2 LRT in 2023.

The analysis supports the need for 1 lane of additional roadway capacity at each screenline (includes the capacity provided by the Brian Coburn Boulevard Extension). All screenlines exceed a total V/C of 0.90 (generally considered the capacity of a roadway link); while most individual roads have V/C ratios well in excess of 0.90 with numerous locations exhibiting V/C ratios of more than 1.0.

Table 4-4: 2031 Average AM Peak Hour/Peak Direction Auto Volume & V/C Affordable Network

	Average Peak Hour Volume	# Lanes (Per Direction)	Lane Capacity (Per Direction)	Total Capacity (Per Direction)	V/C Volume/ Capacity
Screenline 16					
Sir George-Étienne Cartier Parkway	622	1	800	800	0.78
OR 174	3927	2	1800	3,600	***1.09***
St. Joseph Boulevard	1867	2	1000	2,000	***0.93***
Innes Road (West of BHBP)	3218	3	800	2,400	***1.34***
SCREENLINE TOTAL	**9,634**	**8**	**4,400**	**8,800**	**1.09**
Screenline 6					
OR 174	3927	2	1,800	3,600	***1.09***
St. Joseph Boulevard	2053	2	1000	2,000	***1.03***
Innes Road (East of BHBP)	1582	2	800	1,600	***0.99***
BCBE[1]	*1286*	*2*	*800*	*1,600*	***0.80***
Renaud Road	790	1	800	800	***0.99***
SCREENLINE TOTAL	**9,638**	**9**	**5,200**	**9,600**	**1.00**
Blackburn Hamlet Bypass Screenline					
Innes Road (in Blackburn Hamlet)	308	1	600	600	0.51
BHBP	2280	2	1,000	2,000	***1.14***
Renaud Road	790	1	800	800	***0.99***
SCREENLINE TOTAL (WITH INNES/In Hamlet)	**3,378**	**4**	**2,400**	**3,400**	***0.99***
SCREENLINE TOTAL (NO INNES/In Hamlet)	**3,070**	**3**	**1,800**	**2,800**	***1.10***

1. Widening is assumed (per 2013 TMP)
2. Locations where V/C exceeds 0.90

4.3.3 Transit

The projected average am peak period transit demand (i.e., transit person trips) at each screenline was developed in the City's EMME model. The developed peak hour transit person trips include surface transit operations, future LRT along OR 174 and future BRT facilities.

Transit performance is a function of the type of service currently provided or the type of service that will be provided in the future. Existing transit services which operate in mixed use conditions with automobile traffic will be subject to the same performance issues encountered by automobiles. Better transit performance is projected where transit priority measures or dedicated lanes are provided (e.g. currently provided on sections of OR 174) or will be provided. A dedicated transit facility such as the Confederation Line LRT system in the OR 174 corridor provides the highest level of performance.

Transit is considered an integral element in addressing the mobility needs of the study area and beyond. In the City's TMP the Cumberland Transitway is planned for implementation as part of the Network Concept, sometime after 2031, and transit priority measures are low-cost measures proposed as a method of facilitating transit use before this BRT facility is built.

4.3.4 Roadway Lane Requirements

Notwithstanding the increased use of transit, additional roadway capacity will be warranted within the study area. The added lane requirements that are needed to satisfy the projected 2031 average auto demands are:

- **SCREENLINE 6:** 1 Lane/Direction
- **SCREENLINE 16:** 1 Lane/Direction
- **BLACKBURN HAMLET SCREENLINE:** 1 Lane/Direction

The identified lane requirements confirm the recommendations from the City's TMP related to roadway capacity improvements. The development of roadway and transit options should also consider, where feasible, opportunities to mitigate or reduce neighbourhood traffic issues (e.g. Chapel Hill South and Bradley Estates). Additionally, any future roadway options should be developed in a manner that minimizes cut-through traffic in existing and future neighbourhoods.

The capacity improvements identified in this analysis generally confirm the recommendations of the City's TMP. It is expected that both transit and roadway enhancements will form part of any identified solution to the mobility needs of this area.

5. EXISTING ENVIRONMENTAL CONDITIONS

This section documents the baseline conditions for the study area against which the potential environmental effects of the alternatives can be assessed. The findings of the studies, investigations and policy review undertaken to document the existing conditions within the study area include environmental conditions for the natural, social, cultural, built, and economic environments.

Overall, the baseline data was collected and analyzed for key environmental parameters to:

- Provide an understanding of existing conditions.

- Allow for predictions of how the proposed project may cause these environmental conditions to change and how those changes can be mitigated.
- Provide a basis for designing monitoring programs.

The following sub-sections describe the study area boundaries and the existing ecological, social, cultural, built environment and economic conditions within the general study area. Once a preferred alternative is selected, a detailed update to existing conditions will occur, as applicable, localized to that corridor.

Some areas within the study area have been previously evaluated during other environmental assessments. These previous studies have been used to inform the documentation of the existing conditions report. Where information gaps exist, new content has been added.

5.1 Study Area

5.1.1 Physical Boundaries

The study area for existing conditions may vary depending on the environmental features which were investigated. The study area boundaries are not rigidly defined and remain flexible to accommodate the extent of the environmental feature being described. This is because some potential environmental effects may be localized, such as noise, whereas others, like the movement of people may have broader implications outside of a restricted geographical boundary. Where broader study area boundaries have been used, they have been identified in context.

In general, the study area falls within the boundaries identified on **Figure 5-1**.

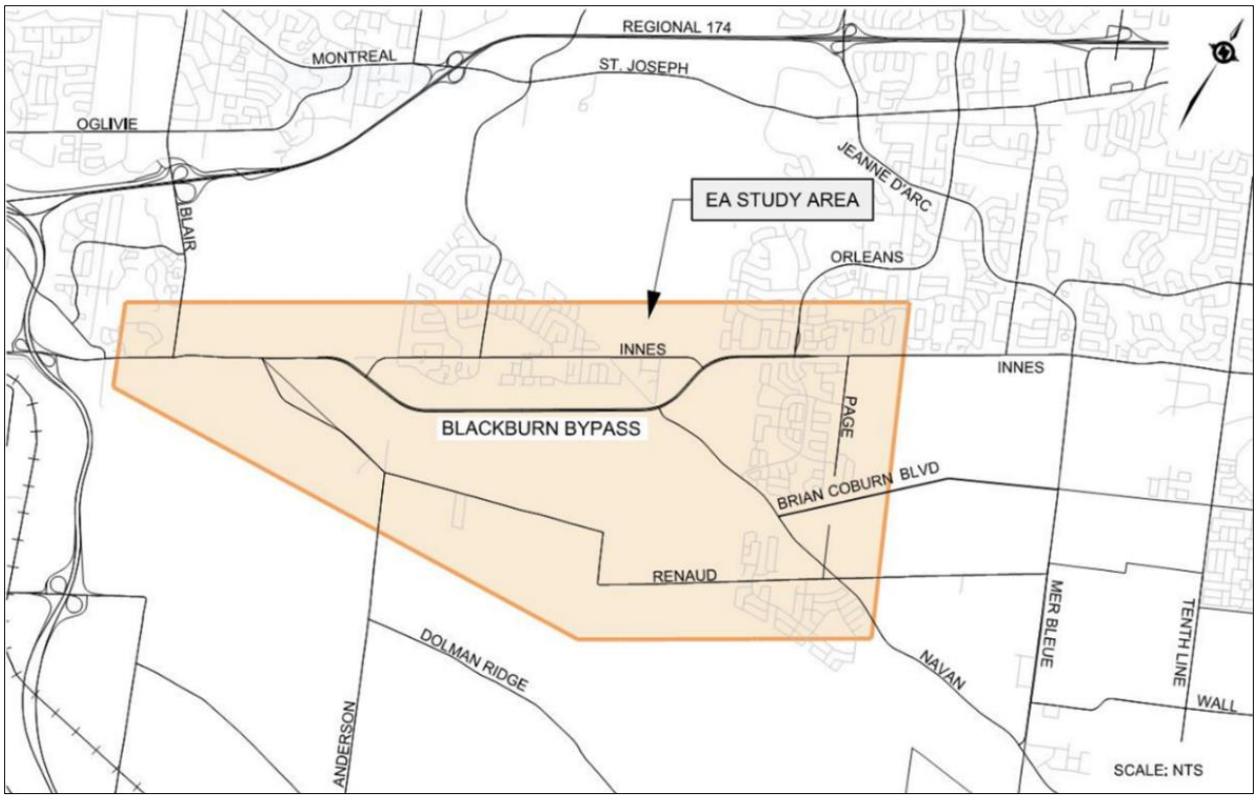

Figure 5-1: Study Area Boundaries

The Blackburn Hamlet Bypass/Innes Road (Navan Road to Blair Road) Transit Priority Environmental Assessment Study is located within the broader BCBE/CTW EA study area, which covers approximately 18 km^2 with geographical boundaries that extend from:

- West Limit: Approximately 500 m west of Blair Road.
- North Limit: Parallels Innes Road approximately 500 m to the north.
- East Limit: Approximately 500 m east of Pagé Road.
- South Limit: Approximately 500 m south of Renaud Road connecting to Innes Road west of Blair Road.

There are some additional existing environmental conditions details included in this ESR and its Appendices which were collected for the BCBE/CTW EA.

5.1.2 Temporal Boundaries

The temporal boundaries of the study area will encompass all phases of the project implementation including planning and design, construction, and operation/maintenance.

5.2 Natural Environment

The natural environment includes the physical and ecological/biological components that are essential to our health, quality of life and survival. Many environmental features have a variety of ecological, recreational, and/or aesthetic features and functions that are highly valued from both an environmental and social context. This section of the report will present an overview of the biological/ecological and physical elements of the study area with detailed reports available in **APPENDIX D**.

5.2.1 Aquatic Environment

The study area falls within the jurisdictional boundaries of the Rideau Valley Conservation Authority (RVCA) and Ministry of Natural Resources and Forestry (MNRF) Kemptville District. Most of the study area is located within the NCC's Greenbelt.

The study area is located primarily within the Greens Creek watershed. Greens Creek flows north for approximately 5 km from the study area before draining directly into the Ottawa River. The Greens Creek watershed encompasses a number of subwatersheds within the study area: Black Creek subwatershed and Mud Creek Subwatershed. Each of these creeks discharge into Greens Creek. The headwaters of Mud Creek and Black Creek originate from the Mer Bleue Bog, a provincially significant and internationally recognized wetland that exists within the southeast portion of the study area.

5.2.1.1 Surface Water

Mud Creek

Mud Creek originates at the Mer Bleue Bog located at the southern extent of the study area, which provides much of the headwater flow with additional flow arising from drainage of adjacent agricultural and residential land uses. One named drainage feature, the James Blais Municipal Drain, contributes to flow for one of the Mud Creek tributaries and is located within the Chapel Hill South residential area along the north side of Renaud Road and Navan Road. The

outlet of Mud Creek to Greens Creek is located approximately 0.65 km north of Innes Road. Mud Creek has experienced anthropogenic changes, such as road crossings, shoreline/instream modifications and little to no riparian buffer, however, nearly 50% of the creek has remained unaltered (RVCA, 2012b). Most of the remaining unaltered/natural reaches of the creek exist within 4 km upstream of the confluence with Greens Creek (i.e. middle and lower reaches).

Black Creek

The main-stem of Black Creek is located approximately 1.2 km south of Mud Creek and flows parallel to Mud Creek in a westerly direction before draining into Greens Creek. The confluence at Greens Creek is approximately 200 m east of Cyrville Road, which is located near the southwest limit of the study area. Black Creek also originates at the Mer Bleue Bog as this wetland is the primary headwater feature for the creek. Part of the Black Creek main-stem channel is a municipal drainage feature, the Lacroix Drain, which is located within the Mer Bleue Bog east of Anderson Road. The City Stream Watch program surveyed Black Creek in 2012 between Anderson Road and the confluence with Greens Creek. Through this stream survey, it was determined that most of Black Creek has been subject to anthropogenic changes that have altered the Creek's natural features resulting in approximately 8% of the Creek remaining unaltered (RVCA, 2012a). This can likely be attributed to the agricultural land uses present throughout much of the Black Creek subwatershed. Overall, there is limited residential development along Black Creek.

Greens Creek

The Greens Creek watershed is an important link between the Mer Bleue Bog wetland and the Ottawa River, where it outflows approximately 0.8 km downstream of the Sir George Etienne Parkway. In addition to the Mer Bleue headwaters, drainage from four (4) primary tributaries including Borthwick Creek, Black Creek, Mud Creek and Ramsay Creek contribute to flows within Greens Creek. The Greens Creek main-stem channel meanders through deeply incised channels due to the predominant leda clay-based substrates giving rise to highly unstable slopes. Frequent occurrences of slope failure and landslides, primarily between St. Joseph Boulevard. and Innes Road. have occurred within this section of the Greens Creek watershed. Nonetheless, Greens Creek has maintained a relatively high percentage of natural riparian buffer within the watershed compared to other urban streams within the City of Ottawa as more than 70% of the 13.4 km stream length surveyed by City Stream Watch possesses a buffer width of 30 m or greater (RVCA, 2016). The extensive natural features retained within the Greens Creek watershed is further exemplified by the limited percent of anthropogenic alteration along the main stem of the channel. Based on the 2016 City Stream Watch assessment along Greens Creek, approximately 69% of the channel has remained either unaltered or natural (RVCA, 2016).

Voyageur Creek

The Voyageur Creek watershed consists of a relatively short watercourse (approximately 6 km long) that is a direct tributary of the Ottawa River. Voyageur Creek originates near Orléans Boulevard and flows north through the Chapel Hill North neighborhood. The creek upstream of St. Joseph Boulevard consists of branched channels within forested ravines, however, from OR 174 to the Ottawa River the creek is piped underground. Due to the urban location of the Voyageur Creek headwaters, the watershed receives uncontrolled runoff which results in flooding and erosion (RVCA, 2013). The forest ravines of Voyageur Creek have maintained a

quality riparian buffer of the headwater reaches and approximately 50% of the creek upstream of OR 174 has remained unaltered (RVCA, 2013).

5.2.1.2 Fisheries

Generally, fish species found within the watercourses that flow through the study area are reflective of the watercourse's specific thermal regimes (i.e., warmwater and coolwater) (**Figure 5-2**).

Mud Creek

The thermal regime of Mud Creek has been classified as warmwater and is known to support a diverse bait/forage fish community. Based on fish community sampling completed by the City Stream Watch program in 2012, many fish species including pumpkinseed (*Lepomis gibbosus*), Creek Chub and Northern Redbelly Dace were captured along Mud Creek within the limits of the study area. In addition to fish and fish habitat surveys completed through the City Stream Watch Program, fisheries investigations at various tributaries and drainage features of Mud Creek were also conducted. These surveys were completed in 2009 as part of the Hospital Link/Cumberland Transitway Connection EA. Of the eight (8) reaches that were surveyed, fish were captured at five (5) reaches and no additional species were identified. Overall, the species inventory list shows the diversity and range of species (i.e. bait/forage fish and recreational species) increases within Mud Creek closer to the outlet to Greens Creek.

Black Creek

Although the main-stem of Black Creek falls outside of the study area, tributaries of Black Creek extend north to within the study limits. City Stream Watch thermal regime assessments indicate that Black Creek is classified as a coolwater system. Fish community sampling conducted in 2007 and 2012 during the City Stream Watch stream assessments have resulted in the capture of a number of fish species upstream and downstream. The species list indicates the primary fish community present within Black Creek includes coolwater bait/forage fish species along with a few coarse fish species including Brown Bullhead and Burbot.

Greens Creek

Results of the 2016 City Stream Watch assessment indicate that Greens Creek is primarily a warmwater system with cooler temperatures observed within the upper reaches. The fish community within Greens Creek consists of a wide range of species from bait/forage fish to recreational species, however, the recreational fish species have predominantly been captured near the outlet to the Ottawa River. With respect to the study area, RVCA was able to provide background information from fish community sampling that was carried out in 2010 and 2016 immediately downstream of Innes Road.

The fish community within the study area and the downstream reaches primarily consists of diverse bait/forage fish species who prefer warmwater and coolwater conditions, as well as recreational species with similar thermal regime preferences. A small proportion of the fish species identified within the study area, including Burbot and Trout-Perch, prefer coldwater conditions.

A fish community and freshwater mussel community sampling was completed by Morrison Hershfield Limited (MH) at the Greens Creek Ottawa Road (OR) 174 culvert crossing as part of

the Ottawa Light Rail Transit (LRT) Stage 2 Preliminary Design Study in 2016 through 2018. The survey captured young-of-year (YOY) Burbot. The freshwater mussel sampling resulted in the capture of (3) species not previously known within the creek including Eastern Elliptio (*Elliptio complanata*), Cylindrical Papershell (*Anodontoides ferussacianus*), and Fragile Papershell (Leptodea fragilis). The distribution of the freshwater mussels throughout the upper reaches within the study area are not well known.

Voyageur Creek

Based on the results of City Stream Watch assessments along Voyageur Creek, this tributary has been classified as a coolwater system (RVCA, 2013). Through fish community sampling efforts, only two (2) coolwater species of bait/forage fish have been documented within Voyageur Creek, including Brook Stickleback (*Culaea inconstans*) and Creek Chub (*Semotilus atromaculatus*). The limited fish community within Voyageur Creek is likely a result of the extensive piped segment between OR 174 and the Ottawa River as this presents a potential barrier to upstream fish passage.

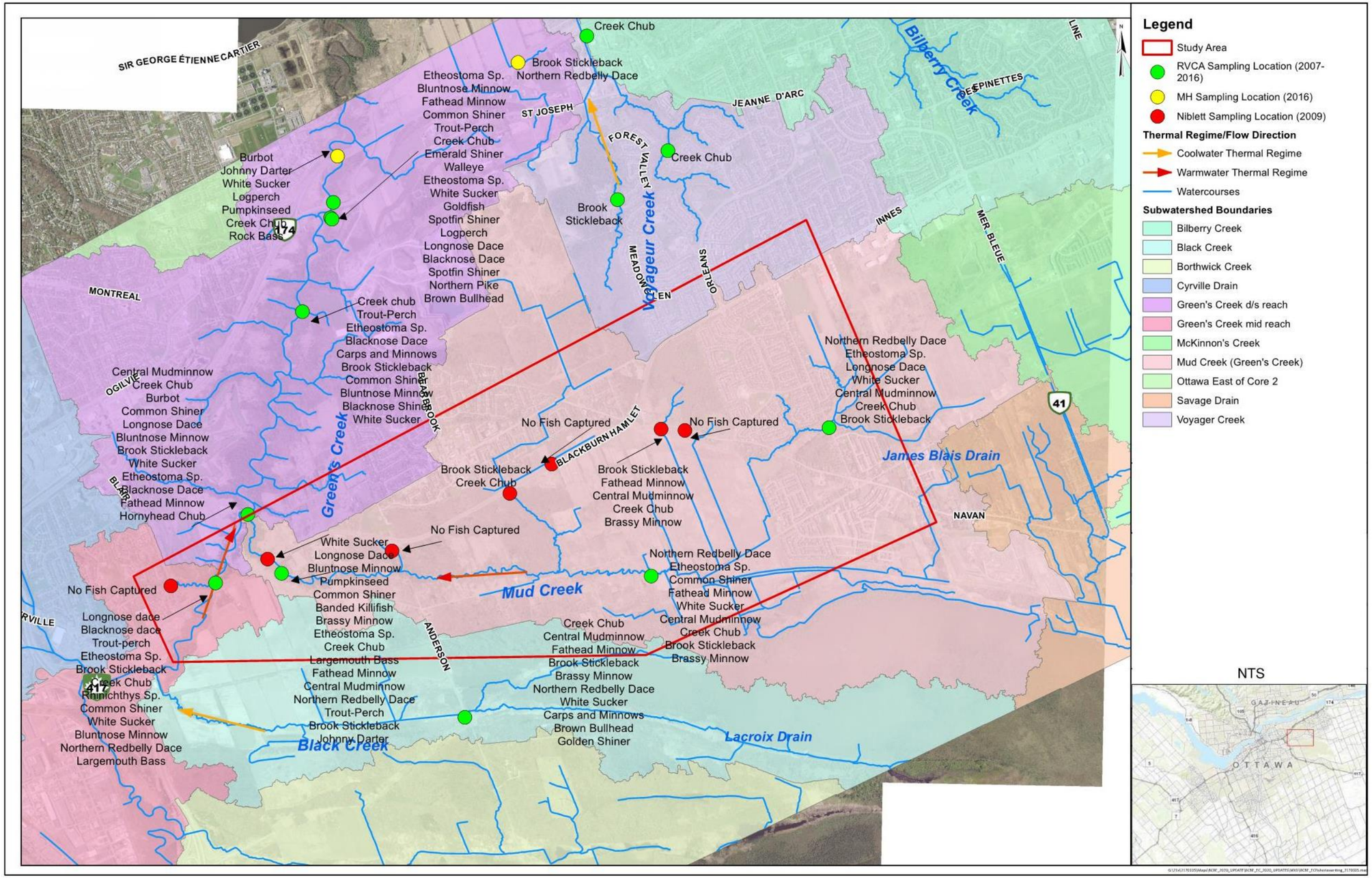

Figure 5-2: Fish & Fish Habitat

5.2.1.3 Aquatic/Fisheries Species at Risk

Based on the review of relevant background information, there have been no recorded aquatic Species at Risk (SAR) (provincially and federally) in the reaches of Mud Creek, Black Creek, and Greens Creek within and adjacent to the study area.

Field surveys were conducted to ground-truth the background information collected as well as to expand upon the knowledge of aquatic environment existing conditions within the study area to the extent possible. Field investigations completed within the EA area were limited to observations collected from publicly accessible lands (ex: roadside rights-of-way). Details of the aquatic/fisheries field survey, completed on October 29, 2020, are available in **APPENDIX D: 1**.

5.2.2 Terrestrial Environment

Existing conditions of the terrestrial environment were evaluated in 2017 and involved undertaking a review of existing background information compiled from a variety of sources, including MNRF, the City of Ottawa, Committee on the Status of Endangered Wildlife in Canada (COSEWIC), ECCC and LIO. In addition, reviews of aerial photography and direct communication with MNRF have been undertaken.

A screening of potential SAR and SAR habitat was completed by confirming if the ranges of the species' habitat overlapped with the study. This was completed by referring to the full list of SAR that occur within the City of Ottawa, produced by the City of Ottawa (2019), and then reviewing observations records with more specific locations. As well, an information request was sent to the MECP on November 4, 2020, for any further information on SAR to confirm what was publicly available and to obtain specific information on SAR occurrences from their internal information. A response was received on December 3, 2020, confirming that the list provided to them was accurate. When a species was potentially present or confirmed to be present, and suitable habitat was available for the SAR, it was included for further review.

Field surveys were conducted to ground-truth the background information collected as well as to expand upon the knowledge of terrestrial SAR and SAR habitat existing conditions within the study area to the extent possible. Field investigations completed within the EA area were limited to observations collected with binoculars from publicly accessible lands (ex: roadside rights-of-way). Areas to the east of Navan Road were completely inaccessible to the survey team during the field surveys as they were under active construction and operation.

Details of the terrestrial field survey, completed on October 29, 2020, are available in **APPENDIX D: 2**.

5.2.2.1 Natural Heritage Features

Designated Natural Areas are defined by resource agencies, municipalities, the government and/or public, through legislation, policies, or approved management plans, to have special or unique value. Such areas may have a variety of ecological, recreational, and/or aesthetic features and functions that are highly valued. There are a number of natural heritage areas within the study area (**Figure 5-3**).

Areas of Natural and Scientific Interest (ANSIs) – Life Science

Blackburn Hamlet Department of National Defence Forest

Located at the northern boundary of the study area the Blackburn Hamlet Department of National Defence (DND) Forest is situated on a highland area of deep sand which drains through small rivulets north and westward to Greens Creek. This Forest is dominated by mature and submature Sugar Maple, American Beech, and Eastern Hemlock. Ground flora contains a relatively large number of regionally uncommon species. Such sand forests are rarely found in a natural or near-natural state in the site district. This area is vulnerable to urban development (AECOM, 2015).

Greens Creek Conservation Area

Greens Creek Conservation Area is situated in the northwest of the study area and forms part of the NCC's Greenbelt. The Greens Creek catchment supports a variety of provincially and regionally rare species. Its geology is unique due to the presence of two (2) types of leda clay, which create inherent slope instability (RVCA, 2016). The slope instability is exacerbated by increased flows due to adjacent development and agriculture (RVCA, 2016). The forest cover is a complex of deciduous and mixed woodland, with young to mature Sugar Maple, Trembling Aspen, Eastern Hemlock, White Spruce, and Eastern White Pine on drier slopes. White Pine and White Cedar are common on the Creek's steep, eroding slopes along with deciduous thicket swamps.

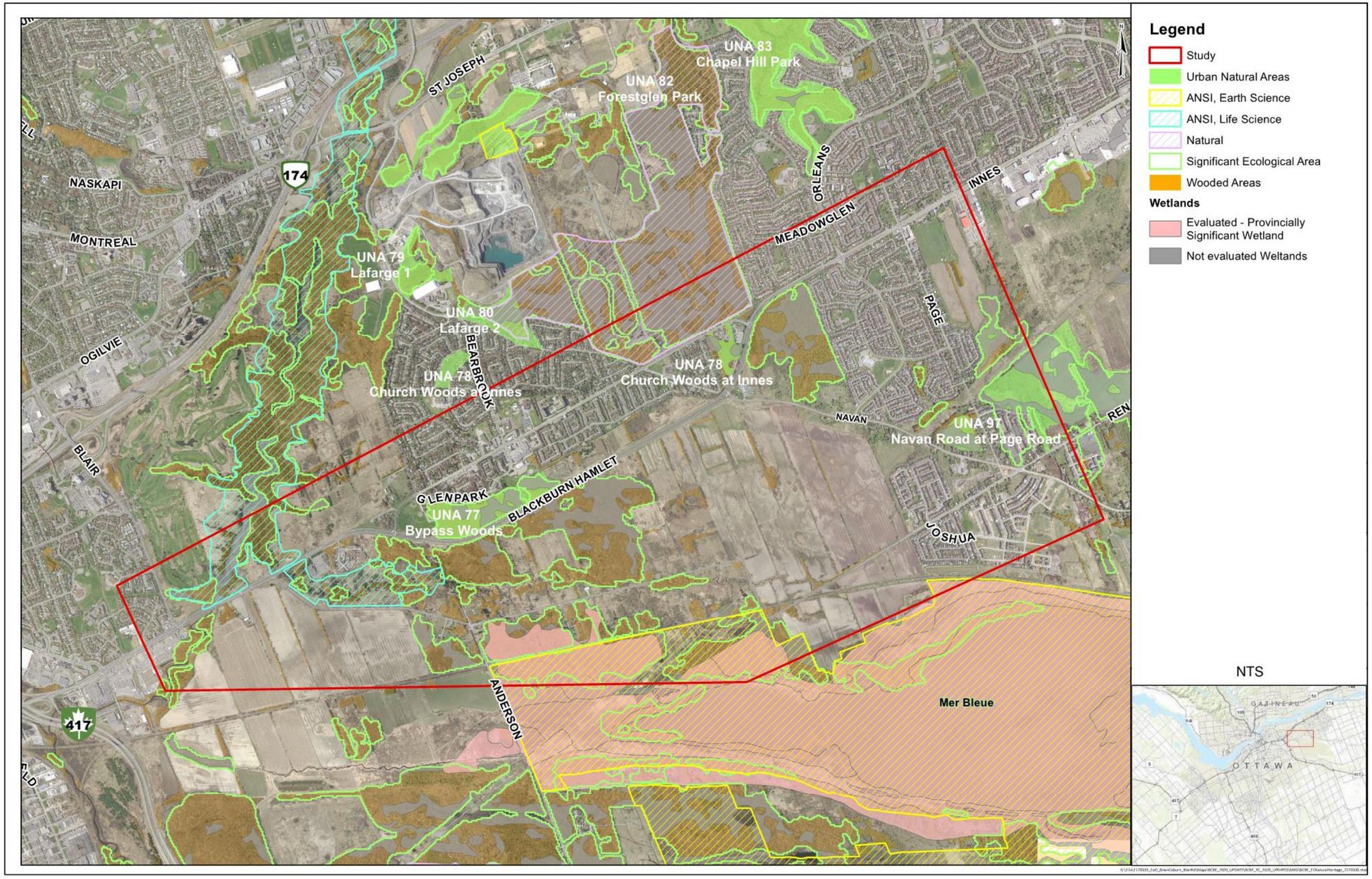

Figure 5-3: Natural Features

ANSIs – Earth Science

Francon Quarry

This area is located north of the study area. Francon Quarry has dawsonite-rich carbonatite sills having a rather unique mineralogy, not found anywhere else in the region (AECOM, 2016). It is currently called the Bearbrook Quarry and is operated by Lafarge Canada Inc. This area is labelled as a 'Special Study Area' under the NCC Greenbelt Master Plan.

'Special Study Areas' consist of privately-owned lands that have attributes of importance to key Greenbelt natural environment lands located immediately adjacent to them. Within the Master Plan, the NCC proposes to explore options that would protect key environmental characteristics within the Special Study Areas and achieve complementary recreational opportunities, and to work with partner agencies and landowners to identify protection options.

Candidate ANSI/Natural Area (MNRF) DND Forest (Part of RCMP Technical and Protective Operations Facility)

The Blackburn Hamlet DND Forest area is located northeast of the Blackburn Hamlet Community. It is a sand-based forest with mixed canopies due to a high-water table resulting in subtle topographic variation between upland and lowland forest. The upland forest cover is dominated by White Birch-Trembling Aspen, Green Ash and Red Maple with scattered Bur Oak and Basswood supporting a variety of the typical and uncommon sand-based ground flora (AECOM, 2016).

City of Ottawa – Urban Natural Areas (UNA)

There are a total of eight (8) urban natural areas located within the study area (Muncaster Environmental Planning Inc. & Brunton Consulting Services, 2005):

- Bypass Woods (UNA 77)
- Church Woods at Innes (UNA 78)
- Lafarge 1 (UNA 79)
- Lafarge 2 (UNA 80)
- Forestglen Park (UNA 82)
- Chapel Hill Park (UNA 83)
- Navan Road at Pagé Road (UNA 97)
- Centre Park (UNA 76)

Significant Woodlands

Significant Woodlands are mapped on Annex 14 of the City of Ottawa's Official Plan to be within the eight (8) UNAs noted above. Potentially Significant Woodlands are found throughout the study area, within the Official Plan Natural Heritage Areas noted above and within ANSIs and Provincially Significant Wetlands (PSW), as well as in the forested areas south and north of the BHBP.

Significant Wetlands

The Provincial Policy Statement (PPS) 2020, prohibits development and site alteration in significant wetlands, also referred to as Provincially Significant Wetlands (PSWs).

Mer Bleue Bog

There is one designated PSW within and immediately surrounding the study area - Mer Bleue Bog. It is located south of the project area and is designated as an Area of Natural and Scientific Interest (Life Science). Mer Bleue Bog is a 7,700-year-old wetland which provides habitat for many regionally rare and significant plants, birds and other wildlife and is managed by the NCC. In addition to being recognized as a PSW, the Mer Bleue Bog is also a wetland of international importance under the Ramsar Convention on Wetlands.

5.2.3 Wildlife

The study area has been identified as potentially containing:

- Specialized Habitat for Wildlife: Amphibian Woodland and Wetland Breeding; Bald Eagle and Osprey Nesting, Foraging and Perching; Deer Yarding; Colonial Nesting Bird (Tree/Shrub, Watercourse Banks); Turtle Wintering and Nesting; Raptor Wintering and Nesting; Area Sensitive Forest Bird Breeding; Waterfowl Staging and Nesting; and Bat Maternity Colony.
- Potential habitat for Special Concern species within the study area include Monarch butterfly, Eastern Wood-pewee, Wood Thrush, eastern milksnake, eastern ribbonsnake, snapping turtle, and Eastern Musk Turtle Vegetation and Insect Species of Conservation Concern.
- Species of Conservation Concern includes species that may be locally rare or in decline, but that have not yet reached the level of rarity that is normally associated with **"**Endangered" or "Threatened" designations under the Ontario *Endangered Species Act*. This information is from the Natural Heritage Information Centre (NHIC) data and presented in **Table 5-1**.

Table 5-1: Vegetation & Insect Species of Conservation Concern

Species of Conservation Concern			
Species Group	**Common Name**	**Scientific Name**	**Rank/Status**
Plants and Lichens	Woodland Pinedrops	*Pterospora andromedea*	S2
	Blistered Jellyskin	*Leptogium corticola*	S2
	Black-foam Lichen	*Anzia colpodes*	SH, THR
	Cupped Fringe Lichen	*Heterodermia hypoleuca*	S2
	Large Purple Fringed Orchid	*Platanthera grandiflora*	S1
	Southern Twayblade	*Neottia bifolia*	S1
Insects	Arrowhead Spiketail	*Cordulegaster obliqua*	S2

Status Ranks

SH: Only known from historical occurrences
S1: Critically imperiled (territory/province)
S2: Imperiled (territory/province level)
THR: Threatened (COSEWIC status)

5.2.3.1 Rare Vegetation

Vegetation information was taken from: the *Urban Natural Areas Environmental Evaluation Study*. Ottawa. Annex A – UNA 77 (Appendix –Vascular Flora observed Table) (Muncaster Environmental Planning Inc. and Brunton Consulting Services. 2005), and UNA 78 (Appendix – Vascular Flora observed).

UNA 77 – Bypass Woods

- Provincially Significant Plants: Carex folliculate (S3 Rank), Carex novae-angliae (S3 Rank).
- Regionally Rare: Hieracium kalmii (*var. fasciculatum*) in swamp forest habitat.
- There are four (4) Regionally Uncommon plants (as documented in the Appendix – Table from UNA 77 Bypass Woods) including: Bearded Shorthusk (*Brachyelytrum erectum*), Interrupted Fern (*Osmunda claytoniana*), Brownish Sedge (*Carex brunnescens*), and American Black Elderberry (*Sambucus canadensis*) plant species in swamp forest habitat.
- One (1) plant was classified as Regionally Rare: Wherry Dowell's Woodfern (*Dryopteris x dowellii*).

UNA 78 – Church Woods at Innes

- Regionally Significant: American shinleaf (*Pyrola americana*).
- Regionally Uncommon plant species in swamp forest habitat; - Bearded Shorthusk (*Brachyelytrum erectum*), Hay-scented Fern (*Dennstaedtia punctilobula*), Hickey's tree club-moss (Lycopodium hickeyi), Interrupted Fern (*Osmunda claytoniana*), and New York fern (*Thelypteris noveboracensis*).

UNA 82 – Forest Glen Park

- Regionally Significant species: Golden Saxifrage (*Chrysosplenium americanum*) in Eastern Hemlock swamp habitat, and Marsh Pennywort (*Hydrocotyle americana*).
- There are seventeen (17) Regionally Uncommon plant species in upland and lowland Eastern Hemlock Habitats including: Slender false foxglove (*Agalinis tenuifolia*), False Nettle (*Boehmeria cylindrica*), and Eastern Rough Sedge (*Carex scabrata*).

UNA 83 – Chapel Hill Park

- Three (3) Regionally Significant Species: Drooping Sedge (*Carex prasina*), Manna Grass (*Glyceria melicaria*), Golden Saxifrage (*Chrysosplenium americanum*) in Coniferous Swamp Forest habitat in seasonal swales.
- Twenty-two (22) Regionally Uncommon plant species including: Fireweed (*Erechtites hieracifolia*), Spotted St. Johnswort (*Hypericum punctatum*), and Ground Pine (*Lycopodium obscurum*).

Greens Creek Conservation Area

- Nine (9) Regionally Significant Species, two (2) of which are Provincial Conservation Concern Species: Witch Hazel (*Hamamelis virginiana*), Floating Bur-reed (*Sparganium*

fluctuans), Cat-tail Sedge (*Carex typhina*) (S2), Small Bellwort (*Uvularia sessifolia*), Spotted Coralroot (*Corallorhiza maculata*), Grove Sandwort (*Moehringia lateriflora*), Climbing Poison-Ivy (*Toxicodendron radicans*), One-flowered Wintergreen (*Moneses uniflora*), Pinesap (*Pterospora andromedea*) (S3).

Mer Bleue Conservation Area

- Over 64 Regionally Significant Species, of which two (2) are additionally Provincial Conservation Concern Species – Twinned Bladderwort (*Utricularia geminiscapa)* (S3) and Downy Goldenrod (*Solidago puberula*) (S2).

DND Woods

- Five (5) Regionally Significant Species: Forest Meadow Grass (*Poa saltuensis*), Onion Sedge (*Carex prasina*), Round-leaved Orchid (*Platanthera orbiculata*), Three-leaved Snakeroot (*Sanicula trifoliata*), and Figwort (*Scrophularia lanceolata*).

5.2.3.2 Animal Movement Corridor

Animal movement corridors are elongated areas that are used by wildlife to move from one habitat to another habitat (MNRF, 2015b). The following animal movement corridors are potentially located in the study area:

- Amphibian Movement Corridors (Terrestrial): Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.
- Deer Movement Corridors: Corridors important for deer to be able to access seasonally important life-cycle habitats or to access new habitat for dispersing individuals by minimizing their vulnerability while travelling.

5.2.3.3 Terrestrial Species at Risk

The following species at risk, as specified under the Endangered Species Act, 2007 (ESA) or the Species at Risk Act (SARA) either have been identified as present, or they may potentially be found within the study area. The list of species is present in the Table below.

Table 5-2: Terrestrial Species at Risk

Species		Designations*		Legislation**	
Common Name	**Scientific Name**	**Federal (SARA)**	**Provincial (SARO)**	**Federal**	**Provincial**
Butternut	*Juglans cinerea*	END	SC	SARA	ESA
Flooded Jellyskin	*Leptogium rivulare*	THR	NAR	SARA	-
Pale-bellied Frost Lichen	*Physconia subpallida*	END	END	SARA	ESA
Monarch Butterfly	*Danaus plexippus*	SC	SC	SARA	FWCA, ESA
Blanding's Turtle	*Emydoidea blandingii*	END	THR	SARA	FWCA, ESA

Species		Designations*		Legislation**	
Common Name	Scientific Name	Federal (SARA)	Provincial (SARO)	Federal	Provincial
Eastern Milksnake	*Lampropeltis triangulum*	SC	NS	SARA	FWCA, ESA
Eastern Ribbonsnake	*Thamnophis sauritus*	SC	SC	SARA	FWCA, ESA
Northern Map Turtle	*Graptemys geographica*	SC	SC	SARA	FWCA, ESA
Snapping Turtle	*Chelydra serpentina*	SC	SC	-	FWCA, ESA
Western Chorus Frog	*Pseudacris triseriata*	THR	NS	SARA	-
Eastern Musk Turtle	*Sternotherus odoratus*	SC	SC	SARA	FWCA, ESA
Eastern Hog-nosed snake[2]	*Heterodon platirhinos*	THR	THR	SARA	ESA
Bank Swallow	*Riparia*	THR	THR	MBCA, SARA	ESA
Barn Swallow	*Hirundo rustica*	THR	SC	MBCA, SARA	ESA
Bobolink	*Dolichonyx oryzivorus*	THR	THR	MBCA, SARA	ESA
Chimney Swift	*Chaetura pelagica*	THR	THR	MBCA, SARA	ESA
Eastern Meadowlark	*Sturnella magna*	THR	THR	MBCA, SARA	ESA
Eastern Wood-pewee	*Contopus virens*	SC	SC	MBCA, SARA	ESA
Henslow's Sparrow	*Ammodramus henslowii*	END	END	MBCA,	ESA
Wood Thrush	*Hylocichla mustelina*	THR	SC	MBCA, SARA	ESA
Least Bittern	*Ixobrychus exilis*	THR	THR	MBCA, SARA	ESA
Common Nighthawk	*Chordeiles minor*	THR	SC	MBCA, SARA	ESA
Little Brown Myotis	*Myotis lucifugus*	END	END	SARA	FWCA, ESA
Northern Myotis	*Myotis septentrionalis*	END	END	SARA	FWCA, ESA
Tri-colored Bat	*Perimyotis subflavus*	END	END	SARA	ESA

[2] This reptile was recorded in square 18VR53 from NHIC database in February 2015 and will need to be verified by MNRF as an observation of a snake during the winter months is unlikely and this is outside of the species natural range.

Species		Designations*		Legislation**	
Common Name	Scientific Name	Federal (SARA)	Provincial (SARO)	Federal	Provincial
Eastern Small Footed Myotis	*Myotis leibii*	-	END	-	FWCA, ESA

*Designations: **END:** Endangered **NAR:** Not at Risk **NS:** No Status **THR:** Threatened **SC:** Special Concern

Legislation: **SARA: Species at Risk Act **SARO:** Species at Risk Ontario **ESA:** Endangered Species Act **ESA:** Endangered Species Act **MBCA:** Migratory Bird Conservation Act

Potential SAR habitat was identified based on review of 2014 aerial photography for the study area. **Figure 5-4** identifies the potential for bird, bat and amphibian SAR habitat based on the 2023 federal and provincial species listings and 2014 aerial photography, as determined by the study team. It is noted that actual conditions may differ from those illustrated and grasslands are currently under mostly active agricultural activities.

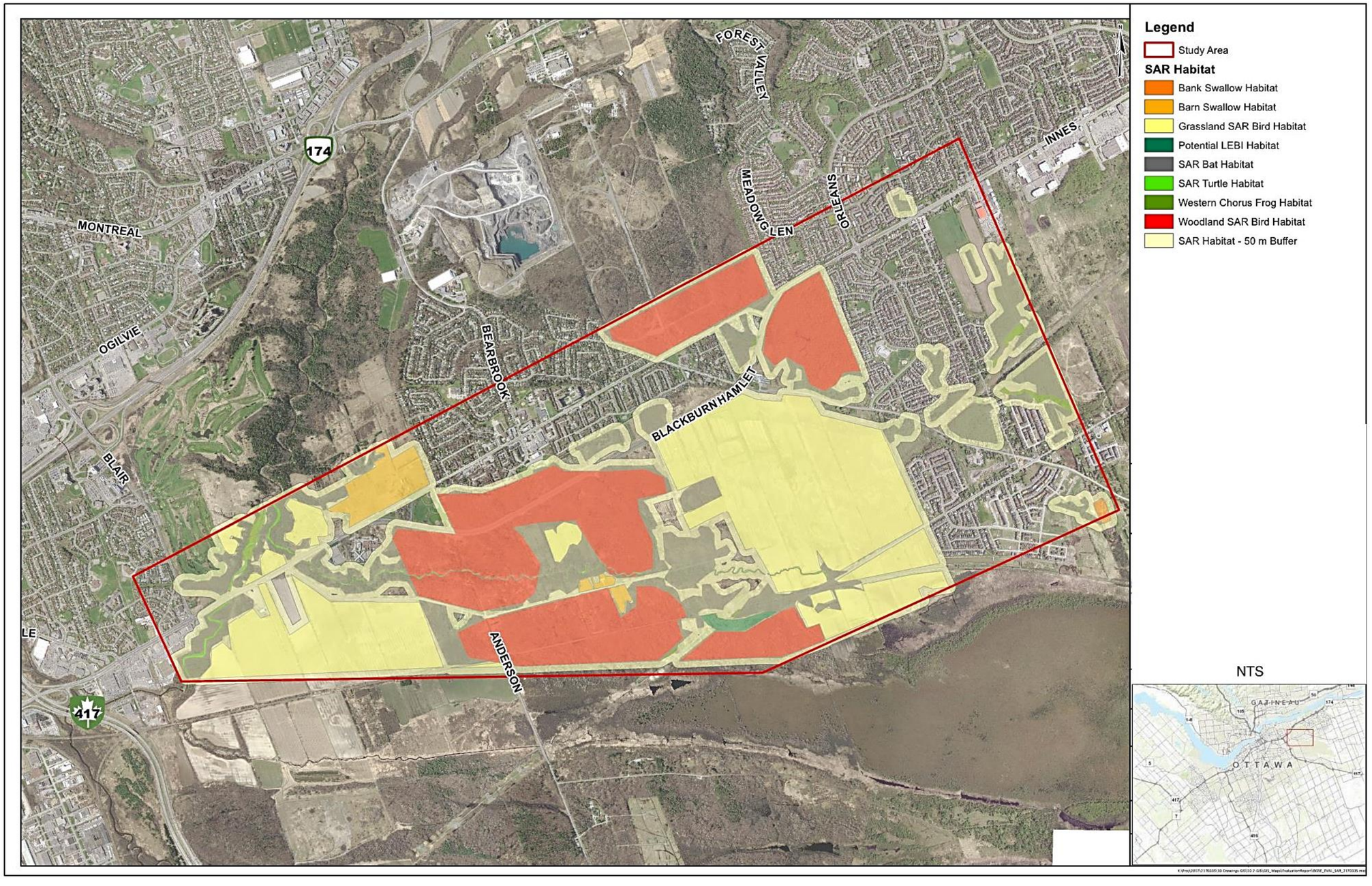

Figure 5-4: Potential Species at Risk habitat (Desktop Review)

5.2.4 Geological Environment

The geologic subsurface conditions were established based on a review of the Published Geologic Survey of Canada (GSC) mapping; past geotechnical reports undertaken within the study area by Golder Associates Ltd. (Golder) and McRostie Genest St-Louis and Associates; and reports published in the MTO GEOCRES Library (Golder, 2018a). Golder documented findings in a Technical Memorandum (2018a), which are summarized in the sections below and available in **APPENDIX D: 3**.

5.2.4.1 Bedrock Geology

Depths to bedrock range from 25 to 50 metres over most of the study area except for the extreme west and east ends where the bedrock elevation rises west of Anderson Road and east of Navan Road. The study area bedrock consists primarily of shale (Billings Formation) and limestone (Lindsay, Bobcaygeon and Gull River Formations) (**Figure 5-5**). Bedrock outcrops were only encountered in the far northwest portion of the study area at the crossing of Greens Creek at Innes Road and along Beaverpond Drive, and the far northeast portion of the study area (west of Orléans Boulevard, just north of Innes Road).

5.2.4.2 Surficial Geology

The study area is within the physiographic region known as the Ottawa Valley Clay Plain characterized by an extensive deposit of marine clay deposited within the Champlain Sea basin, interrupted by sand or bedrock ridges. Subsurface conditions consist of a thick deposit of weak and compressible marine silty clay, which is often overlain with a relatively thin sand cap. No significant or extensive fill layers were found to exist within the study area, with sporadic filling, including pavement structures from the existing roadways encountered at some locations. Throughout most of the study area, thin organic topsoil deposits were encountered with thicker and peaty organic soils (up to approximately 2 metres) found in isolated areas south of Blair Road and near Pagé Road. Thick peat and organic deposits are also expected in the area of the Mer Bleue bog. Alluvial sand deposits exist on the western and central portions of the study area with depths upwards of 6 metres encountered in the most western portion of the study area. East of Bearbrook Road, sand deposits with thicknesses up to 4 metres were encountered. However, the sand cap was not encountered at all locations and is considered to have been eroded sporadically. The sand tends to be in a generally loose to compact state (**Figure 5-6**).

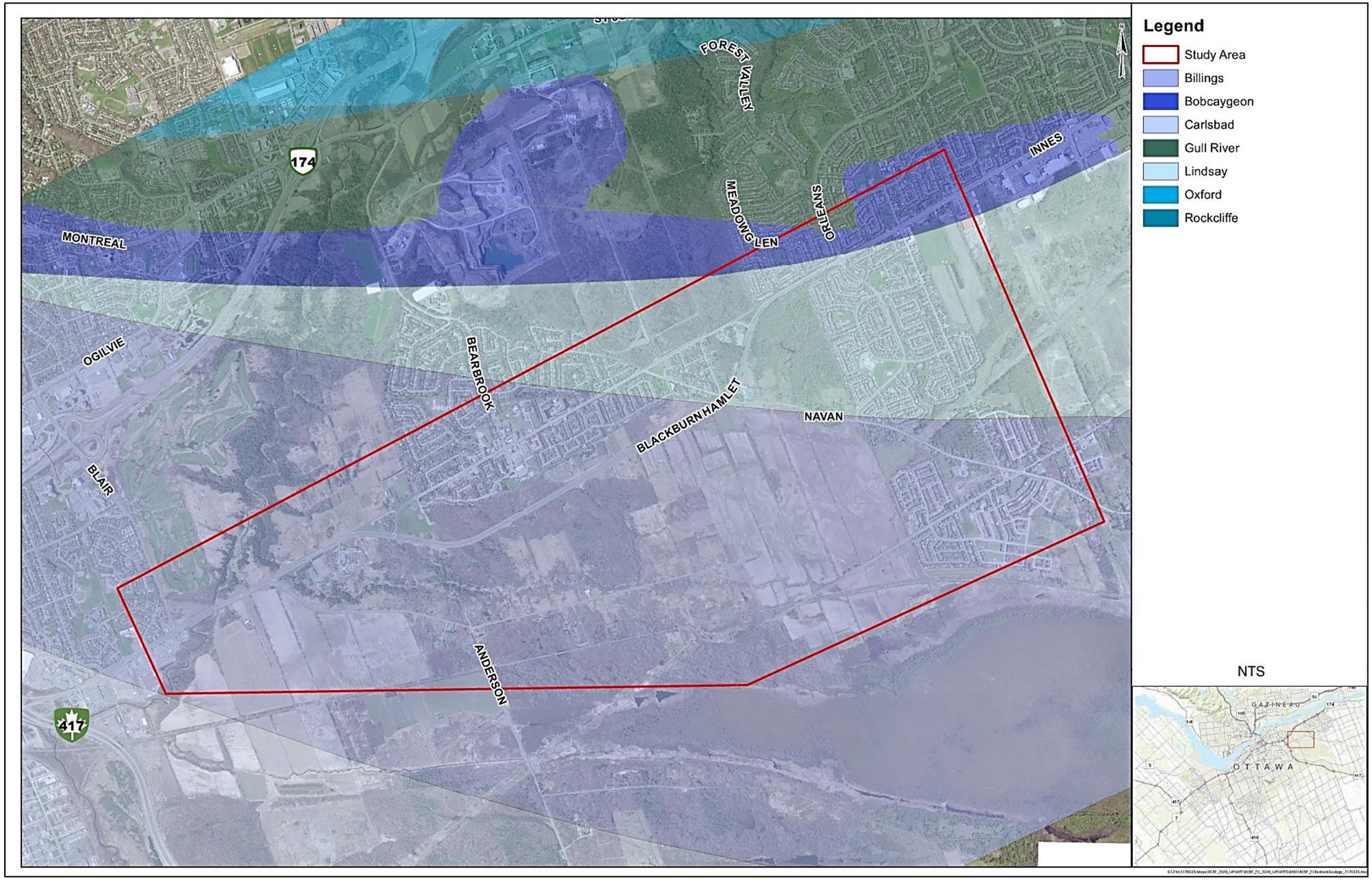

Figure 5-5: Bedrock Geology

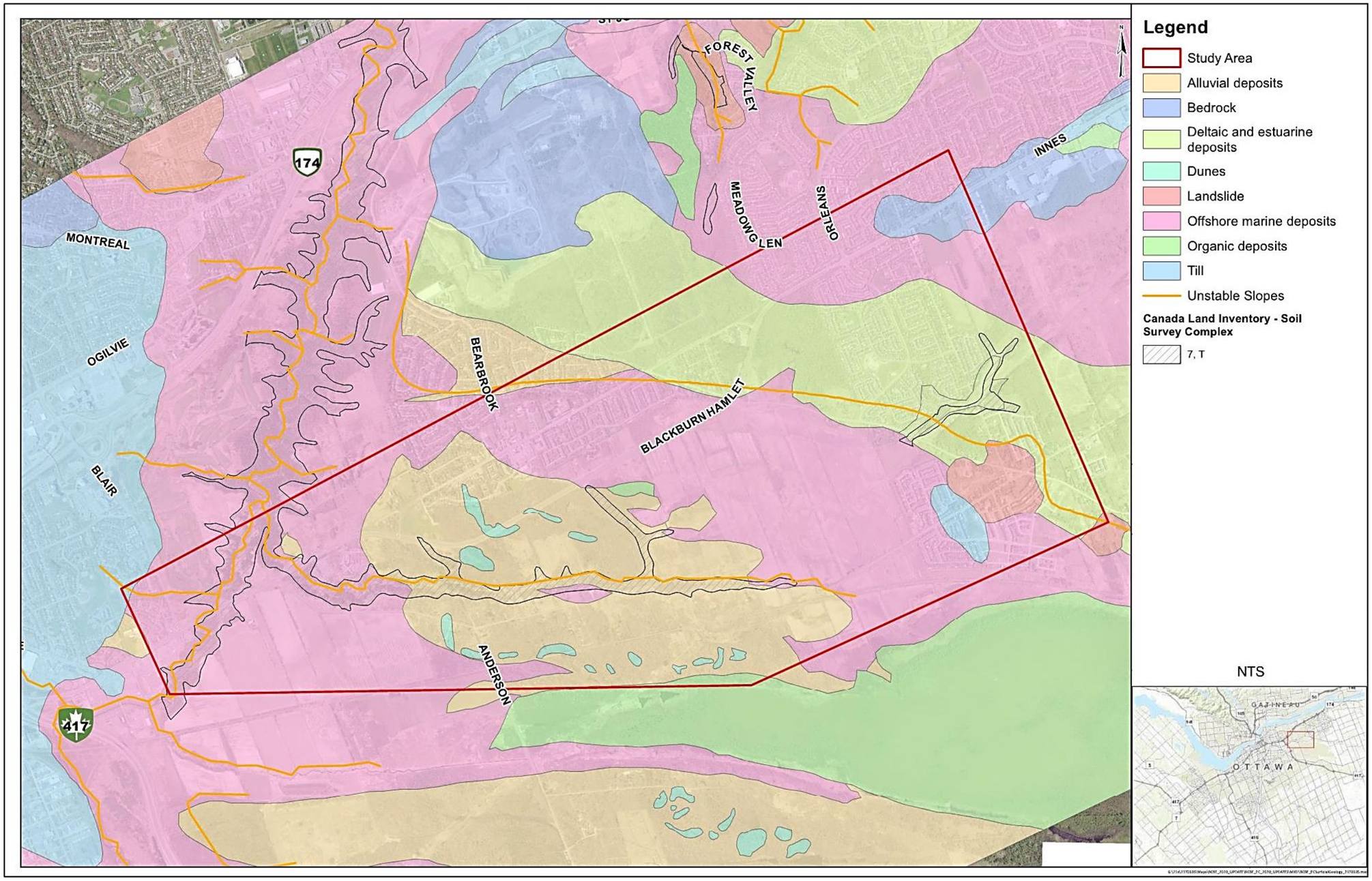

Figure 5-6: Surficial Geology

Silty Clay

A thick deposit of sensitive and compressible silty clay is found below the fill, sand cap and organic matter, where present. Weathered grey-brown crusts with generally stiff to very stiff consistency are found in areas of thick silty clay deposits and present singularly in areas where the silty clay deposits are thinner (in the vicinity of Renaud Road and east of Blair Road). Depths of the weathered zone vary from approximately 1 to 4.5 m based on previous geotechnical borehole information.

The silty clay depths range up to 30 m between about Anderson Road to the eastern limits of the study area with layers of approximately 3 to 9 m thickness in the southeast corner of the study area and absent in the area surrounding Blair Road. Below the weathering, the silty clay is grey with deeper layers having occasional black mottling and containing silt, fine sand seams and clayey silt layers. Typically, the silty clay deposit has a firm consistency with shear strengths generally increasing with depth. Throughout the study area, the silty clay varies from soft to stiff with soft portions (i.e., shear strengths equal or less than 25 kilopascals) located mainly in the eastern half of the study area; and firm to stiff clay in the western portion. The deposit is indicated to be a sensitive to extra sensitive/quick clay.

Glacial Till

Underlying the silty clay is glacial till with the exception of some localized areas, where silty clay was not encountered. At such sites, glacial till is found at the ground surface or immediately below any surficial fill or the sand cap (area west of Anderson Road and southeastern portion of study area). Glacial till depths range in thickness from about 1 to 4 m generally; and consist of gravel, cobbles, and boulders in a matrix of sandy silt and silty sand with a trace to some clay. Generally, the glacial till is expected to be compact to dense.

5.2.4.3 Slopes & Ravines

The Canada Land Inventory (CLI) is an interpretative system for assessing the effects of climate and soil characteristics as they relate to agriculture. The system classifies mineral soils into seven groups according to their potentials and limitations, with the first three classes (Classes 1-3) capable of sustained production of cultivated field crops and are considered prime agricultural land resources (OMAFRA, 2020). The seventh class (Class 7) has no agricultural capability and includes marsh, rockland and soil on very steep slopes (OMAFRA, 2020). Various soil subclasses further identify any limitations of the soils on agriculture. As it relates to steep slopes, Subclass T - Topography denotes limitations due to slope steepness and length (OMAFRA, 2020). As depicted in **Figure 5-6**, soils classified as 7-T are located within the study area, indicating steep and/or long slopes.

Schedule K of the City's Official Plan identifies unstable slopes within the study area, which are predominantly found along Greens Creek and Mud Creek.

Greens Creek

The Greens Creek main-stem channel meanders through deeply incised channels due to the predominantly clay-based substrates. This characteristic of highly unstable slopes within the Greens Creek watershed has led to frequent occurrences of slope failure and landslides,

primarily between St. Joseph Boulevard and Innes Road (RVCA, 2016). Just upstream of Innes Road, the Greens Creek valley system is approximately 5 m in height. This height increases significantly downstream of Innes Road

Mud Creek

Stream bank erosion is widespread along the Mud Creek valley due to both the undercutting of the toe of the slope and high groundwater levels during the spring. The Mud Creek valley exhibits the potential for retrogressive flow slides (JTB Environmental Systems Inc. and J.F. Sabourin & Associates Inc., 2009).

A slope stability hazard assessment was completed by Golder Associates Ltd. in 2015 for Mud Creek (Golder, 2015). The assessment evaluates the stability of the creek and conducts qualitative assessments for the uncontrolled erosion along Mud Creek between Renaud Road and Innes Road.

As part of the above work, two site visits were conducted in the summer of 2012 by Golder personnel to observe the creek bank conditions, visible signs of previous slope failures, and exposed outcrops of native soil. A total of 16 locations were identified by Golder where there was evidence of previous slope instability. The identified slope failures ranged from relatively recently exposed silty clay slopes to areas of observed slope (Golder, 2015).

Golder determined that the valley slope height ranges from approximately 9 m near Renaud Road, to approximately 18 m near Innes Road. Valley slopes are generally inclined from horizontal at angles ranging from approximately 20 to 40 degrees. Golder further determined, that, based on the measured undrained shear strength values, the valley slopes are not considered to be susceptible to retrogressive earthflow sliding, in the event of a slope failure.

Within the upper reach of the Mud Creek valley, Golder has determined (2015):

- The setback distance to the Limit of Hazard Lands ranges from 13 to 28 m between Renaud Road and Weir Road. For planning purposes, a general setback distance of 30 m is recommended.
- The setback distances to the Limit of Hazard Lands range up to about 47 m below Weir Road to the tributary stream that joins Mud Creek. For planning purposes, a general setback of 50 m is recommended for planning purposes.

Golder (2015) notes that the results are applicable to the general sections of slope only, and site-specific studies are required for the detailed evaluation needed for the design of any development adjacent to individual or specific slopes. Project specific slope stability and meander setback investigations were completed for the preferred alternative corridor and are further described as Design Considerations in **Section 7.1** of this report.

5.2.4.4 Groundwater

Groundwater levels within the silty clay deposit were measured at approximately ground surface to about 5 m in depth, and more generally about 2 to 3 m depth. Within the glacial till and bedrock, groundwater levels were generally lower (from approximately 1 to 8 m in depth). Groundwater levels are expected to fluctuate seasonally with higher groundwater levels in spring (Golder, 2018a).

5.3 Social Environment

5.3.1 Federal Planning

5.3.1.1 National Capital Act

The Parliament of Canada passed the *National Capital Act* in 1985. This Act established the NCC, a Crown corporation whose responsibility is "to prepare plans for and assist in the development, conservation and improvement of the National Capital Region in order that the nature and character of the seat of the Government of Canada may be in accordance with its national significance." (R.S.C. 1985, c. N-4, s. 10.1).

The 2013 Greenbelt Master Plan, which sets out the planning policies for the use and development of all Greenbelt lands, is one of the plans that has been prepared to fulfill this requirement. Additionally, the NCC is mandated to "coordinate the development of public lands in the National Capital Region (NCR)", which includes reviewing all changes of land, use, construction, demolition, or other works on federal lands in the region. The NCC carries out this function through its Federal Land Use and Transaction Design processes.

5.3.1.2 Plan for Canada's Capital: 2017 – 2067

The renewed mandate of the NCC, implemented in 2017, has brought into focus the importance of successful long-term planning and decisive stewardship actions to ensure that the Capital is worthy of its important national role. The Plan for Canada's Capital (PFCC) is the preeminent planning document of the NCC and its Capital Planning Framework.

The PFCC outlines a framework for the continued evolution of the Capital to ensure it remains a welcoming and beautiful place, and that it makes Canadians proud.

The PFCC notes that in 2067, the Greenbelt will remain a fundamental part of the region's vast network of natural spaces, in the midst of an urbanized region. The projected population increase will have an impact on the Greenbelt, as those green open lands will become more of a rarity. Much of the growth within the City of Ottawa could take place in communities adjacent to the Greenbelt. Key policy directions for the Greenbelt are identified in the PFCC for the next 50 years, and include:

- Where new infrastructure must cross the Greenbelt since it is demonstrated that there is no other viable alternative, the NCC will encourage clustering of the infrastructure in corridors to avoid further fragmentation of the land base. Any proposed new transportation infrastructure must be evaluated through the cumulative effects assessment process the NCC has jointly established with the City of Ottawa.

With regards to policy directions related to the Capital and the regional economy over the next 50 years the PFCC states that:

- Changes to federal accommodations will include locating facilities near readily available transit, and retrofitting or replacing buildings with more energy efficient design will contribute to regional sustainability and reduce environmental impacts.
- In all aspects of its mandate, the NCC will support the use and development of smart technologies, and the sharing and exchange of information through partnerships with other federal agencies and the municipalities, when appropriate.

5.3.1.3 National Capital Commission Sustainable Development Strategy

The NCC's Sustainable Development Strategy aims to foster environmental protection within Canada's Capital Region. The current Sustainable Development Strategy (2018-2023) aims to protect the natural and cultural heritage, as well as contribute to the improved health and well-being of all residents and visitors in the National Capital Region (NCC, 2018). The NCC recognizes that creating sustainable communities requires collaboration across political and geographical boundaries and has identified thirty-six actions within development with a goal of completion by 2023. The goals and a sample of defined actions are summarized below:

1. **Effective Action on Climate Change:** The NCC commits to working with its partners to better understand climate impact, vulnerability, and risk to increase the region's resiliency. This goal includes the promotion of sustainable transportation and mobility within the National Capital Region.
2. **Low Carbon Government:** The NCC will ensure that its future investments reduce greenhouse gas emissions, resulting in overall cost savings. This includes investing in measures to support low-carbon forms of transportation to reduce emissions from employee commuting and business travel.
3. **Modern and Resilient Infrastructure:** The NCC notes that long-term planning and stewardship functions with respect to federal lands, as well as through the federal land use, design and transaction approval process is vital in working toward more climate resilient infrastructure.
4. **Clean Energy:** The NCC recognizes that energy conservation is linked to public health and environmental well-being.
5. **Pristine Lakes and Rivers:** The NCC aims to continue protecting shoreline vegetation zones within leased properties and prioritize restoring degraded shorelines to improve ecosystem integrity.
6. **Sustainably Managed Lands and Forests:** As actionable goals the NCC aims to promote connectivity of ecosystems and habitats, control the spread of invasive plant species, and implement a forest management strategy with consideration for natural and cultural heritage values and a focus on urban tree protection.
7. **Healthy Wildlife Populations:** Actionable goals include but are not limited to acquiring and analyzing ecological land classification data, creating a pollinator habitat landscape program, and developing guidelines to minimize wildlife mortality on roadways.
    a. **Sustainable Food:** The NCC supports sustainable food production on its lands. The NCC aims to enhance the conservation and quality of soil and water resources.
8. **Connecting Canadians with Nature:** The NCC aims to promote greater accessibility of Capital parks and greenspaces by public transit, and collaboration with partners to install new bike share locations in the NCC urban greenspaces.
9. **Safe and Healthy Communities:** The NCC applies environmental standards to operations and practices on its lands to prevent the pollution of lands, groundwater, and surface water. It additionally manages a decontamination program for contaminated sites on NCC lands.

5.3.1.4 National Capital Commission 2013 Greenbelt Master Plan

The PFCC is the high-level strategic plan for all federal lands in the Capital, while the master plans such as the Greenbelt Master Plan (GMP) provide more specific policy direction to guide

area planning, development, and management decisions. The 1996 GMP established land use strategies to provide recreation and attractive landscapes, to improve damaged and abandoned lands, to secure natural spaces and to support agriculture and forestry. The 2013 GMP considers the extent to which the Greenbelt is presently meeting these objectives and looks ahead to where the Greenbelt could be in 2067.

The GMP takes an integrated land use planning approach that incorporates ecological, economic and social factors in Plan proposals and policies. The GMP sets policies for:

- Protected ecologically significant habitats.
- A connected system of natural lands.
- Sustainable farming.
- Capital experiences, achieved through completion of a recreational pathway system and offering of visitor features such as trails, protected views, and interpretation areas.
- Greenbelt profile and environmental leadership.
- Federal and non-federal facilities which respect the Greenbelt roles of Natural Environment, Sustainable Agriculture and Capital Experiences and Recreation and which demonstrate sustainable design and operations.

Transportation infrastructure, including both roads and transit, within the GMP framework is identified in Section 6.7 of the GMP. The Plan notes that this infrastructure has considerable impacts on the Greenbelt environment, including noise, visual nuisance, habitat loss and fragmentation, and pollution of air, water, and land. Devaluation of the landscape and of natural areas in terms of their recreation and tourism value can also be a significant economic factor. The NCC is committed to achieving sustainable transportation that complies with environmental conservation best practices in the Greenbelt, through collaboration with partners and stakeholders. The NCC will promote and give preference to sustainable, safe and active transportation infrastructure that is consistent with the vision, roles and goals of the Greenbelt and is in accordance with the following policies:

a) Future transportation infrastructure projects that are proposed to be located within or adjacent to the Greenbelt will be considered according to the categories determined through the Cumulative Effects Assessment Study.
b) Work with the City of Ottawa, and other authorities to ensure that projects listed, are planned from the earliest stage to ensure early consultation and collaboration with, and consideration of the input of the NCC.
c) Apply the “No net loss” ecological principle to transportation infrastructure projects, through identification and implementation of appropriate mitigation measures. Off-site restoration may be sought where on-site restoration cannot be achieved.
d) Required, of proponents of any future new transportation infrastructure or improvement to existing transportation infrastructure, a thorough assessment of the loss in environmental value resulting from any such proposal(s), such assessment to include a cumulative effects component.
e) Work with the City of Ottawa and other jurisdictions with the aim of closing unopened road allowances and existing low volume roads in the Greenbelt.
f) Give priority to transport demand management measures when assessing new infrastructure proposals that respond to increasing demand for access to and within the Greenbelt.

g) Apply context sensitive design best practices to transportation infrastructure projects that aim to conserve Greenbelt natural and visual resources. Take landscape ecology principles into account to achieve ecological connectivity and wildlife safety. Include measures that seek to “blend” the infrastructure project into the Greenbelt landscape and protect views. Require the incorporation of wildlife-friendly designs and crossing facilities, where appropriate, in transportation infrastructure projects that affect natural areas on the Greenbelt.

h) Work with proponents of transportation infrastructure projects to ensure the provision of a symbolic and distinctive sense of place and arrival, to and through the Greenbelt.

i) Discourage Park-and-Ride facilities from locating within the Greenbelt.

j) Identify and implement measures to mitigate the deficiencies of existing transportation corridors and other structures and their impacts upon terrestrial and aquatic habitat.

k) Encourage the reduction or elimination of unnecessary lighting along transportation routes and at facilities in the Greenbelt to help achieve a night sky quality, without compromising safety.

l) Work with stakeholders to monitor and evaluate the extent of fragmentation caused by transportation projects and determine the effectiveness of mitigation measures.

m) Maintain and enhance the continuity of recreational pathways and natural links in the planning, design, and function of transportation infrastructure.

The study area is located within the Mer Bleue Sector as defined in the Greenbelt Master Plan. The Sector is characterized by the Mer Bleue designated wetland and the farmlands south of Blackburn Hamlet. **Figure 5-7** highlights the various sector designations including:

- H – Mud Creek Core Natural Area
- K – Innes, Navan, Renaud Road Farms
- M – Visual Quality
- N – Chapel Hill South
- O – Blackburn Station
- Q – Blackburn West Institutional-Commercial Node

Sector specific policies and considerations relate to the tiered framework and mitigation approaches developed through the Joint Cumulative Effects Assessment Study to prevent significant adverse environmental effects on the Greenbelt. Additionally, it is recommended that development have regard for the existing NCC studies, particularly those addressing erosion control thresholds.

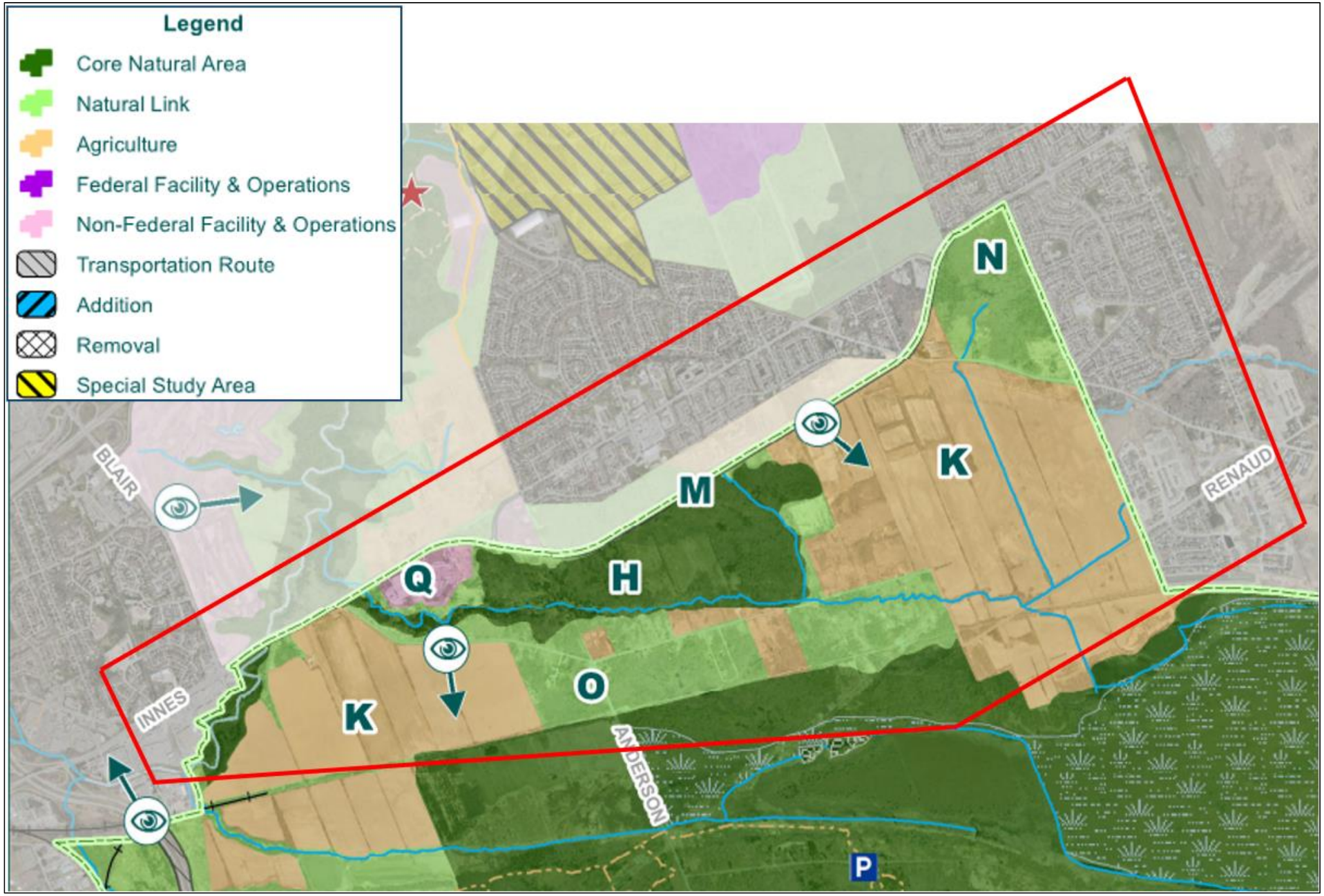

Figure 5-7: Mer Bleue Sector, Greenbelt Master Plan

5.3.1.5 Assessment of Cumulative Effects of Transportation Infrastructure on the National Capital Greenbelt

The *Joint Study to Assess Cumulative Effects of Transportation Infrastructure on the National Capital Greenbelt* (2012) was undertaken in partnership by the NCC and the City of Ottawa to identify projects within the TMP and other transportation projects that could have an impact on the environmental integrity of the federal Greenbelt lands.

The Study developed and implemented a cumulative effects framework and made recommendations for the study of future transportation projects. Thirty projects (transit and roads) within and/or adjacent to the Greenbelt were identified over the planning horizon to 2031.

Two categories of projects (Category 1 and Category 2) were defined, with Category 1 projects having the greatest potential contribution to cumulative effects, especially within Core Natural Areas and Natural Area Linkages.

The Cumberland Transitway (OR 174 to Navan Road) and the Blackburn Hamlet Bypass Widening were approved by the NCC “with conditions.” The Brian Coburn Boulevard (Blackburn Hamlet Bypass) Extension and Chapel Hill Park and Ride Lot were approved by the NCC subject to standard review and approval processes.

The “approved” projects are included in the Greenbelt Master Plan and will be subject to standard design, review and review processes and mitigation will be determined by the necessary EA. The “approved with conditions” projects to be included in the Greenbelt Master Plan are subject to measures to minimize, compensate or offset contributions to cumulative effects on the Greenbelt, with the possibility of a designation “Not Include” in cases where specific mitigative conditions cannot be implemented satisfactorily.

5.3.1.6 Pathway Network for Canada’s Capital Region, 2006 Strategic Plan

The 2006 Pathway Network Strategic Plan is a comprehensive strategy and vision for the planning, management, and expansion of the Capital pathway network. The 2006 Strategic Plan, prepared by the NCC in partnership with the City of Ottawa and the Ville de Gatineau, complements the NCC’s Plan for Canada’s Capital, and sets out a clear and common vision for the integrated network of pathways within Canada’s Capital Region. While the Strategic Plan does not identify projects for implementation, it does include objectives, strategies, and policies to promote the safety and enjoyment of the pathways and ensures that the potential of the network is optimized.

5.3.2 Provincial Planning

5.3.2.1 Provincial Policy Statement

The Provincial Policy Statement (PPS), 2020, is authorized under Section 3 of the Planning Act, R.S.O. 1990. It contains policies relating to a wide range of areas of Provincial interest. Of relevance regarding the study, are policies that relate to recreation, transportation systems and infrastructure, long-term economic prosperity, and the protection of natural, cultural, and built heritage. In particular, the PPS promotes:

- Healthy and active communities by facilitating active transportation and community connectivity.
- The planning for and protection of corridors and rights-of-way for transportation infrastructure and transit to meet current and projected needs.
- Providing safe, efficient, cost-effective, and reliable multimodal transportation systems that facilitate the movement of people, are integrated with adjacent systems and are appropriate to address projected needs.
- Maintaining or restoring the diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems and recognizing linkages between and among natural heritage features and areas, surface water features and groundwater features.
- Restricting development and site alteration in or adjacent to significant natural areas unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.
- Restricting development and site alteration in habitat of endangered or threatened species except in accordance with provincial and federal requirements.
- Restricting development and site alteration in or near sensitive surface or groundwater features such that their features and related hydrological functions will be protected, improved, or restored.
- Conserving heritage and significant cultural heritage landscapes.

5.3.3 Municipal Planning

5.3.3.1 City of Ottawa Official Plan (2013)

The City of Ottawa Official Plan (OP) provides a vision for the future growth of the city and a policy framework to guide the city's physical development to the year 2031. It is a legal document that addresses matters of provincial interest defined by the Planning Act and the Provincial Policy Statement. The City of Ottawa's OP was adopted by City Council in May 2003 and approved by the Minister of Municipal Affairs and Housing in November 2003. Two major updates to the OP were adopted as part of a comprehensive review of the City's Official Plan completed in 2013. On November 26, 2013, Ottawa City Council unanimously approved the Official Plan Amendment #150 (OPA#150); the plan was approved by the Minister of Municipal Affairs on April 24, 2014, although appeals are still pending. Policies contained within the approved plan update are still considered council policy pending appeals.

The purpose of OPA#180 is to make changes to the various parts of the Official Plan to implement changes recommended by the Employment Land Review, the LEAR Review for Agricultural Land and the extension of the planning horizon for the Official Plan to 2036. This amendment constitutes part of the comprehensive 5-year review undertaken by the City in 2013 and as required by Section 26 of the *Planning Act*. Official Plan Amendment 180 was adopted by By-law 2017-19 on January 25th, 2017, and forwarded to the Ministry of Municipal Affairs and Housing for provincial approval.

5.3.3.2 City of Ottawa Official Plan (2022)

The City of Ottawa's new Official Plan (OP) was adopted by City Council on November 24th, 2021, and approved by the Ontario Ministry of Municipal Affairs and Housing on November 4th, 2022. The City's new OP is an update from the previous 2003 OP and directs the City's growth

to 2046. The OP positions Ottawa to be a flexible and resilient city where people want to live, work and play.

The Strategic Directions in the OP outlines five policy areas, referred to as 'Big Moves,' to guide the City towards the goal of becoming the most livable mid-sized city in North America over the next century. They include:

- Achieve, by the end of the planning period, more growth by intensification than by greenfield development.
- By 2046, most trips in the city will be made by sustainable transportation.
- Improve our sophistication in urban and community design and put this knowledge to the service of good urbanism at all scales, from the largest to the very small.
- Embed environmental, climate and health resiliency and energy into the framework of our planning policies. Embed economic development into the framework of our planning policies.

There are several different Transect Areas identified in the OP including a Greenbelt Transect. The OP land use policies for the relevant areas are supported by designations by illustrating the distribution of transportation, road and cycling networks, priority development areas, protected areas, and other constraints to inform development across the City. This is referred to as the Schedule C Series and identifies the key transportation facilities in our study area as outlined in the table and graphics below.

Table 5-3: Table C Series Transect Designations

C-Series Schedule	Designation	Location within the Study Area
C2 – Transit Network (Ultimate)	Transitway – Grade Separated Crossings	Blackburn Hamlet Bypass
	Transit Priority Corridor	Innes Road
C3 – Active Transportation Network (Urban – Major Pathways)	Major pathway	Tauvette Street, across Innes and Blackburn Hamlet Bypass, extending south towards Renaud Road
C4 – Urban Road Network	Arterial – Existing	Blackburn Hamlet Bypass
	Arterial – Future (alignment defined)	*New Road off Navan Road
	Major Collector – Existing	Innes Road
	Collector - Existing	Renaud Road
C7-A – Design Priority Areas – Urban	Corridor- Mainstreet within Design Priority Area	Innes Road
C11-C – Natural Heritage System (East)	Natural Heritage System Core Area	Mer Bleue Conservation Area
	Natural Heritage Features Overlay	
C12 – Urban Greenspace	Open Space	Greenspace between Glen Park Drive/Orient Park Drive and Blackburn Hamlet Bypass

C-Series Schedule	Designation	Location within the Study Area
	Greenbelt Natural Area	Green's Creek Sector, Mer Bleue Sector
	Greenbelt Natural Linkage	Green's Creek Sector, Mer Bleue Sector
	Park	Tauvette Park, Orient Park, Michael Budd Park, Innes Park
C16 – Road Classification and Rights-of-Way Protection	Blackburn Hamlet Bypass (Innes)	G to 86.2m
	Innes Road (between Blair and Backburn Hamlet Bypass (west end))	45.7 to 118.8m
	Innes Road (between Rondel and Blackburn Hamlet Bypass (east))	26m

Overall, the 2022 OP provides an overall policy direction recognizing that land use and transportation are fundamentally connected. Planning for transportation looks beyond moving people and goods, to also guide city-building objectives such as growth management and economic development (**Section 4.1**).

The Transportation policy in the Plan reflects Council's commitment towards more equitable, safe, and healthy communities and climate change action. This project recognizes the City will direction to rely primarily on space- and cost-efficient modes of transportation to accommodate the projected population growth and intensification targets of this Plan. This project has a deliberate approach to the allocation of space for automobiles and includes both public transit and active transportation. The design also incorporates a Safe Systems Approach to reduce the frequency and severity of collisions for all road users through traffic management and intersection design.

Related to the Promotion of healthy 15-minute neighbourhoods and as part of new road construction and road reconstruction projects this project considers:

- Sidewalks on both sides
- Cycling facilities
- Feasible connections to active transportation facilities
- Transit service along corridors and in areas targeted for intensification and new growth including greenfield areas

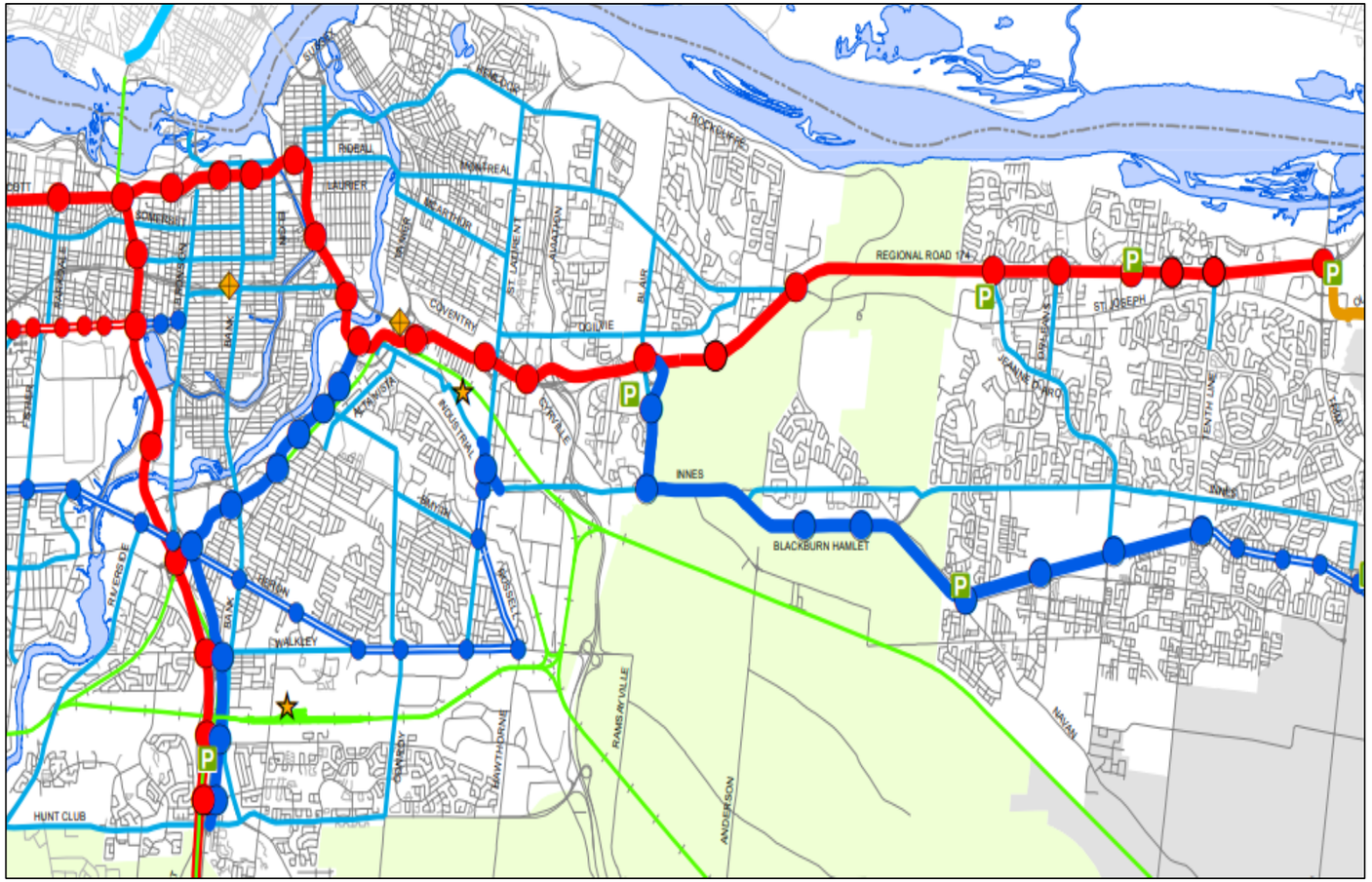

Figure 5-8: Transit Network (City of Ottawa 2022) OP

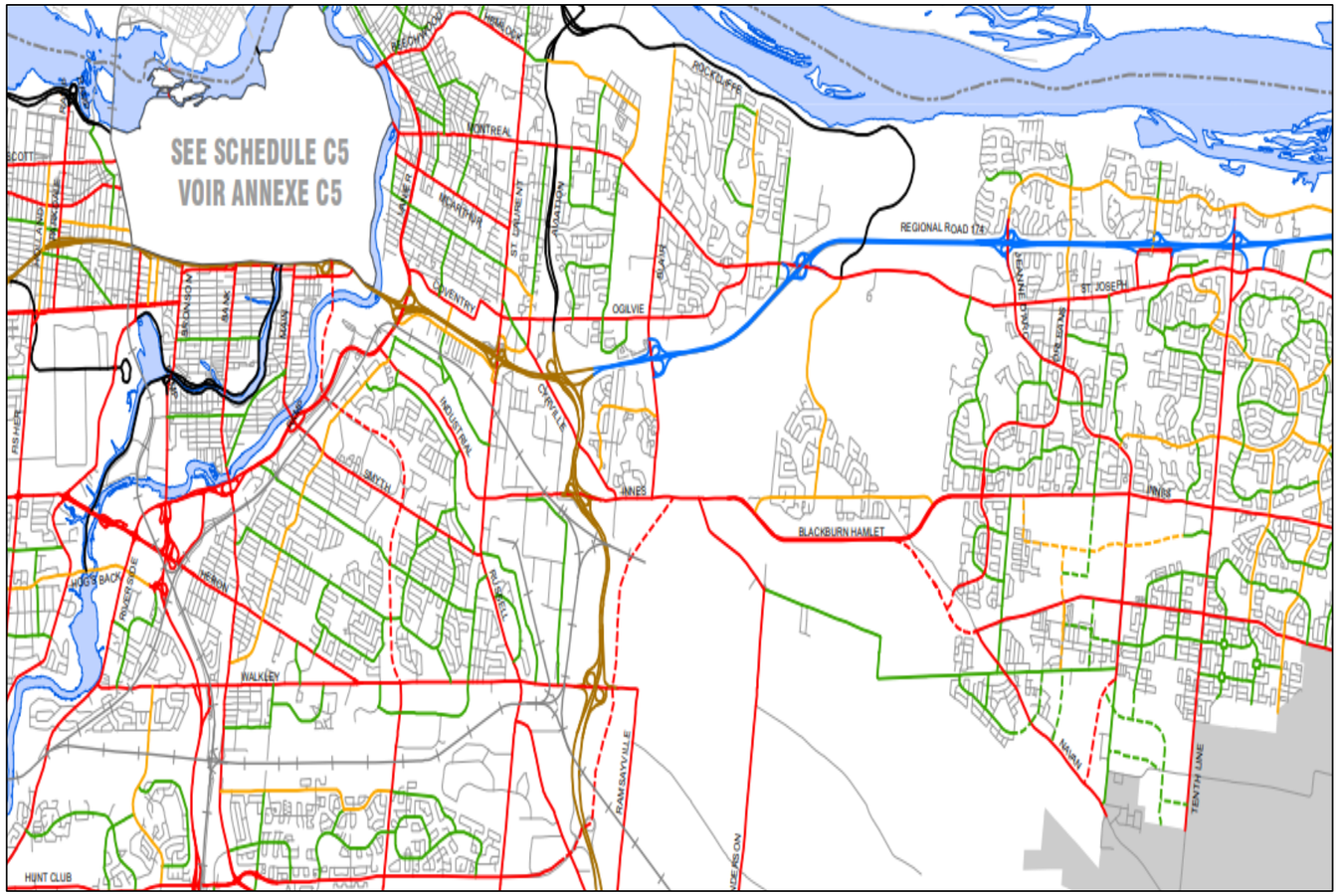

Figure 5-9: Schedule C4 – Urban Road Network (City of Ottawa 2022) OP

5.3.3.3 City of Ottawa Transportation Master Plan (TMP)

To implement the transportation policies expressed in the OP, City Council has adopted a Transportation Master Plan (TMP) that identifies facilities and services that the City intends to put in place over the next two decades to meet the travel needs of residents and businesses in Ottawa and to support the development pattern identified in the OP.

The City's TMP and OP place considerable emphasis on transit. The TMP states that enhanced transit service elements will be provided as early as possible. These may take the form of surface transit routes with accelerated frequencies, accompanied by transit priority measures. While the City is protecting for grade-separation of most of the rapid transit network (i.e. intersections where rapid transit corridors intersect with streets, or pedestrian crossings at rapid transit stations), where practical it will defer the costs of grade-separation by using transit priority measures that reduce delay and improve service reliability by isolating transit from mixed traffic.

The TMP indicates that the majority of Ottawa's transit service is delivered on roads, where traffic congestion increases delay and reduces the reliability and efficiency of transit services. Transit priority can improve the competitiveness of transit by reducing travel times and improving service reliability, while allowing more transit service to be delivered with the same resources. Transit priority measures (e.g. dedicated bus lanes, transit signal priority treatments, bus queue jumps, special bus stop arrangements, and traffic management techniques such as queue relocation) are intended to eliminate delay to transit services caused by congestion, and to minimize delay caused by traffic signals. Providing road corridors with a set of coordinated transit priority measures can substantially improve the quality of service enjoyed by transit customers without incurring the costs of a fully grade-separated rapid transit corridor. As stated, the transportation analysis and the development of solutions will be undertaken in a manner that prioritizes the implementation of transit in the study area.

The 2013 TMP/OP also supports the use of non-auto modes including walking and cycling:

Walking: The City's Pedestrian Charter establishes the vision, goals, and objectives for walking. The Charter articulates a commitment to creating a city where people walk because they want to and defines a series of guiding principles to create a supportive urban environment. The Ottawa Pedestrian Plan contains a number of policies and actions for the City to implement. They address land use, walking network development, street and pedestrian facility design, maintenance, safety programs, information, promotion, stakeholder engagement, interjurisdictional cooperation, and performance measurement. The City requires that the planning processes such as Community Design Plans, Transit Oriented Design plans, and Environmental Assessments for transportation projects include the prescribed pedestrian facilities found within the 2013 Pedestrian Plan.

The City of Ottawa 2013 Pedestrian Plan contains mapping of the proposed network (Exhibit 3.2 within the Plan) as well as an outline of the prioritization process that was undertaken to determine the links that are deemed affordable that would be built during the planning horizon of the 2013 Pedestrian Plan. The plan does not identify any proposed connections within the Blair Road, Innes, Navan, or Blackburn Hamlet corridors.

Cycling: The Ottawa Cycling Plan (OCP) contains policies and actions to increase the safety, convenience, and comfort of cycling in Ottawa. These include land use, cycling network

development, street and cycling facility design, bicycle parking, cycling-transit integration, funding, maintenance, safety programs, wayfinding assistance, information, promotion, stakeholder engagement, inter-jurisdictional cooperation, and performance measurement. The existing study area includes on road cycling facilities (generally on-road bicycle lanes/paved shoulders) and off-road facilities (e.g. Prescott-Russell Trail).

The OCP 2013 notes that cyclists are permitted on all City roadways except major divided highways. The OCP identifies a complete network of cycling routes covering the entire City. While this Ultimate Network Concept (UNC) has no targeted completion date, it serves as a framework for prioritizing projects within the planning horizon. The OCP 2013 notes that the second important role of the UNC map is to allow for coordination when roadworks or developments are being reviewed.

Cross-Town Bikeways are defined in the OCP 2013 as those facilities that will include both on-road and off-road facilities to provide a consistently high level of comfort for their entire length and be the main priority of the cycling network for maintenance. Geo Ottawa, as referenced in the OCP, highlights the UNC. The following routes have been identified within the UNC as highlighted on Geo-Ottawa (2020) and in **Figure 5-8**:

- **Spine Routes:** Blair Road, Navan Road, and Innes Road.
- **Local Routes:** Anderson Road and Renaud Road connecting to the Montreal and Ottawa Rail Corridor Major Pathway.
- **Major Pathways:** Prescott-Russell Trail, Blackburn Hamlet Bypass, and various routes not along an existing major transportation corridor.

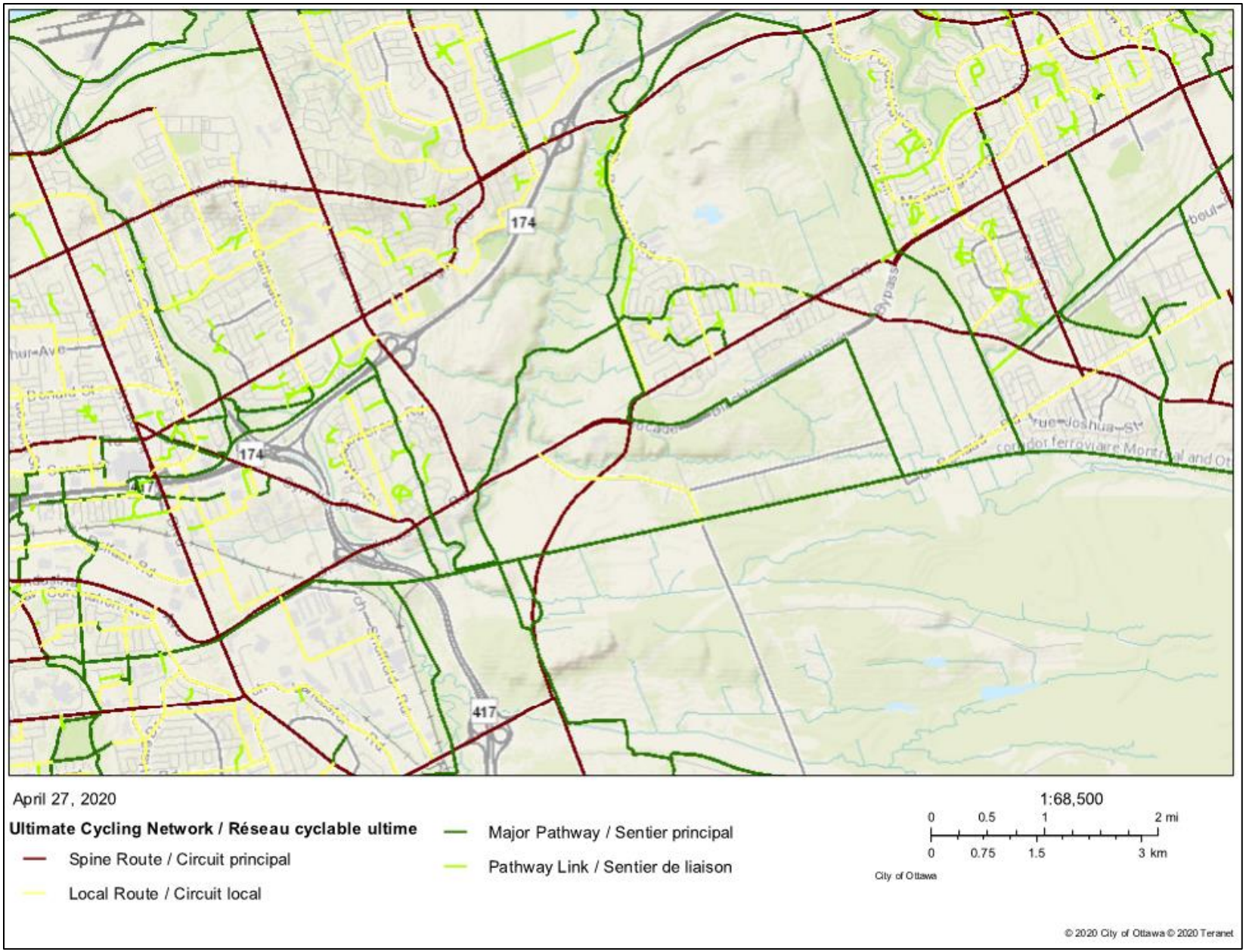

Figure 5-10: Ultimate Cycling Network (Geo-Ottawa 2019)

The OCP (2013) has established targets and budget requirements for the 2031 planning horizon, with implementation over three-time frames:

- Phase 1 projects to be implemented between 2014 and 2019.
- Phase 2 projects to be implemented between 2020 and 2025.
- Phase 3 projects to be implemented between 2026 and 2031.

As indicated in **Figure 5-9**, bike lanes (or other cycling improvements) are identified as a Phase 3 project for the Blair Road corridor from Ogilvie Road to Meadowbrook Road as part of the TOD development (P3-2).

5.3.3.4 City of Ottawa Transportation Master Plan Update 2023

The City of Ottawa's population is growing, with projections for 1.4 million people by 2046. Sustainable transportation and walkable "15-minute neighbourhoods" have been emphasized as priorities for the City's development. The TMP is a critical document in the development and implementation of this vision for the City as it strives to become North America's most livable mid-sized city. The vision for the TMP is: "*In 2046, Ottawa's transportation network will be flexible, dependable, safe and efficient in meeting the evolving needs of residents and businesses across the city, while enabling the City to meet its climate goals. The network will provide travel options for people regardless of their income, identity, or ability."*

The Transportation Master Plan is currently being updated. Part 1 was approved at the City Council meeting of April 26, 2023. Part 1 included the TMP Policies, Active Transportation Projects and Networks, and Transit and Road Project Prioritization Frameworks for TMP Part 2, development of the Capital Infrastructure. The next step is the development of the TMP Capital Infrastructure Plan, including additional public engagement on travel patterns and trends, transit and road projects, and network investment scenarios.

Part 1 re-enforces the City commitment towards: investing in safe and healthy "complete streets"; expanding and connecting the City's pedestrian and cycling networks, including a focus on major barriers; and attracting and retaining residents by providing safe, convenient, and sustainable transportation options.

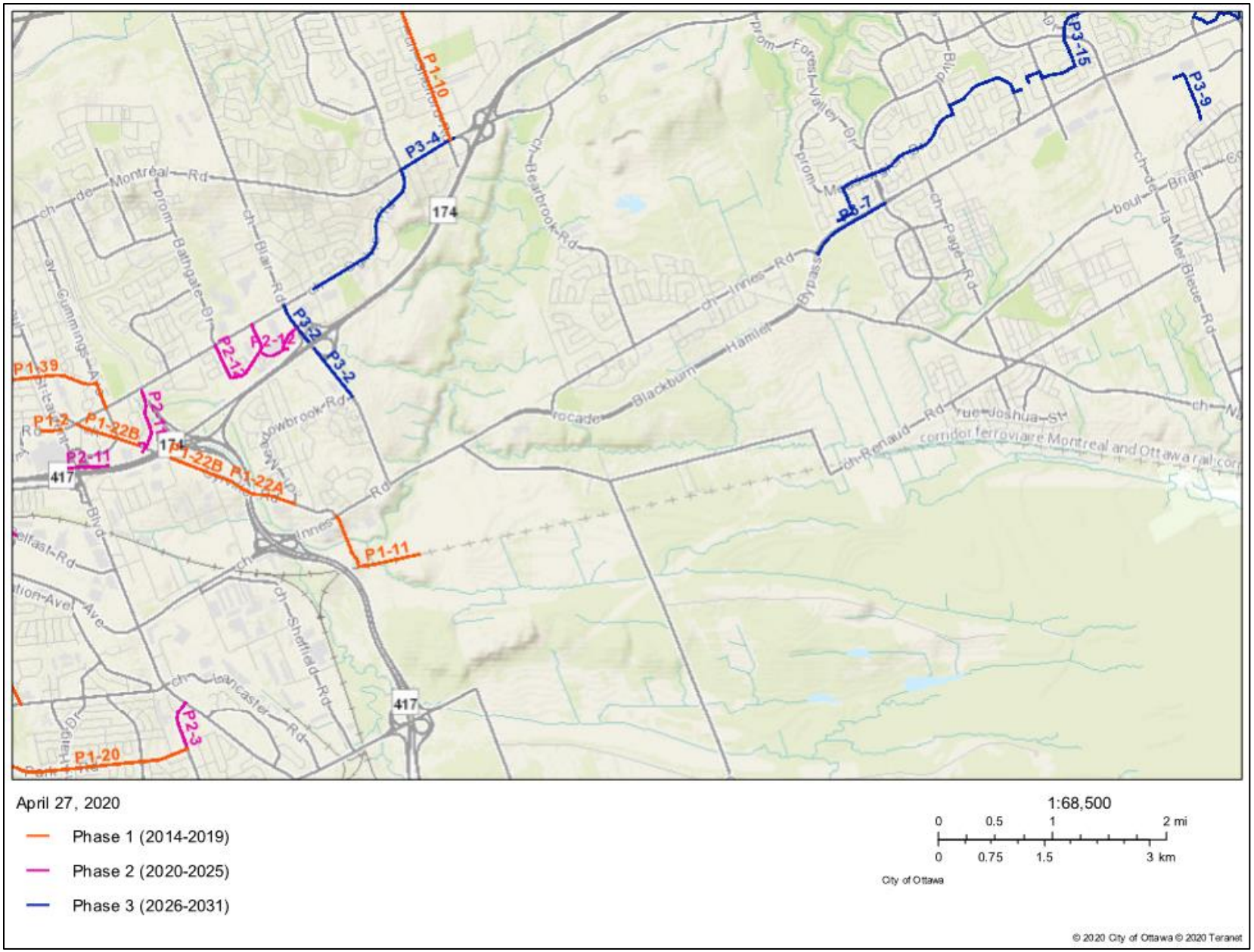

Figure 5-11: City of Ottawa Cycling Plan – Phased Projects (Geo-Ottawa 2019)

5.3.3.5 Climate Change Master Plan (2020)

On April 24, 2019, Ottawa City Council declared a climate emergency, joining a growing global movement calling for urgent action to avert the climate crisis. The City of Ottawa's Climate Change Master Plan (CCMP) provides a framework for how the City can mitigate and adapt to climate change over the next three decades (2020a). The CCMP sets guiding principles, goals, greenhouse gas (GHG) emission reduction targets, and priority actions for the next five years (2020-2025). The CCMP identifies a total of eight priority actions for the City over the next five years (2020-2025):

1. Implement Energy Evolution: Ottawa's Community Energy Transition Strategy
2. Undertake a climate vulnerability assessment and develop a climate resiliency strategy.
3. Apply a climate lens to the new Official Plan and its supporting documents.
4. Apply a climate lens to asset management and capital projects.
5. Explore community and corporate carbon budgets.
6. Explore options for carbon sequestration methods and the role of green infrastructure.
7. Encourage private action through education, incentives, and municipal support.
8. Develop a governance framework to build corporate and community capacity, align priorities, and share accountability in tackling climate change.

The CCMP is not a standalone document, and must be coordinated with other municipal planning documents, such as those described in **Section 5.3.3** of this report. The CCMP provides the framework for actions that address both climate mitigation and climate resilience/ adaptation.

As one of the priorities identified in the CCMP, applying a climate lens to asset management has been identified as a critical area to be explored and developed in the short-term to achieve the long-term vision. Specifically, risk management and asset resiliency are core principles of asset management. The City of Ottawa commits to increasing climate considerations into the Capital Asset Management Plan.

5.3.3.6 Secondary Plans, Community Design Plans, TOD Guidelines

The East Urban Community (EUC) of the southeast Orléans area is a 570-hectare parcel of relatively urban land that has been designated as a Developing Community within the City of Ottawa Official Plan (OP). The proposed plan for the entire EUC area includes an addition of 6,700 residential units, accommodating 18,110 new residents (CH2M, 2018).

There are three City of Ottawa *Secondary Plans* within the land use planning study area:

Mer Bleue Expansion Area Secondary Plan (2017)

This figure illustrates that the study area is located within the Mer Bleue Sector as defined in the Greenbelt Master Plan. The Sector is characterized by the Mer Bleue designated wetland and the farmlands south of Blackburn Hamlet. The Mer Bleue Expansion Area Secondary Plan sets out a series of policies that relate to creating a mix of densities, forms and uses, establishing small-scale commercial sites, providing for a hierarchy of neighborhood parks, improving pedestrian, and cycling facilities, preserving natural heritage features, and creating a well-designed street and block network. The Mer Bleue Expansion Area is that area as outlined in the Community Design Plan **Figure 5-12**.

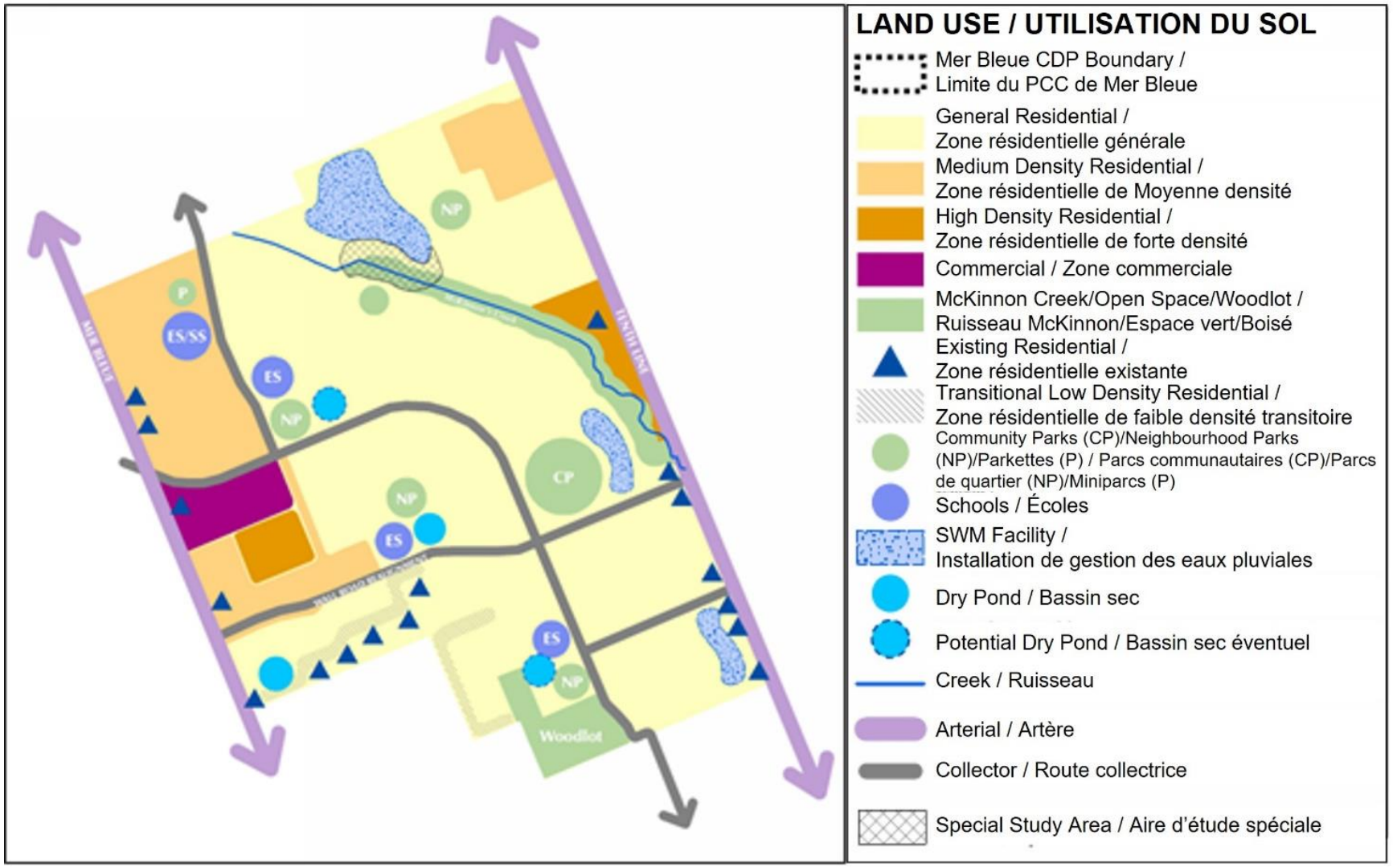

Figure 5-12: Mer Bleue Secondary Plan, Urban Expansion Area Boundaries

Blair Secondary Plan (2015)

The Blair Secondary Plan (**Figure 5-14**) provides direction on maximum building heights and minimum densities within the planning area identified within the Blair Transit-Oriented Development Plan to prioritize development intensification that is transit oriented and accessible to pedestrians, cyclists, and vehicles. The Transit-Oriented Development (TOD) area is defined as an area within an approximate 800 m walk from a transit station.

Consolidated Villages Secondary Plan

The Notre-Dame-Des-Champs Village, located in the southeastern portion of the study area, is part of the City of Ottawa's (n.d.b) Consolidated Villages Secondary Plan (**Figure 5-12**). The Village is bound by Mer Bleue Road to the east, the Wall Road homes at the northern extent, the Grand Pre neighbourhood south of Navan Road, and extends east to encompass the lots on Turquoise. The goal of this plan is to preserve the rich cultural heritage that exists in these distinct areas of Ottawa while providing a framework for future development that is compatible with their character and identity. Specific goals have been created for the Notre-Dame-Des-Champs Village, which includes:

- Ensuring that development is environmentally responsible,
- Developing a pedestrian-friendly village,
- Preserving the village identity, and
- Conducting a future comprehensive planning study to consolidate the Village and the urban parts of the Notre-Dame-Des-Champs community.

The listed CDPs implement the policies of the Official Plan and Secondary Plans, including their goals and objectives related to land use, intensification, transit, and employment opportunities.

A significant amount of commercial development will be concentrated in the EUC Mixed-Use Center as well as within Phase 2 lands, generating increased employment opportunities. At least 5,000 new jobs will be accommodated in the Mixed-Use Center, as directed by the OP. The Mer Bleue CDP proposes the development of 3,000 new residential units of various housing types and at least 5,000 new office, institutional, and commercial employment opportunities. The Mer Bleue Expansion Area 10 CDP (City of Ottawa, 2017a) envisions a community of 3,500 units and 10,000 residents (CH2M, 2018).

5.3.3.7 City of Ottawa 2036 Population Projections (2017)

The City expects a 31% increase in total population from 921,000 residents in 2011 to 1,214,000 million residents in 2036 (OPA #180, 2017).

The East Urban Community, Mer Bleue CDP and expansion area, and the Orleans Industrial Park contribute to an 812% population increase and 157% employment increase from 2012 to 2031. In the west end of the study area, the Blair TOD contributes significantly to the growth for this region as well, with a population increase of 179% and an employment increase of 22% from 2012 to 2031. Most other areas within the study limits are mature and established neighborhoods where growth is significantly less, even decreasing in some neighborhoods. For example, population decreases in the Pineview community by 13% from 2012 to 2031 and by 6% in Blackburn Hamlet. In general, the broader study area is expected to experience

significant growth over the remainder of the planning horizon due primarily to Community Design Plans that have set ambitious targets for increasing population and employment opportunities in this region of Ottawa (City of Ottawa, n.d.b).

The new Official Plan provides a strategy and policy framework to guide development and growth over a 28-year period from July 2018 to July 2046. New projections are required to estimate the growth that will occur over this period. The projections begin with population growth, being the driver for household growth and employment growth.

From 2018 to 2046, Ottawa is projected to increase by 402,000 persons for a population of almost 1,410,000 persons in 2046. The projected housing for this population is a growth of 194,800 private dwellings for a total of 599,200 private dwellings in 2046. Employment is projected to increase by almost 189,500 jobs for a total of 827,000 jobs in 2046.

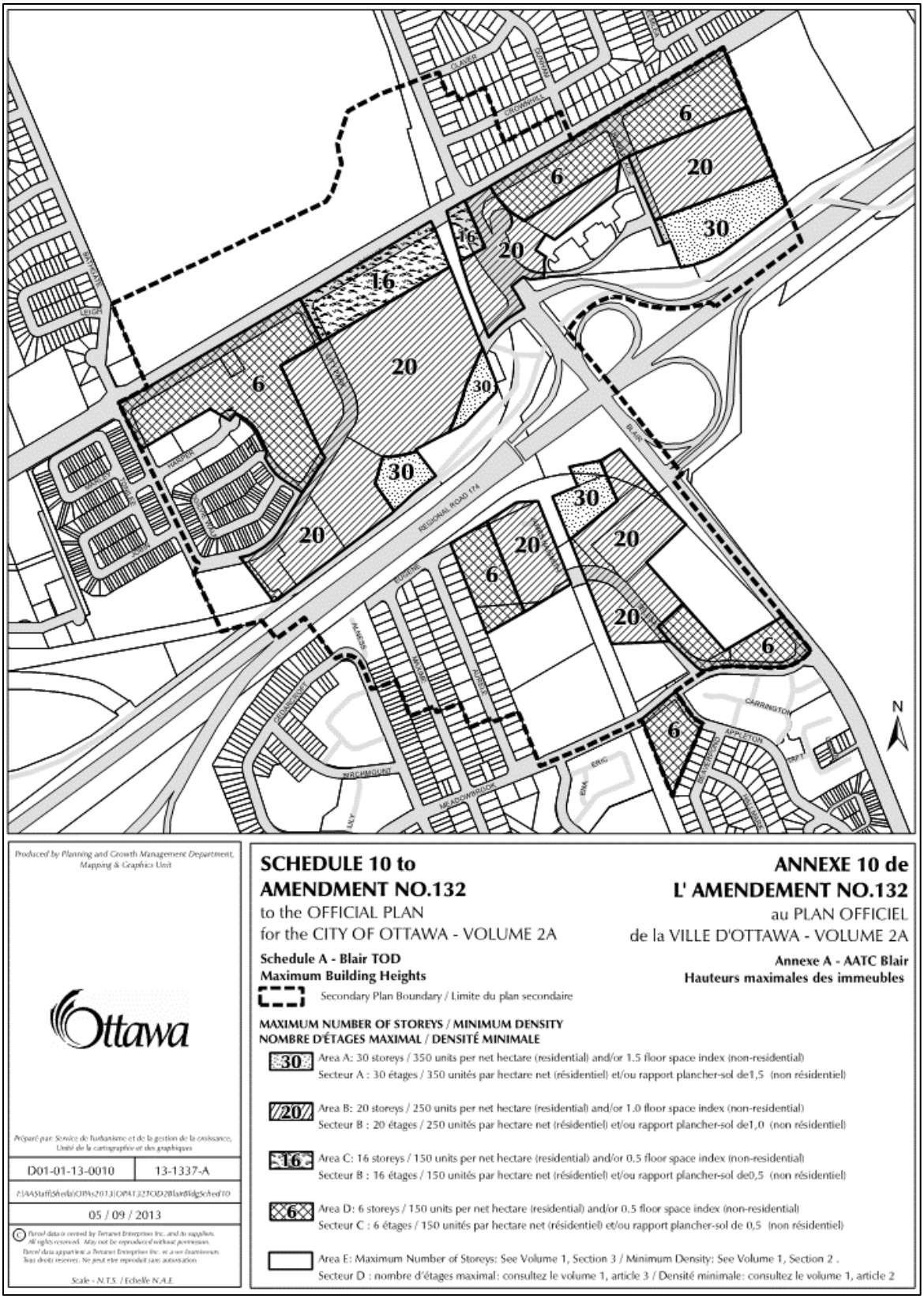

Figure 5-13: Blair Secondary Plan

Figure 5-14: Consolidated Villages Secondary Plan – Notre-Dame Des-Champs

Other *relevant City of Ottawa plans* that guide development within the study area include:

Blair Transit-Oriented Development (TOD) Plan (2014)

The interim eastern terminus for the City of Ottawa's Light Rail Transit (LRT) Confederation Line is located at the meeting point of Ottawa Road 174 and Blair Road. As a primary exchange point for the transfer between light rail and buses, this area has been identified by the OP as a Transit Oriented Development (TOD) priority site. The TOD area is 119 hectares in size and includes properties within an 800 metre walk from the station platform. It is divided into three sectors: the northwest sector is located north of Highway 174 and west of Blair Road; the northeast sector is east of Blair Road and north of Highway 174 and the south sector is located south of Highway 174.

The Plan calls for creating new and improved street, cycling and pedestrian connections to increase accessibility to Blair Station. There are close to 8,700 jobs and residents combined in the Blair TOD study area (2014). Over the next 20 years, current projections foresee the addition of approximately 2,300 jobs and residents combined over this time period. Over the longer-term, well beyond the next 20 years, there is capacity for close to 28,900 jobs and residents combined if fully built to transit-supportive densities. This long-term scenario is expected to include over 2,200 residential units – most of which would be condominium or rental apartments.

Orléans Industrial Park Land Use & Design Study (2003)

On the south side of Innes Road north of the hydro corridor, and between Pagé Road and Tenth Line Road is the Orléans Industrial Park. A Land Use & Design Study was initiated for this area to create a long-term plan for its future development and growth. Designated an Arterial Mainstreet, Innes Road has been experiencing increasing development pressures. As a designated Employment Area, the projection is for 6,700 jobs to be created within the Orléans Industrial Park by 2021. A small portion of this site is also designated as Mixed-Use Center, supporting a live-work environment. To facilitate this future intensification and subdivision of land, a collector road network has been established in the Plan and includes extending both Belcourt Boulevard and Vanguard Drive as the primary north-south and east-west corridors.

5.3.3.8 City of Ottawa Zoning Bylaw No. 2008-250

The City of Ottawa's Comprehensive Zoning By-law 2008-250 implements the overall policies and objectives for growth and development that are identified in the City of Ottawa Official Plan through specific regulatory provisions.

"Section 87, Rapid Transit Network" stipulates that the provisions of the Zoning by-law do not apply to the rapid transit network and to land used for the construction, staging and repair works to support the rapid transit network. Further, any related construction, staging or repair works to support this network are permitted in all zones.

5.3.4 Land Use

Existing land uses within the study area include natural, residential, recreational, agricultural, institutional, retail commercial, industrial and hydro corridors. **APPENDIX E: 1** contains contains the CH2M inventory of existing land uses within the study area (CH2M, 2018). The main residential neighbourhoods include Blackburn Hamlet, Pineview, Chapel Hill and Chapel

Hill South, Orléans Village, and Village of Navan. There are public parks located within each neighbourhood that serve as recreational facilities for residents. City of Ottawa municipal land use designations are illustrated on **Figure 5-15**, while the federal NCC Greenbelt land use designations are depicted on **Figure 5-16**.

The study area falls within the Mer Bleue and Greens Creek Sectors of the National Capital Greenbelt (discussed in **Section 5.3.1**). The Greenbelt consists of 20,000 hectares of greenspace and includes a comprehensive trail network that is easily accessible to residents in the area. Other recreational uses within the Greenbelt include the Pine View Golf Course; the Mer Bleue Golf, Driving Range & Miniputt; the Louis Riel Dome; Superdome Sports Centre; and the Hornet's Nest (an outdoor facility with 11 soccer fields located on Bearbrook Road just north of Blackburn Hamlet).

Agricultural lands with active farmland tenants are found within the Greenbelt to the north and south of Blackburn Hamlet. Institutional uses within the study area include schools, churches, retirement homes, libraries, and the Ottawa Regional Detention Centre.

Retail commercial uses are predominantly concentrated along major urban roadways such as Innes Road, St. Joseph Boulevard, and Jeanne D'Arc Boulevard.

Industrial land uses include a mineral extraction use (Bearbrook Quarry, forming part of the Greenbelt), sand and gravel suppliers (located in the northeastern portion of the study area). A 70-hectare landfill and recycling center is located on the south side of Navan Road outside of the study area. A hydro corridor with high voltage transmission lines cuts through the southern portion of the study area.

The many active development applications in the study area provide for approximately 4,027 additional residential units, multiple commercial blocks, retail units and industrial sites (CH2M, 2018). These proposed developments are primarily concentrated within the East Urban Community, the Orleans Business Park, and the Mer Bleue CDP area at the eastern portion of the study area. There are also several developments underway in the Blair Transit Oriented Development (TOD) area (CH2M, 2018).

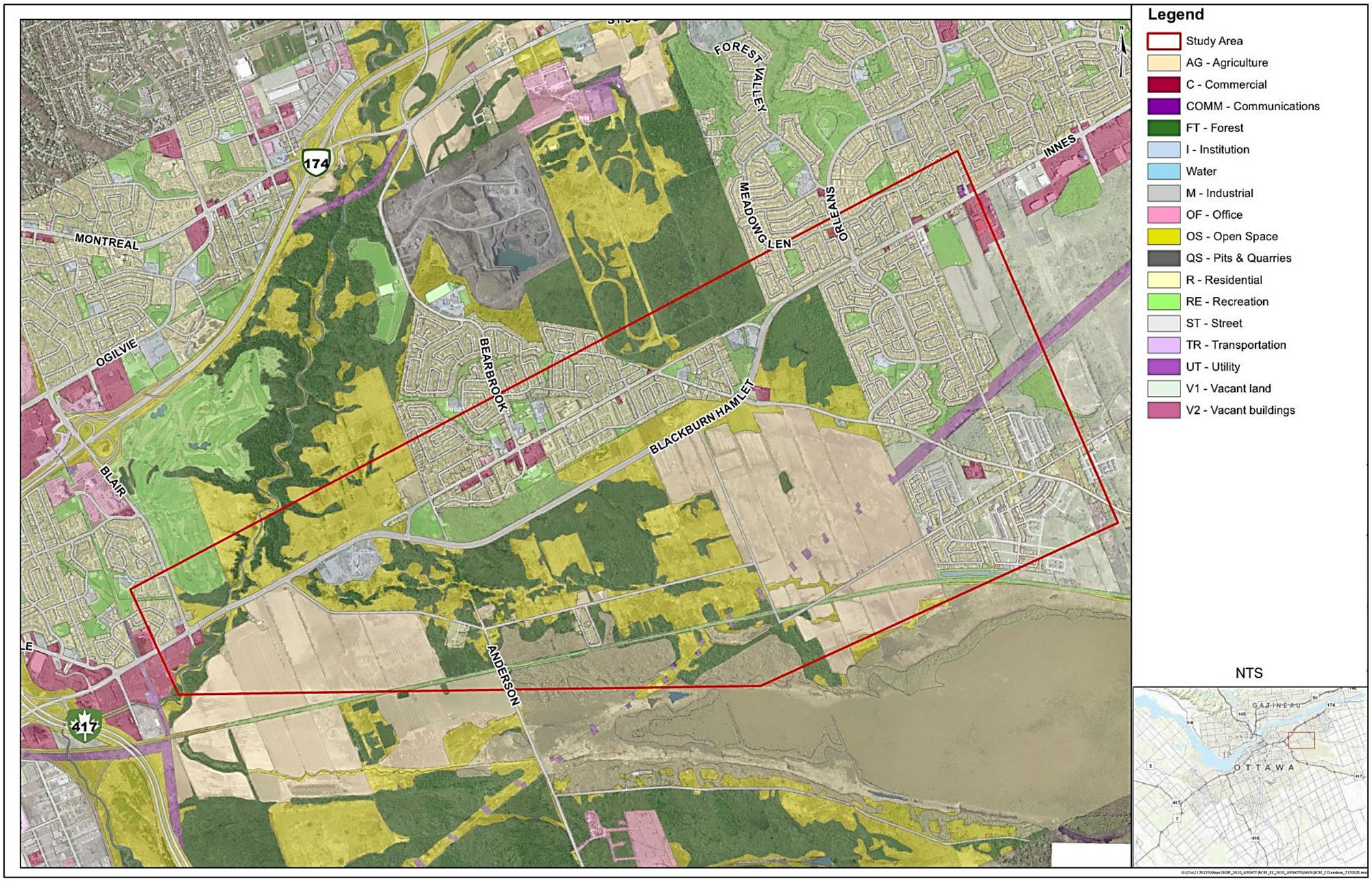

Figure 5-15: Existing Official Plan Land Use Designations

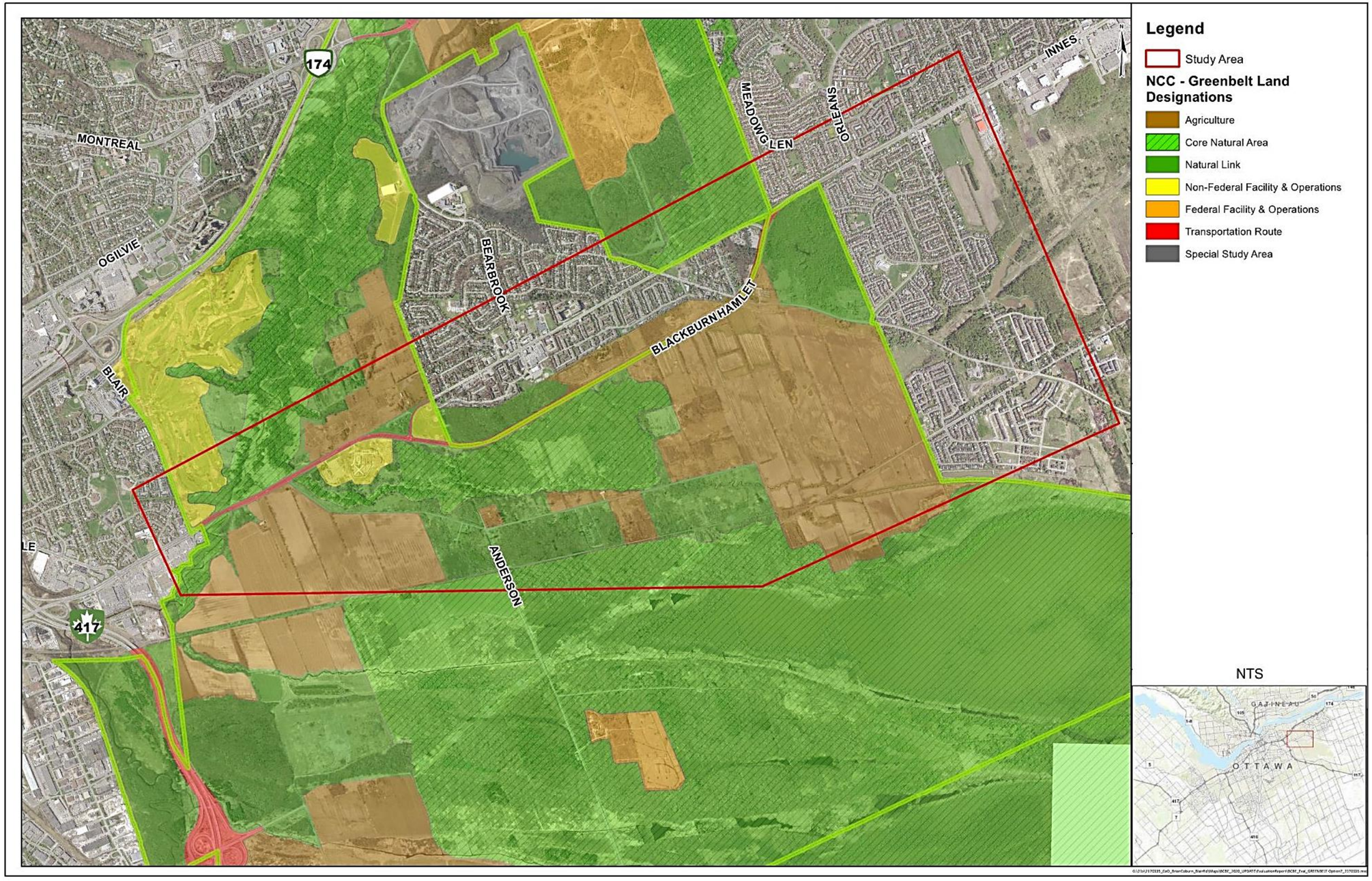

Figure 5-16: Existing Greenbelt Land Use Designations (NCC)

5.3.4.1 Land Ownership

More than 50% of the lands within the study area are owned by the NCC and form part of the NCC's Greenbelt (**Figure 5-17**). Other major landowners include the Federal Government (Department of National Defence) and the City of Ottawa (including Parks and Open Space Network and Natural Environment lands). The remainder of the land parcels are in private ownership.

5.3.5 Landscape Character

Analyses of the natural and built environment provides input on: Land uses (**Figure 5-18**); connectivity (**Figure 5-19**); important views (**Figure 5-20**); and landscape character. The study area has been broken into descriptive roadway spans. The roadway spans begin at Blair Station in the west, continue east to Brian Coburn Boulevard, and then are directed south to the Greenbelt's Mer Bleue Sector.

Innes Road – Blackburn Hamlet Bypass

The span of Innes Road, beginning from Blair Road and continuing until Blackburn Hamlet Bypass, is within the NCC Greenbelt. Rural zones comprise the majority of land-uses, which contributes to a rural feel. There are views of agricultural and open fields, as well as forested areas which surround both Mud Creek and Greens Creek.

Fast moving, heavy vehicular traffic may deter cyclists from using the existing on-road bicycle lane. Bicycle lane widths are reduced during winter months due to incomplete snow-removal.

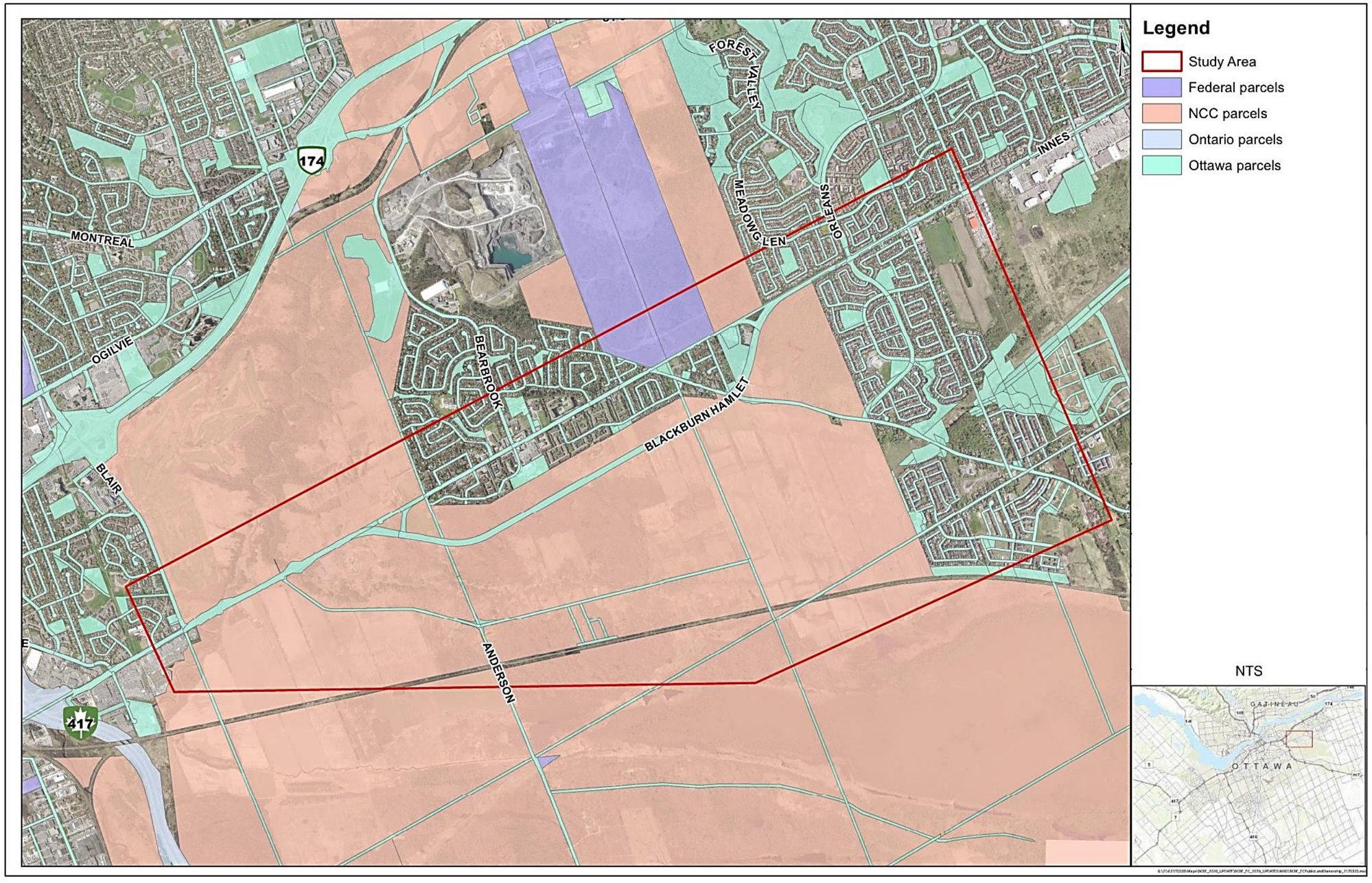

Figure 5-17: Public Land Ownership

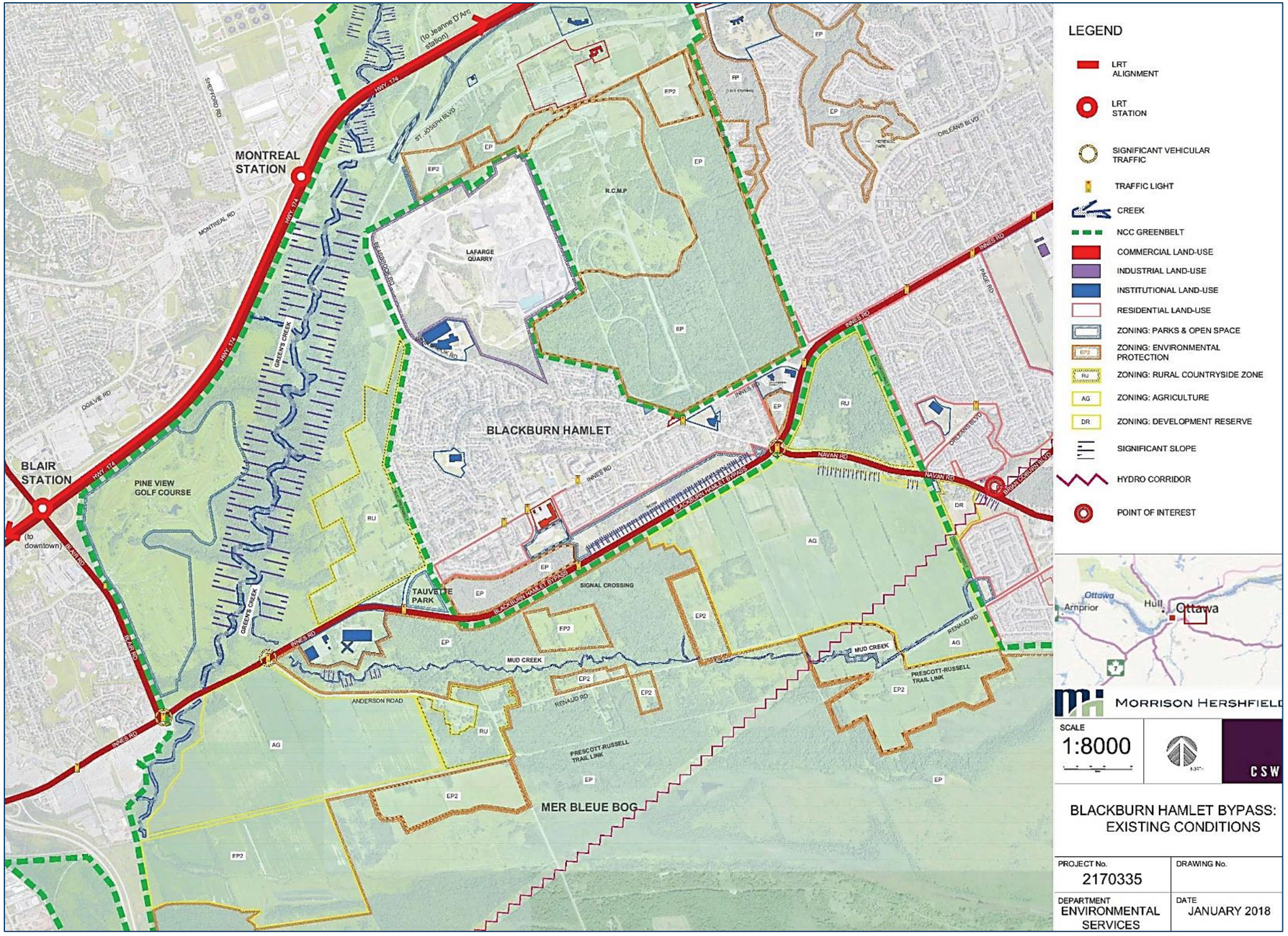

Figure 5-18: Existing Land Use Zone Designations

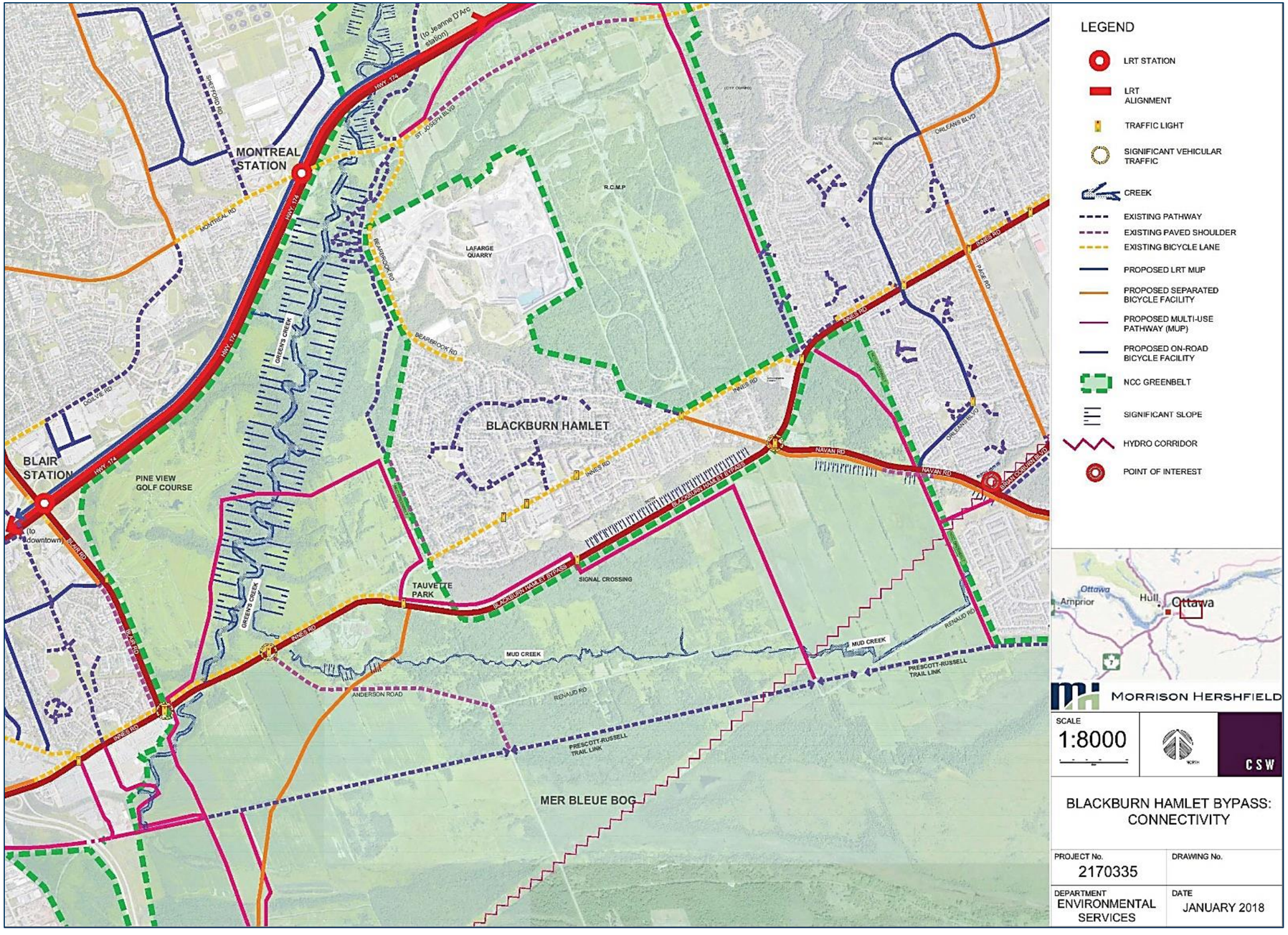

Figure 5-19: Multi-Modal Transport Connectivity

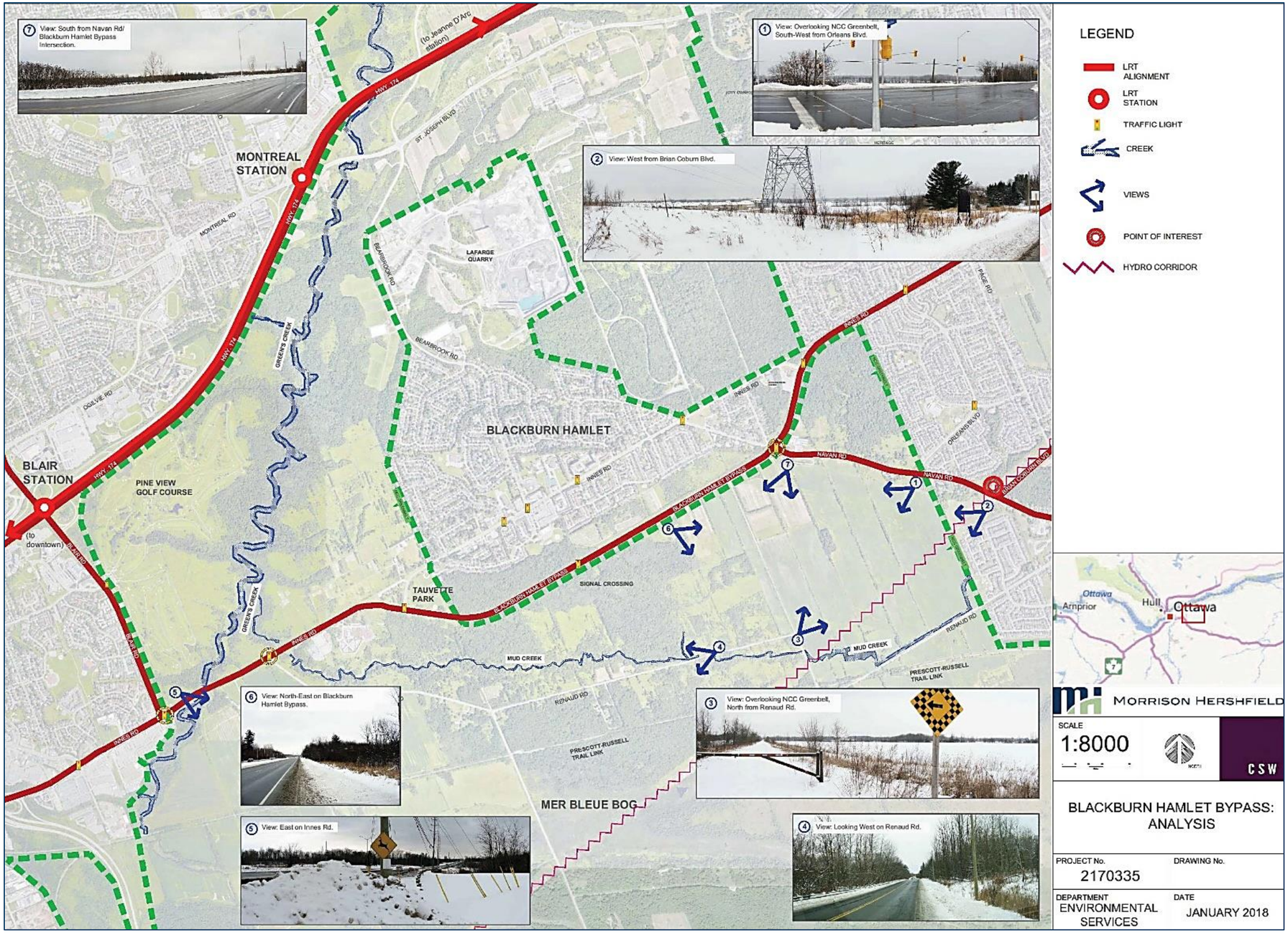

Figure 5-20: View & Vistas

Blackburn Hamlet Bypass – Navan Road

The Blackburn Hamlet Bypass is an efficient route for vehicular traffic. Aligned between the NCC Greenbelt and Blackburn Hamlet, the Bypass has good views of forested areas and agricultural lands. A proposed multi-use pathway (MUP) will allow cyclists to commute to and from Blair Station. The proposed alignment runs parallel to the Blackburn Hamlet Bypass.

Navan Road – Brian Coburn Boulevard

Proposed separated bicycle facilities along Navan Road will effectively link south Orléans to Blackburn Hamlet (**Figure 5-19**).

This span of Navan Road is aligned parallel to an escarpment within the NCC Greenbelt. Looking south offers excellent views of agricultural lands within the NCC Greenbelt. Within the Greenbelt, both sides of Navan Road are considered Environmental Zone (I) which indicates more land-use opportunities than environmental protection zones.

Greenbelt – Renaud Road

Renaud Road and Anderson Road are aligned through the Greenbelt's Mer Bleue sector. Environmental protection zoning surrounds Mer Bleue Bog, Mud Creek, and forested core-natural areas. These areas are important natural features within the Greenbelt. The views of agricultural lands, farmhouses, and forested areas contribute to a rural feel.

The Prescott-Russell Trail Link and paved shoulders on Anderson Road are currently appropriate for cycling. Proposed MUPs will increase connectivity to Blair Station by directing cyclists north to Navan Road and Blackburn Hamlet Bypass. With narrow unpaved shoulders and an 80 km/h speed limit, Renaud Road is not currently an effective cycling route.

5.3.6 Air Quality, Noise & Vibration

GWE completed a qualitative report describing the existing conditions relating to air quality, noise, and ground vibrations (**APPENDIX E: 2**). Sensitive residential areas are located north of the Blackburn Hamlet Bypass, in the vicinity of Navan Road (**Figure 5-21**). Current major sources of air quality and noise emissions in the area are the existing road networks, including Ottawa Road 174, Blackburn Hamlet Bypass, St. Joseph Boulevard, Navan Road, Anderson Road, Bearbrook Road, Innes Road and Orléans Boulevard. Ottawa Road 174 is also a source of minor ground vibrations and ground-borne noise, mainly due to heavy vehicles passing over uneven surfaces (GWE, 2018).

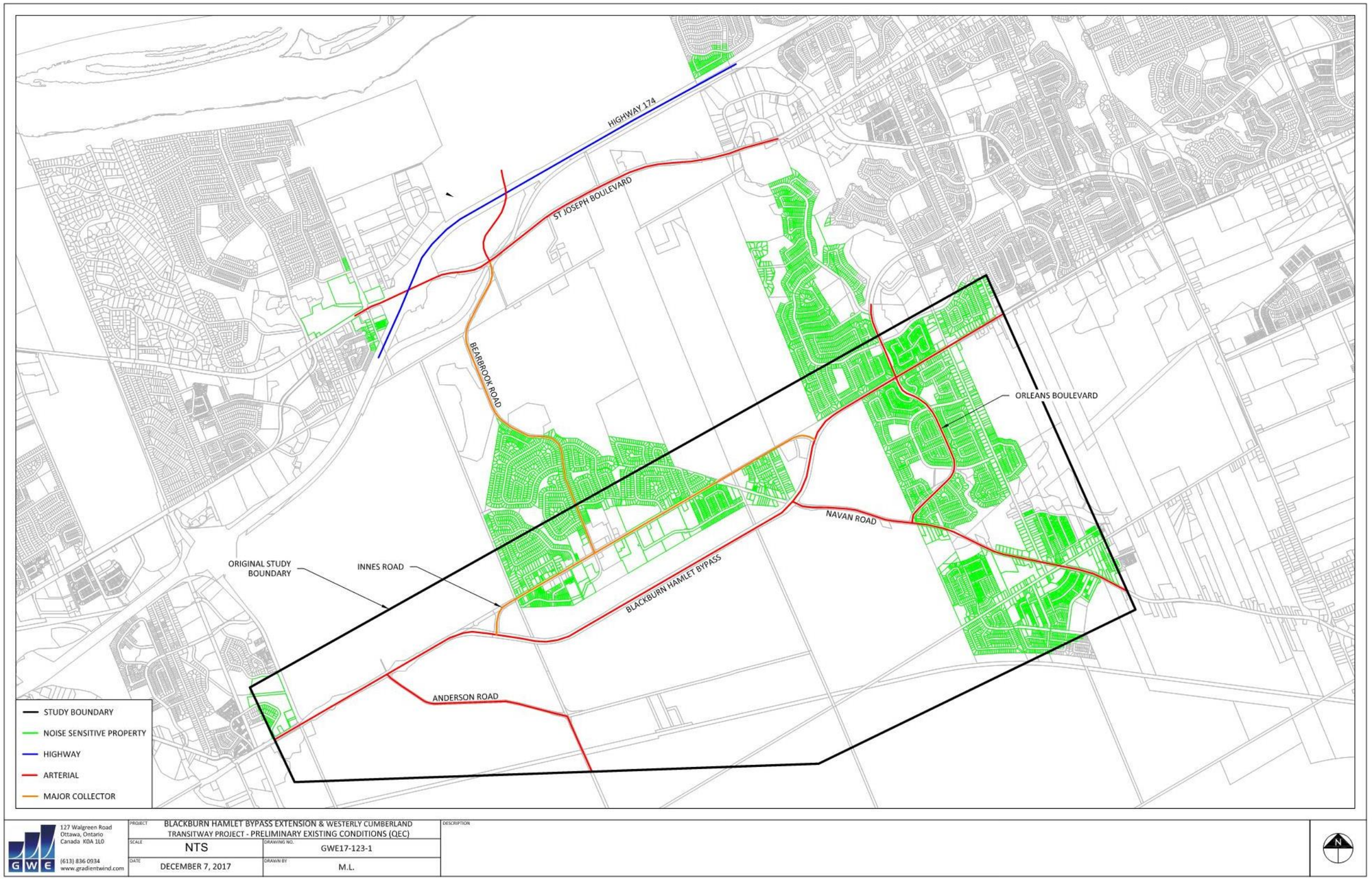

Figure 5-21: Nosie Sensitive Receptors

5.4 Cultural Environment

5.4.1 Aboriginal Land Claims

The City of Ottawa is within the land claim area of the Algonquins of Ontario. The land claim is in the process of negotiation and currently, an Agreement-in-Principle has been prepared as a first step toward an eventual signed Treaty between the Algonquins of Ontario, the Province of Ontario, and the Government of Canada (2016). The Agreement-in-Principle contains Maps of Proposed Settlement Lands, including a "Proposed Settlement Lands in the City of Ottawa" (Algonquins of Ontario, Government of Ontario, Government of Canada, 2016). None of the lands within the study area encompass any Proposed Settlement Lands.

5.4.2 Archaeological Potential

A Stage 1 Archaeological Assessment of the study area has been undertaken to ensure preservation and management of any property that may hold an archaeological interest, in keeping with the requirements of Section VI of the Ontario Heritage Act, RSO 1990, c.0.18. As part of the data collection, historic maps as well as relevant archaeological, historical, and environmental documentation were reviewed. Over the past twenty years, fifteen archaeological assessments were completed for properties contained within the study area with an additional fourteen assessments completed within the vicinity. Additionally, a property inspection was conducted on November 15, 2017. The Stage 1 Archaeological Assessment, as completed by Golder (2018b) is presented in **APPENDIX F: 1**.

The archaeological potential of the study area has been impacted by the bedrock stone quarry located east of Bearbrook Road as well as the building footprints, infrastructure, and landscaping associated with the residential developments within Gloucester, Blackburn Hamlet, Chapel Hill, and Chapel Hill South.

Archaeological potential is not present in areas where previous Stage 2 Archaeological Assessments were conducted following the establishment of the 2011 MHSTCI Standards and Guidelines (**Figure 5-22**).

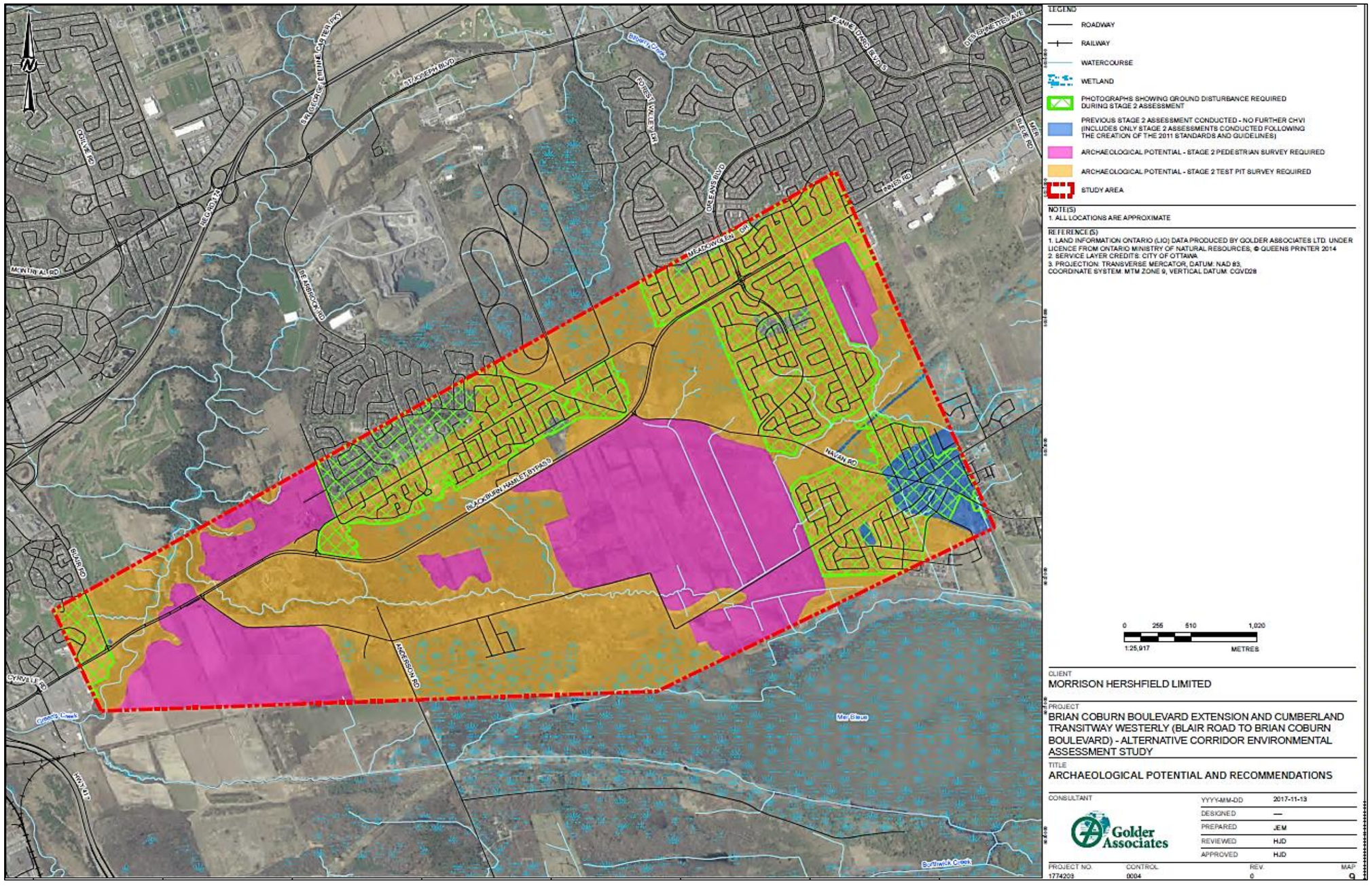

Figure 5-22: Archaeological Potential

5.4.2.1 Identified Archaeological Resources

One registered archaeological site was identified within the study area. The Mer Bleue site (BiFv-22) is located in the southeast corner of the study area and is described as 'a pre-contact lithic scatter consisting of quartz, chert-like, and slate flakes covering a 20 metre-diameter area' (Golder, 2018b). The Ministry of Heritage, Sport, Tourism and Culture Industries' (MHSTCI) archaeological site database indicates the site remains unexcavated and still of cultural heritage value or interest. Though within the project study area, the registered site is not located within the immediate project area.

Potential for Archaeological Resources

Areas identified within the study area as having "potential for archaeological resources" are based on the following indicators (**Figure 5-22**).

Historic Euro-Canadian Settlement Patterns: All areas that fall within 100 m of early transportation routes and 300 m of early Euro-Canadian settlement.

Pathways of Historic Roadways/Transportation Routes: Montreal Road and St. Joseph's Boulevard in the north, Innes Road, Anderson Road, Renaud Road, and Navan Road follow paths of historic roadways. In addition, some 19th century historic roads that have been altered or are no longer in use represent areas of archaeological potential.

Pre-Contact Archaeological Potential Areas: The Mer Bleue site (BiFv-22), is deemed of cultural heritage value or interest (Note that the MHSTCI's archaeological site database contains no record of a Stage 3 site specific assessment).

Areas within 300 m of all Watercourses and Secondary Water Sources: Includes areas found within 300 m of the following primary water sources: Greens Creek, Mud Creek, other small watercourses, the northern portion of the Mer Bleue Bog and several wetlands.

5.4.3 Cultural Heritage Resources

Federal, provincial, and municipal heritage registers, inventories, and databases were reviewed to identify known cultural heritage resources in the study area (Golder, 2018b). This included a review of the Canadian Register of Historic Places; the Government of Canada's Directory of Federal Heritage Designations; Ontario's Heritage Trust Online Plaque Database; Ontario's Heritage Trust Places of Worship Inventory; Ontario Ministry of Government and Consumer Services (OMGCS) Database of Registered Cemeteries; the City of Ottawa's Heritage Register and Heritage Resources Inventory; and aerial photographs from 1976 and contemporary aerial photos and satellite imagery. Golder has completed a summary of findings in a Technical Memorandum, available in **APPENDIX F: 2**.

In addition, stakeholder consultation included contact with the City of Ottawa Heritage Planner regarding cultural heritage resources in the study area. They advised that no properties designated under Part IV of the Ontario Heritage Act and no properties listed on the Heritage Register are located in the study area. However, eight properties are included on the City's Heritage Reference List. No protections or restrictions are placed on properties included on the Heritage Reference List. Lastly, the MTCS's checklist for *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* (2016) was completed for the study area.

Protected Cultural Heritage Resources

None of the properties identified in the study area are protected cultural heritage resources.

Cultural Heritage Landscapes

The NCC has identified a combination of distinct landscape features and man-made structures as components of the cultural heritage landscape. These include landscape features that visually express land stewardship, ecological diversity, and the history of the Capital; buildings structures and features of cultural and heritage value that celebrate the Capital's rural history; and rural cultural heritage. Characteristics of the rural cultural heritage landscape in the study area include the pattern of fields and ditches, ongoing agricultural activity and the remaining rural roads with soft shoulders and open ditches.

Heritage Reference List Properties

The following eight properties were identified on the City of Ottawa's Heritage Reference List: 1873 Innes Road (Mrs. Emerson Woodburn House); 1691 Blair Road; 2090 Innes Road/2170 Anderson Road (original Woodburn property); 2567 Navan Road (William Purdy House); 2750 Navan Road (St. Mary the Virgin Anglican Church & Cemetery); 2871 Navan Road (H. Lemieux House); 3143 Navan Road (Louis Perrault Farm); and 6211 Renaud Road (D. & E. Robinson House).

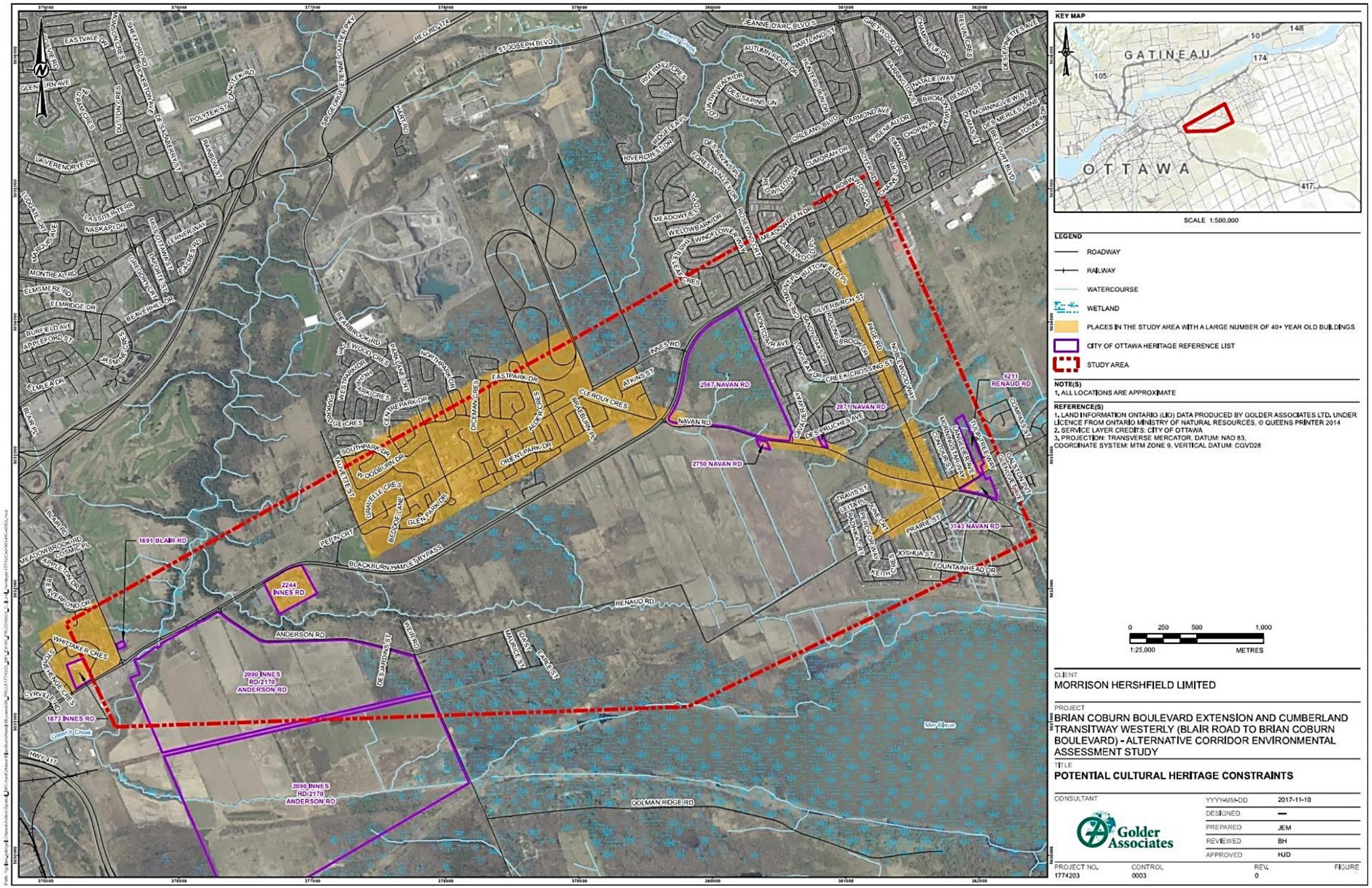

Figure 5-23: Potential Cultural Heritage Constraints

Buildings Over 40 Years of Age

The *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* includes consideration of buildings or structures that are over 40 years old to be considered as having potential cultural heritage value or interest. Within the study area, such buildings are located along the major roads and Blackburn Hamlet is a mid-century modern residential development and planned community from the late 1960s and early 1970s.

Figure 5-23 illustrates the location of the eight properties on the City's Heritage Reference List, as well as the land areas deemed to have potential cultural heritage value with properties over 40 years old.

5.5 Built Environment

5.5.1 Transportation

Section 2.3.1 of the City's Official Plan describes the City's transportation system as one which emphasizes the use of public transit, and wherever possible reduces the reliance on private automobiles. The single biggest transportation issue the City currently faces is accommodating the movement of people during the morning and evening peak periods. Therefore, a key strategy in the OP is to expand the rapid transit network to serve more of the urban area. However, despite encouraging increased transit use through infrastructure improvements, on-going improvements to the road infrastructure network are also needed to accommodate projected traffic volumes. This includes road widenings and extensions. These improvements are designed and maintained in coordination with the City of Ottawa's Transportation Master Plan's *"Complete Streets Policy*", which plans for transportation infrastructure that prioritizes the needs of pedestrians and cyclists and ensures safety, comfort and convenience to users of all ages and abilities.

Along with protecting corridors for the development of the transit network and acquiring lands for transit rights-of-way (ROW), Section 2.3.1 also stipulates that it will protect rights-of-way for the future development of the road transportation network. A right-of-way establishes allowances for a new road, major widening of an existing road, or minor widening of an existing road.

Section 3.5 of the OP provides a transportation infrastructure policy for lands designated as Greenbelt. This policy stipulates that "roads and other infrastructure will be designed to maintain the rural character of the Greenbelt to minimize the fragmentation of farmland and natural areas. Combining infrastructure in a limited number of corridors and utilizing existing rights-of-way wherever possible can help achieve this end. Transportation infrastructure, including lighting, will be designed to a rural standard.

5.5.2 Transit Network

The proposed future Bus Rapid Transit corridor (BRT) travels along Innes Road from Blair Road and continues east along the Blackburn Hamlet Bypass. As part of the future Cumberland Transitway, it will continue through the Greenbelt southwest of Navan Road to the newly constructed Brian Coburn Boulevard then continue further east to Tenth Line Road.

The BRT also travels north from Innes Road along Blair Road to Ottawa Road 174. There are several proposed transitway stops within the study area as well as two park and ride facilities in

the vicinity of the study area: proposed Chapel Hill, Blair, and Jeanne D'Arc. In addition to the proposed BRT route, there are also a number of additional local OC Transpo routes that run through the study area.

Current transit network modifications within the study area include the extension of the Light Rail Transit (LRT) line beyond the Stage 1 Confederation Line that will end at Blair Road, which recently opened in September 2019. Stage 2 LRT will include an extension east to Trim Road along Ottawa Road 174 with construction currently underway and completion expected in 2024. Innes Road and Jeanne D'Arc Boulevard are planned to be established as Transit Priority Corridors.

In terms of transit use, the 2011 transit (or non-auto) modal share is estimated at 37% at the Greens Creek Screenline (SL16). The projected 2031 TMP transit modal share is 43%.

5.5.3 Road Network

The road-based transportation system within the study area is a network of provincial highways, municipal freeways, arterial roads, collector roads, and local roads. The existing roadways which service east/west travel demands range from multi-lane, high speed roadways (such as OR 174) to single lane, lower speed operations (such as Sir George-Étienne Cartier Parkway). The major network includes:

Highway 417: This provincially owned Highway 417 is a six lane, divided highway that runs east west along the northwestern border of the study area. At the Aviation Parkway/Highway 417/Ottawa Road 174 major interchange, Highway 417 becomes a north south, four lane highway with an interchange located at Innes Road.

Ottawa Road 174: This municipally owned freeway is a four lane, divided freeway that runs east west along the north border of the study area east of the Highway 417 interchange. Arterial roads located within the study area include Innes Road, Blair Road, the Blackburn Hamlet Bypass, Anderson Road, Brian Coburn Boulevard, and Orléans Boulevard. Navan Road is designated in the City's TMP as an arterial road. Renaud Road is designated as a collector roadway.

5.5.4 Structures

Structures within the study area include bridges and culverts with spans greater than 3 metres, which are termed "bridge-culverts." There are thirteen (13) such structures within the original and expanded study areas (**Table 5-4**).

Table 5-4: Existing Structures Within the Study Area

Structure	Photograph
The **Renaud-Anderson Road Culvert** (SN 224610), located on Renaud Road, 1.64 km east of Anderson Road. The culvert is a Reinforced Concrete Pipe measuring 750 mm in diameter. It is nearing the end of its service life, slated for in-kind replacement.	
The **Greens Creek Bridge** (SN 227130), located on Innes Road about 0.32 kilometres east of Blair Road, is a concrete rigid frame structure with long concrete retaining walls along the sides of the creek. It was constructed in 1989 and is currently rated in generally fair condition.	
The **Mud Creek Bridge-Culvert** (SN 227160) is located under Innes Road about 0.13 km east of Anderson Road. Constructed in 1989, it is a concrete box culvert with high fill cover, with concrete head walls and wing walls. It is currently rated in generally fair condition.	
The **Beaudoin Bridge-Culvert** over Mud Creek (SN 227040), located under Renaud Road about 1.35 km east of Anderson Road, is a corrugated steel plate (CSP) arch structure with open bottom built in 1965. It features gabion basket wing walls and is currently in fair condition.	

Structure	Photograph
The **Kemp Road Culvert** (SN 228160) is located under Renaud Road about 1.45 km east of Ida Street. It is a CSP open bottom structure, built in 1999, with gabion head walls and wing walls. It is in generally good condition according to City records.	
The **Renaud Road Culvert** (SN 228180) is located 1.80 km west of Navan Road. It is a CSP pipe constructed in 1975 and is currently in poor condition. The road embankment side slopes in this area are also showing signs of instability and erosion.	
The **Navan Road Culvert** (SN 228111) is located 1.25 km southeast of the Blackburn Hamlet Bypass. It is a CSP pipe that has been re-lined with another CSP pipe, located under high fill cover. It was constructed in 1996 according to City records and appears to be in fair to good condition, with some corrosion of the invert.	
The **Pagé Road Storm Retention Pond Culvert** (SN 228115) is located under Pagé Road, just north of Brian Coburn Boulevard., about 0.50 km northeast of Navan Road. It is a precast concrete box structure built in 2011. It features concrete inlet and outlet structures.	

Structure	Photograph
The **Brian Coburn Bridge-Culvert** (SN 227450) is a twin-cell precast concrete pipe culvert under the new Brian Coburn Boulevard extension, located 0.20 km southeast of the Pagé Road/Montpelier Place intersection. It includes concrete headwalls and wing walls as well as long precast concrete block retaining walls on the south side. It was built in 2015.	 
The **Ottawa Road 174 Greens Creek Bridge-Culvert** (SN 227110) is a four-barrel CSP arch crossing constructed in 1958. It is located about 0.75 km east of Montreal Road. The easternmost barrel has been re-lined with a CSP culvert and the barrels each feature tapered CSP wing walls. The culvert was rated in generally poor condition and is nearing the end of its service life. As part of the Stage 2 LRT construction project, the culverts are in the process of being relined.	 

Structure	Photograph
The **Chapel Hill Creek Culvert** (SN 228150-1 and SN 228150-2) is a culvert for the east leg of Chapel Hill Creek, passing under St. Joseph Boulevard. It features a CSP and concrete pipe run, both built in 1991 and currently rated in good condition. The inlet features extensive gabion basket retaining walls and slope protection. The culvert is located 0.45 km west of Jeanne D'Arc Boulevard. Chapel Hill Creek converges to a single stream between St. Joseph and Youville Drive. The western leg goes under Forest Valley Drive and St. Joseph Boulevard. through a sewer.	
The **Youville Drive Bridge** (SN 227300) is a twin-cell concrete box bridge-culvert with gabion wing walls. It was constructed in 1980 and is currently in fair to poor condition. The structure features an outfall directly downstream where two storm sewers also outlet. It is located about 0.50 km west of Jeanne D'Arc Boulevard.	

5.5.5 Pedestrian & Cycling Networks

The study area includes pedestrian and cycling facilities within the City and the NCC's Greenbelt. Innes Road has a dedicated bike lane which extends from the western to eastern border of the study limits and is referred to as a Cross-Town Bikeway within the City's Official Plan (OPA #150, 2014a). There are also a series of existing bike paths, paved shoulders, pedestrian walkways, and multi-use pathways throughout the study area. In addition to the City and NCC trail network, informal trails and accessways also exist and form important connections within the multi-modal network.

The Prescott-Russell Trail is a City of Ottawa Rural Shared-Use Pathway that extends eastward from the greenbelt near Blair Road through the Village of Navan to the Prescott-Russell Trail at Canaan Road. **Figure 5-24** below, highlights the existing pedestrian and cycling networks.

5.5.6 Sewage, Water & Stormwater

Water Distribution System

There are watermains located within the residential areas of Blackburn Hamlet and Chapel Hill South (**Figure 5-25**). There is a large backbone 1200 mm water pipe located on St Joseph Boulevard, a 400 mm water pipe on Innes Road and a 300 mm water pipe located on Navan Road. The 1200 mm water pipe is connected to the Orléans Reservoir and the Forest Ridge pumping station located in the northeast corner of the study area.

Water wells are located within the rural areas of the study area, including within the Greenbelt and around Mud Creek (**Figure 5-25**). It is likely that some of the domestic and agriculturally designated water wells that are not in proximity to the City's water distribution system are currently in use.

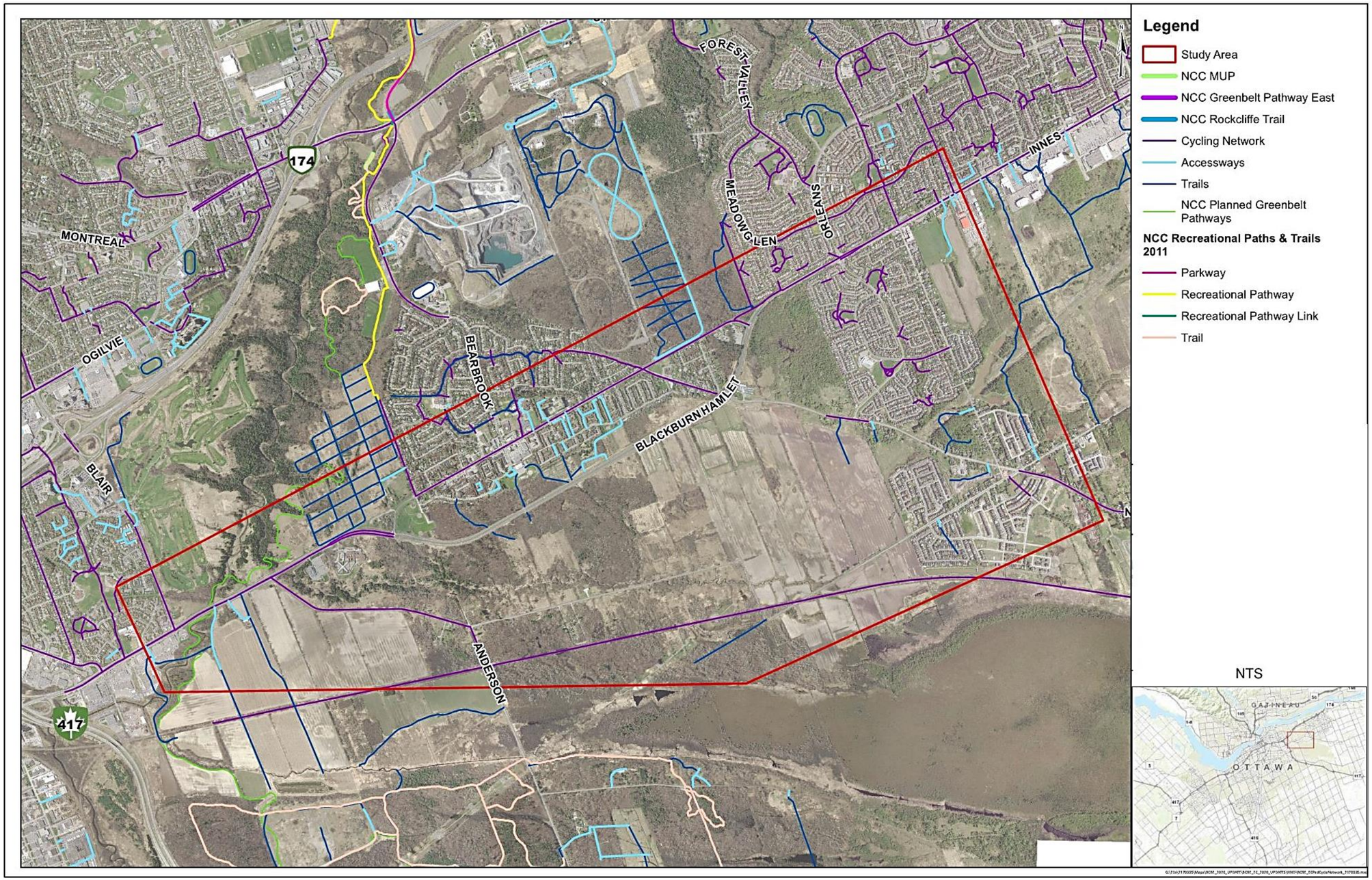

Figure 5-24: Cycling & Pedestrian Networks

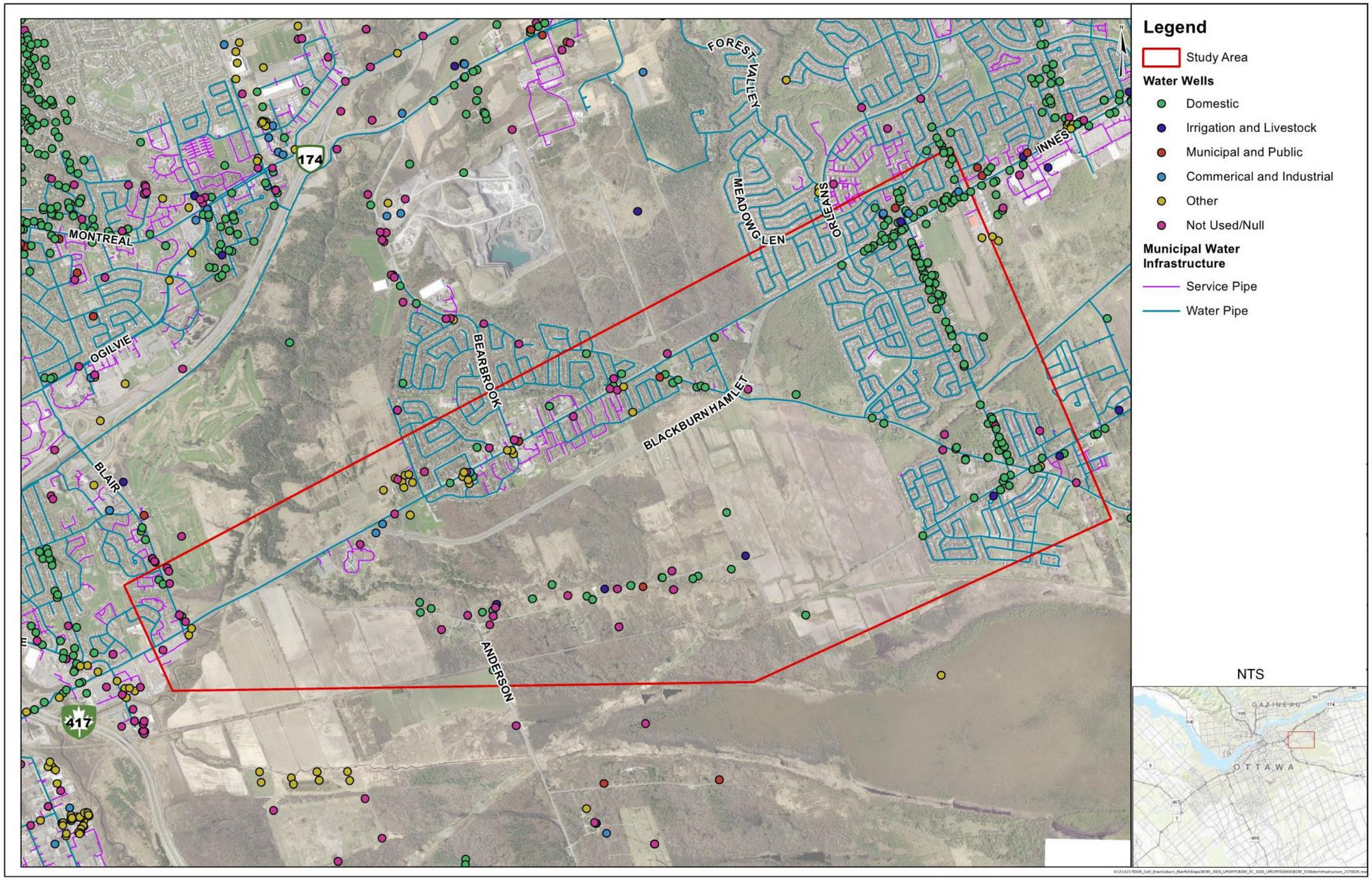

Figure 5-25: Water Infrastructure

Sanitary Sewers

Local sanitary sewers service the residential neighbourhoods. These local sewers feed into the four trunk sewers located in the project area. There is the 900 mm Forest Valley trunk sewer located on Forest Valley Drive/Orléans Boulevard. There is the 525 mm Innes Road Trunk located on Innes Road west of Blackburn Hamlet. On the western edge of the study area are the 2700 mm South Ottawa Tunnel and the 1650 mm North Greens Creek Collector. Sewer infrastructure is illustrated on **Figure 5-26**.

Storm Drainage

The largest diameter storm sewers are typically located along arterial roads, including Innes Road (1350 mm), Brian Coburn Boulevard (1200 mm), Orléans Boulevard (1650 mm), and Blair Road (1350 mm) within the study area.

The 2013 study *Establishing Static and Unit Thresholds for Erosion, Mud and McEwan Creeks* by JTB Environmental Systems Inc. (JTBES), recommends unit thresholds be applied to new or increased discharges to Mud Creek to prevent further erosion to the creek.

Two stormwater management facilities are located within the study area. The first, servicing the Bradley Estates community, is located south of Keith Crescent. The second services Chapel Hill South and Trails Edge communities and is located on either side of Brian Coburn Boulevard at Pagé Road. Both facilities outlet to tributaries of Mud Creek.

Municipal Drains

There is one municipal drain in the study area: the James Blais Drain, located east of Pagé Road. The drain outlets to a stormwater management pond located at the intersection of Brian Coburn Boulevard and Pagé Road.

5.5.7 Utilities

Hydro One and Hydro Ottawa

The entire study area is within the Hydro Ottawa service area (**Figure 5-27**). There is an aerial Hydro line located on Bearbrook Road. This line is located on the west side of the road south of the Hornet's Nest Soccer Park and on the east side north of the park. There is an aerial Hydro line located on Innes Road and the majority of this line is located on the north side of Innes Road. Another pole line is located on the north side of the Blackburn Hamlet Bypass. This pole line continues down the east side of Navan Road.

Hydro One Transmission has a high voltage transmission line consisting of two parallel tower lines that crosses the southern end of the study area.

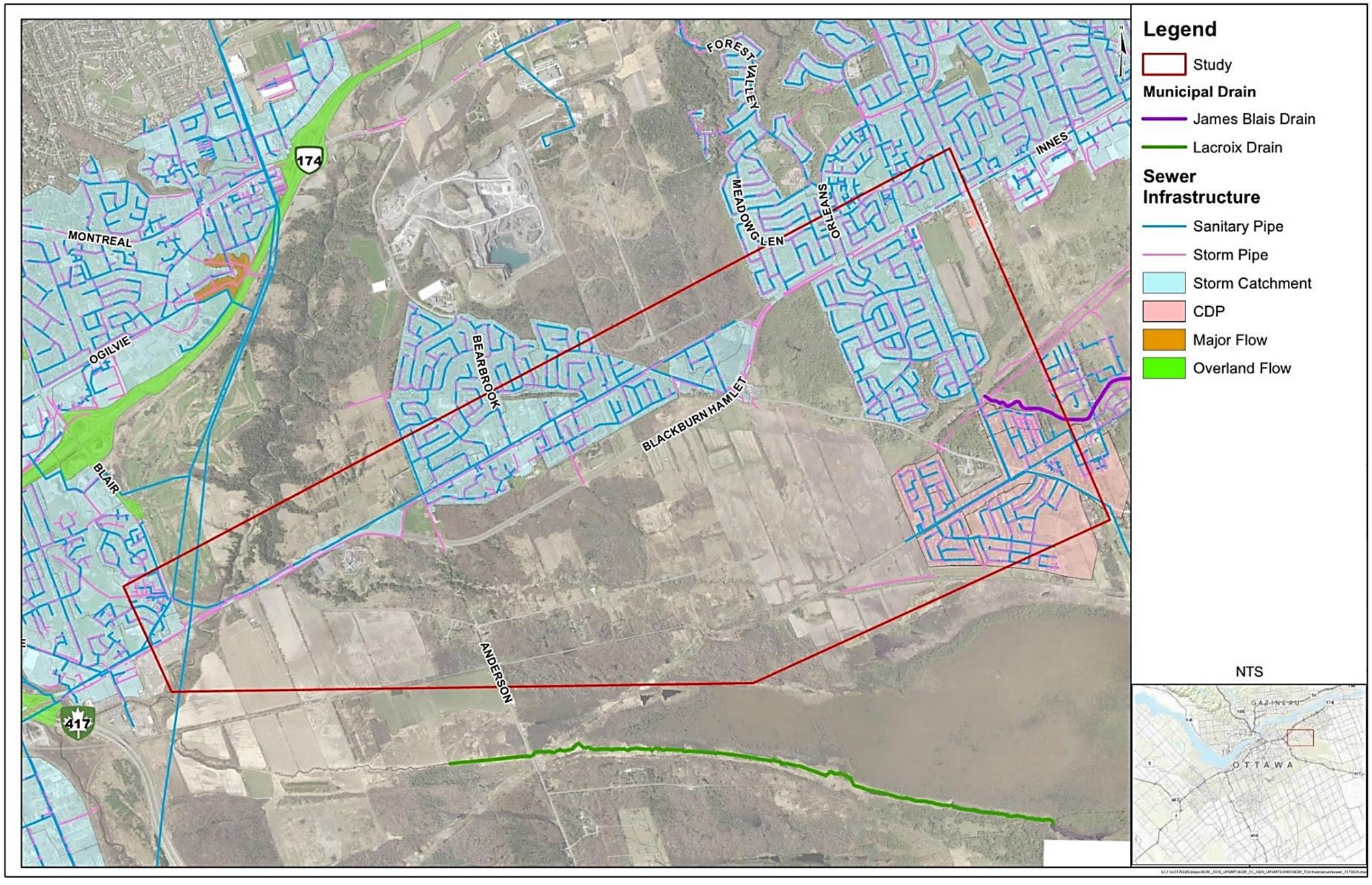

Figure 5-26: Sewer Infrastructure

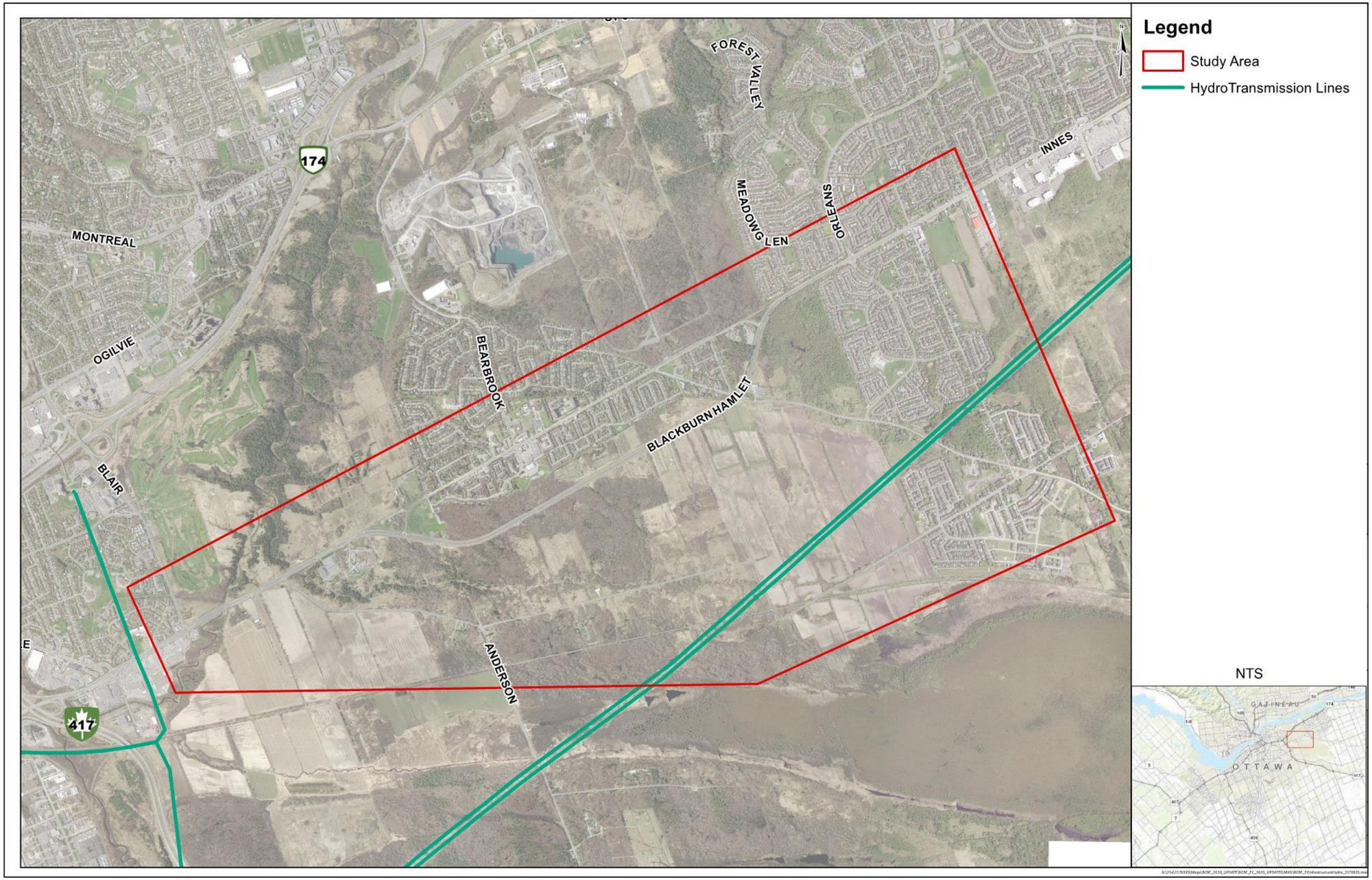

Figure 5-27: Hydro Infrastructure

Telecommunications

The majority of the telecom infrastructure in the study area is located on Hydro poles. There are Bell conduits on Innes Road and there are Bell pole lines on Navan Road and Renaud Road.

Natural Gas

On the east side of the study area there is a 500 mm interprovincial transmission main that borders the east edge of the RCMP property located on St Joseph Boulevard. There is a major junction point located at the eastern intersection of Innes Road and the BHBP. From this junction, there is a 200 mm gas main on Innes Road and a 400 mm gas main located on the BHBP.

There are 300 mm and 150 mm diameter gas mains which run along the south side of Innes Road. In addition, there is an NPS 16 (400 mm) diameter vital gas main which runs through the corridor on the south side of Anderson Road/Renaud Road from Innes Road to the north-south section of Renaud Road. There are large valve boxes for the vital gas main in the area of the existing Anderson Road/Renaud Road roundabout. The vital gas main has three access points for inspection, two are located in front of 2126 and 2170 Anderson Road and the third is located south of the Innes Road and Anderson Road Intersection. The rest of the developed area is served by local gas mains.

Other Utilities

There is street lighting on most of the roads in the study area. There are also traffic conduits at the major intersections in the area.

5.5.8 Communication & Hazardous Materials

Former and current activities within the study area have the potential to impact the soil and/or groundwater along the proposed alignment section. A Phase I Environmental Site Assessment was undertaken to identify actual or potential issues of environmental concern within the study area. The Phase 1 Environmental Site Assessment is available for review in **APPENDIX C**Error! Reference source not found.. The identification of issues was based on readily available information and did not include an intrusive investigation.

The Phase 1 Environmental Site Assessment, undertaken by Golder (2020), included a site visit on November 7, 2017, and a review of the following records:

- The City of Ottawa's Historic Land Use Inventory (HLUI).
- Federal, provincial, and private sector databases[3], which include Certificates of Approval, List of Expired Technical **Standards** and Safety Authority (TSSA) Facilities, Fuel Storage Tank, Ontario Regulation 347 Waste Generators Summary, TSSA Incidents, Private and Retail Fuel Storage Tanks, Scott's Manufacturing Directory and Ontario Spills.

[3] For a complete description of each of the databases searched for the Phase 1 Environmental Site Assessment, refer to Appendix B of Golder's (2020) Phase 1 Environmental Site Assessment Report.

- Past and currently available aerial photographs, for various specific years within the period spanning the years 1945 to 2014.

5.5.8.1 Areas of Potential Environmental Concern

Given the large size of the study area, several areas of potential environmental concern were identified within the Phase 1 Environmental Site Assessment. These areas were described based on their tendency to potentially impact the soil and/or groundwater. Golder (2020) classified a number of **"**noteworthy records" that included:

- Various former and current commercial/light industrial land uses such as gas stations/garages, a printing shop, a dry-cleaning facility, nurseries with greenhouses, a hydro substation, construction company sites, an area of dumping/waste storage.
- The Ottawa-Carleton Detention Centre.
- Locations with records of minor spills.
- A former Department of National Defence artillery range.

An additional Phase I Environmental Site Assessment was completed by Golder (2020) for this project as described below. The 2020 study was conducted to incorporate the Blair Road Transit Priority Environmental Assessment study area, and adjacent to the current study area.

Historic Land Use Inventory (HLUI)

The HLUI data provided by the City, included approximately 80 records for the study area. Noteworthy records for the study area include retail fuels outlets, two automotive garages, two construction companies, dry cleaning facilities, a transit facility, and a Department of National Defense bombing range (Golder, 2020).

ESRIS Reports

Various environmental concerns were noted through the ESRIS review, including Certificates of Approval (various uses), fuel storage tanks, expired TSSA facilities, various waste generation sites, TSSA incidents, private and retail fuel storage tanks, Scott's Manufacturing Directory listings and various spills as reported to Ontario (Golder, 2020).

Agricultural Land, Developed Areas & Transportation Facilities

In addition to the full List of "noteworthy" issues (List Numbers 1 to 36) described in Golder's Phase I Environmental Site Assessment (2020), there are numerous agricultural fields within the study area that have persisted for at least 70 years. Golder (2020) identified such agricultural fields as potential issues of environmental concern given that pesticides and fertilizers may have been applied to crops on these fields. Usage of pesticides and fertilizers may have resulted in shallow soil impacts.

A review of aerial photography indicates that the study area was developed prior to 1945. Today, lands within the NCC's Greenbelt primarily consist of agricultural fields with some farm and/or residential properties located along Innes Road, Renaud Road, Maurice Street, Riel Street and Navan Road. The Ottawa-Carleton Detention Centre located just west of Blackburn Hamlet Bypass at 2125 Anderson Road (2244 Innes Road) was constructed between 1965 and 1976.

Reviews of aerial photography indicated that residential development was observed to have occurred between the early 1950s and 1965, primarily near and along Innes Road within the communities that are now known as Blackburn Hamlet and Pineview Village. Between 1965 and 1999, aerial photos indicated further development, primarily consisting of residential and commercial development, within Blackburn Hamlet and Chapel Hill South. By 1991, these neighbourhoods were developed as they are today. Ongoing development (again primarily residential with some commercial) has taken place within Chapel Hill South, Chapel Hill North, and Orléans Village between the years 1965 to 2014.

For parcels of land within the study area that were developed prior to the 1940's, Golder (2020) reports that such land may show the potential for the presence of former and/or existing heating oil tanks.

It is also noted that residual salt may be present along the roadways within the study area. The presence of residual salt is due to de-icing agents having been, and presently being, applied for the purpose of road maintenance.

5.6 Climate Change

Climate Change Projection Data

Climate change projection models used for this study were primarily sourced from an international body referred to as the Intergovernmental Panel on Climate Change (IPCC). The IPCC was established by the United Nations and World Meteorological Organization in 1988 to review information on climate change. The IPCC has since been preparing Assessment Reports that, among other things, aggregate global climate models and projection data. The latest such report, the Fifth Assessment Report (AR5), included projection information from forty Global Climate Models (GCMs).

For this climate change risk assessment, projected changes for various climate elements were computed through the GCMs from AR5 using historical climate data from Environment and Climate Change Canada. This was accomplished using the Climate Change Hazards Information Portal (CCHIP), a climate analysis tool developed by Risk Sciences International (RSI).

AR5 also uses the concept of Representative Concentration Pathways (RCPs) to denote scenarios of various climate change intensities. Each scenario is named after 'radiative forcing values', a measure of the rate of energy change per unit area of the globe, measured in watts per square metre.

The scenario with the lowest projected change, or 2.6 W/m^2, is represented by RCP 2.6, while the highest projected change, or 8.5 W/m^2, is represented by RCP 8.5. The two RCPs used in this risk assessment were RCP 4.5 (moderate future emissions), and RCP 8.5 (highest future emissions).

The historical climate data used in the computation of climate projections comes from the Ottawa CDA meteorological station, located at the Central Experimental Farm, which has over 100 years of data.

In addition to CCHIP, historical trends and climate projections were identified through the review of past climate change risk assessments from the Ottawa area and academic papers from the field of climate science.

Daily Average Temperature

Temperatures in the Ottawa area are projected to increase in future. Overall, annual daily average, maximum, and minimum temperatures are projected to increase at similar rates. All three variables are projected to increase on average between 2.4 and 3.1 degrees by 2050, and between 3.3 and 5.8 degrees by 2080.

Extreme Heat Days

Along with an increase in average daily temperatures, an increase in extreme temperatures is projected for the study area under the RCP 4.5 and 8.5 climate scenarios. Projections for the number of days with daily maximum temperatures above 30ºC, show a possible increase from an annual average of 12 days, historically, to between 33 and 37 days in 2050 and to between 42 and 69 days in 2080.

Precipitation

According to current projections under the RCP 4.5 and 8.5 climate scenarios:

- Total annual precipitation would increase.
- Extreme precipitation would increase at a faster rate than total annual precipitation.

The total annual precipitation is projected to increase by up to 11% in 2080, the average maximum 24hr precipitation is expected to increase by 17% in that same time frame. The 11% increase in total annual precipitation would predominantly occur in the form of extreme rain events.

Average Snowfall Trend

A downward trend can be identified in the historical data for the Ottawa CDA station, and this generally aligns with projections for annual increases in temperature.

Freeze-Thaw Cycles

The ensemble of projections for both the moderate and high concentration pathways (RCPs) show a noticeable decrease in the number of days with freeze-thaw cycles in 2050 and 2080. The months of April and October may see 62% to 95% fewer freeze-thaw cycles on average under the RCP 4.5 and 8.5 climate scenarios. December, January, and February are projected to see an increase in freeze-thaw cycles. The month of March would continue to see the most days with freeze-thaw cycles in 2080.

Freezing Rain

An Environment and Climate Change Canada study by Cheng et. al. (2007) concluded that freezing rain events are very likely to increase in northern, eastern, and southern Ontario in the coming century. The study concluded that eastern Ontario is likely to see a 60% and 95% increase in freezing rain event frequency by 2050 and 2080, respectively, during the months of

December, January, and February. The study projected that the frequency of freezing rain events would remain unchanged for the months of November, March, and April.

Wind

One Environment and Climate Change Canada study by Cheng et. al. (2012) looked at projected increases in daily and hourly wind gusts for various regions of Ontario, including eastern Ontario. The results suggest modest increases in wind gusts are likely in the coming decades. Wind gusts over 70 km/h may see the highest increase in frequency, occurring 23% to 46% more often than current conditions.

Water Balance

Water deficits exist when potential evapotranspiration is greater than actual evapotranspiration. Results from CCHIP for the RCP 4.5 and 8.5 climate scenarios show that water surplus in the region would increase during the winter months (December to March), while water deficits will increase from May to October, with pronounced deficits in July and August.

Rainfall Intensity Duration Frequency

Intensity Duration Frequency (IDF) relates rainfall intensity with its duration and frequency and is used for flood forecasting and drainage design. For this parameter, the IDF_CC tool, developed by Western University, was used to project the change in total 24-hour precipitation for various design return periods. The results project a 19-22% increase in the 5-year, 24-hour rainfall amount, and a 17-30% increase in the 100-year, 24-hour rainfall amount.

5.6.1 Climate Projections Report, 2020

Climate Projections for the National Capital Region were prepared by CBCL Ltd. in June 2020, as a joint venture between the City of Ottawa and the NCC. The projections for climate changes and extremes documented in the 2020 Projection Report illustrate a similar trend to those noted in **Section 5.6** above.

The Climate Projections Report further notes that climate change is expected to impact both transportation infrastructure and operations (CBCL Ltd., 2020). Potential opportunities to the transportation sector such as longer construction seasons or reduced winter snow clearing may also result from a changing climate.

Strategies to manage uncertainty in climate modeling include (CBCL Ltd., 2020):

- Where practical, use a low-regret approach that accounts for the full range of climate projections.
- Plan/design for the most probable climate conditions over the intended lifetime.
- Include flexibility and/or additional safety factors for alternative courses of action.
- Monitoring climate conditions and project performance over time.
- Opting for adaptations that provide a clear financial or social benefit.
- Implementing design and construction modifications in response to observed changes.

5.7 Sustainability & Resilience

The City of Ottawa, in partnership with the City of Gatineau and the National Capital Commission have completed *A Plan for Sustainability and Resilience in Canada's Capital Region* (HB Lanarc Consultants Ltd., 2012). The plan identifies a long-term vision and set of goals speaking to all dimensions of sustainability—economic, social, cultural, and environmental. The plan outlines a set of strategies with broad guidelines to achieve these goals over the long term. A Risk Prevention and Mitigation Plan was created as a sub-plan to combine sustainability planning with long-term risk management. This sub-plan assesses the effects of long-term risks on communities and describes how the Sustainability and Resilience Plan can mitigate or prevent them.

The Sustainability and Resilience Plan developed a set of 10 strategies that form the core of the plan. The strategies most relevant to this project and the study area include:

- Manage Growth and Development:
  - Maintain a compact region
  - Protect the integrity of rural areas
  - Encourage design excellence
- Encourage Sustainable Mobility:
  - Integrate land use and transportation systems
- Protect and Restore Green and Natural Systems:
  - Continue to conserve large natural areas and strengthen connections between them
  - Promote habitat restoration and species recovery
  - Control the spread of invasive species.
- Support Local Food and Agriculture:
  - Protect agricultural land

The Plan notes that to reduce the use of private automobiles, walking, cycling and access to transit need to become more efficient and attractive forms of transportation. The Plan indicates that a region utilizing smart growth (compact, mixed, and transit-oriented development) tends to reduce public infrastructure and service costs as well as direct and indirect transportation costs. By utilizing the Sustainability Best Practices Approach, the Plan indicates that by 2060, most population growth may occur within the urban boundary. Around rapid transit stations, an increased intensification of residential land and decrease in single-detached housing is projected when compared to historic trends.

6. IDENTIFICATION & EVALUATION OF ALTERNATIVE SOLUTIONS

Near term Alternative Solutions were determined for the study area to address the near-term traffic needs. The Alternative Solutions include:

- Do Nothing
- Expand/Enhance Transit Service (Localized Transit Priority, Bus Only Lanes (BOL), HOV Lanes)

- Expand/Enhance Accessibility/Pedestrian/Cycling Facilities
- Transportation System Management
- Travel Demand Management
- Expand Roadway Capacity (General Purpose or HOV Lanes)

6.1 Alternative Solutions

6.1.1 Do Nothing

Under the 'Do Nothing' alternative, no significant changes would be made to the transportation network. Although capital costs and certain environmental impacts would be low for this alternative, the 'Do Nothing' approach does not accommodate near-term travel demand (general purpose traffic and transit) within the Study Area. Further, it does not address the needs of pedestrians and cyclists within the BHBP and Innes Road corridors.

6.1.2 Expand/Enhance Transit Service

The expansion or enhancement of transit service is a key measure for managing the increased travel demand on the roadway network. Transit programs that offer services competitive to automobile use can absorb a significant portion of person-trip demand, consequently reducing a community's vehicle-trip demand and leading to considerable reductions in the need for additional supportive roadway infrastructure.

The City of Ottawa's Growth Management Strategy (2020) recognizes the contribution of transit modal split in decreasing vehicle-trip demand. As such, a significant increase in transit ridership has been targeted to manage the ever-growing travel demand pressure across the City's roadway network including the East Urban Area.

The Official Plan and the TMP have set out an extensive plan for implementation of rapid transit lines, transit service strategies, and transit priority measures (e.g., BOL, HOV lanes, queue jump lanes, etc.), which will be instrumental to reaching the City's increased transit mode split objective. Additional east-west capacity will be required to meet the projected 2031 travel demand.

The expansion or enhancement of transit service has potential to help accommodate in the near-term, the projected increased east-west travel demand.

6.1.3 Expand/Enhance Accessibility & Active Transportation Facilities

Measures to accommodate and increase walking, cycling and accessibility are an integral part of the TMP. The City of Ottawa is committed to promoting these modes and opportunities as a way of meeting future mobility needs. Design solutions may include MUPs, sidewalks, pedestrian crossings, and/or cycle tracks. Though these measures would help address existing deficiencies, improve service for active modes of transportation and provide enhanced accessibility, they will not serve as stand-alone solutions to address the near-term travel demand in the Study Area. These measures should be considered as part of a package of solutions.

6.1.4 Transportation System Management

Transportation System Management (TSM) is a category of alternatives that includes various approaches to optimizing the existing transportation network. Typical measures include intersection improvements, traffic signalization changes, signage, etc. The extent to which the City of Ottawa can address the needs for maximizing its people-moving capacity is limited and, although important, is not usually seen as a stand-alone solution.

6.1.5 Travel Demand Management

The City's future travel projections consider the portion of the population that regularly works from home. Travel Demand Management (TDM) measures to increase the portion of the population that regularly works from home or other measures such as peak spreading (e.g., encouraging commuters to travel outside the morning and afternoon peak hours), while beneficial, are not considered a stand-alone solution that would satisfy near-term future travel demands within the broader study area.

6.1.6 Expand Roadway & Transit Capacity

There is an identified need for expanding roadway capacity to meet future travel demand. Given the high demand for transit service and good potential for High Occupancy Vehicle (HOV) travel within the project limits, consideration should be given to allocation of additional roadway capacity to transit and/or HOV travel.

Such consideration can either involve new lanes by widening the existing roadway or conversion of existing general traffic lanes to transit or HOV lanes.

Increased ridesharing is an effective strategy that can decrease total vehicle-trip demand through the promotion of the sharing of private vehicles by individuals, such as carpooling. A common ridesharing supportive measure is the implementation of designated BOL or HOV lanes, which provide vehicles meeting a specified minimum occupancy with travel time and trip reliability benefits over general traffic. BOL only allow transit vehicles to use the lane, while HOV lanes are often implemented for vehicles with a minimum of two passengers and typically carry transit vehicles.

A preliminary review was undertaken of the potential for BOL or HOV lanes on Innes Road/ Blackburn Hamlet Bypass. The review examined the impacts and potential benefits associated with the introduction of BOL or HOV facilities as part of planned near-term transportation improvements in the Study Area. The potential for BOL and HOV lane use was determined to be significant on Innes Road and on Blair Road just northwest of the Study Area, especially since Blair Road is destined to the Blair LRT Station. The City's EMME travel demand model projected a 2031 base case scenario in which approximately 30% of the total person trips on Innes Road and BHBP would be made either by persons on transit or persons in multiple occupant vehicles during morning peak traffic hours.

6.2 Confirmation of the Preferred Solution

Of the above alternatives, a combination of expanding the roadway and improving transit capacity in conjunction with measures to accommodate and increase walking, cycling and accessibility, is the recommended Alternative Solution to address the identified near-term problems, needs and opportunities for Innes Road/BHBP (Navan Road to Blair Road). The

provision of transit priority queue jump lanes on all approaches to the intersection of Navan Road/BHBP is recommended, along with the provision of HOV lanes in both directions on Innes Road from BHBP to Blair Road.

While a combination of roadway widening and measures to accommodate and increase walking, cycling and accessibility does not meet the long-term needs in accordance with the TMP, the provision of dedicated shared Transit/HOV lanes on Innes Road/BHBP is considered the best near-term solution and is recommended to be carried forward for further study.

7. IDENTIFICATION & EVALUATION OF ALTERNATIVE DESIGNS

7.1 Alternative Design Concepts

Various design alternatives were developed for the preferred Near-Term Solution with consideration of the long-term solution identified for the Brian Coburn Boulevard Extension/Cumberland Transitway. The broader study area contains important ecological and agricultural areas which were included in the preliminary screening of design concepts. Additional considerations for comparative evaluation of design alternatives included social, cultural and transportation environments as well as cost.

7.1.1 Option 1 – Select Widening of Innes Road & Navan Road

Option 1 is a combination of road widening, new widening for shared transit and HOV lanes, new transit operating within mixed use and new roads where buses will operate in mixed traffic, primarily along Innes Road, BHBP and Navan Road, as illustrated in **Figure 7-1**. A portion of Innes Road and a segment of Blair Road near the Innes Road intersection would be widened from 4 to 6 lanes, including the addition of 2 shared transit and HOV lanes, keeping 2 GP lanes. Transit would operate in mixed traffic from Innes Road to Cleroux Crescent and extend Cleroux Crescent to Innes Road. As sub options, buses would operate in mixed traffic along Cleroux Crescent East and West, which would connect via intersection modifications to the Innes Road and BHBP intersection. Navan Road would be widened from 4 to 6 lanes to add 2 shared transit and HOV lanes, keeping 2 GP lanes. An additional sub option would either widen Navan Road to add 2 transit only lanes south of the Innes Road/BHBP intersection or transit would operate in mixed traffic on this segment of the BHBP.

7.1.2 Option 2 – Navan Widening/Cleroux, Innes Road & Bearbrook Bus Route

Option 2 is a combination of road widening, new widening for shared transit and HOV lanes and new transit operating within mixed use, primarily along Innes Road and Navan Road, as illustrated in **Figure 7-2**. A portion of Innes Road would be widened from 3 to 5 lanes to add 2 transit only lanes between Bearbrook Road and BHBP. A segment of Bearbrook Road near the Innes Road intersection would be widened from 2 to 4 lanes to also add 2 transit only lanes. Similar to Option 1, as sub options, buses would operate in mixed traffic along Cleroux Crescent East and West, which would be extended and connect via intersection modifications to the Innes Road and BHBP intersection. Navan Road would be widened from 4 to 6 lanes to add 2 transit only lanes, keeping 2 GP lanes. An additional sub option would either widen Navan Road to add 2 transit only lanes south of the Innes Road/BHBP intersection or transit would operate in mixed traffic on this segment of the BHBP.

7.1.3 Option 3 – Navan Widening & Orleans Bus Route

Option 3 is a combination of road widening and new buses operating within mixed traffic, primarily along Navan Road and Orleans Boulevard, as illustrated in **Figure 7-3**. Navan Road would be widened from 4 to 6 lanes to add 2 transit only lanes, keeping 2 GP lanes. Buses would operate in mixed traffic along a segment of Orleans Boulevard from Navan Road to north of Meadowglen Drive.

7.1.4 Option 4 – Blair/Innes/BHBP/Navan Widening & Blair BRT

Option 4 is a combination of road widening and new BRT, primarily along Innes Road, BHBP and Navan Road, as illustrated in **Figure 7-4**. A portion of Innes Road and a segment of Blair Road near the Innes Road intersection would be widened from 4 to 6 lanes, including the addition of 2 shared transit HOV lanes, keeping 6 GP lanes. This portion would also include the construction of a partial segment of the future BRT. The BHBP would be widened from 4 to 6 lanes, including 2 shared transit and HOV lanes, keeping 2 GP lanes. Navan Road from Innes Road to Brian Coburn Boulevard would be widened from 4 to 6 lanes, including 2 shared transit and HOV lanes, keeping 2 GP lanes.

Navan Road would be widened from 4 to 6 lanes to add 2 shared transit and HOV lanes. An additional sub option would either widen Navan Road to add 2 transit only lanes south of the Innes Road/BHBP intersection or transit would operate in mixed traffic on this segment of the BHBP.

7.1.5 Option 5 – Blair/Innes/BHBP/BCBE/Navan Widening & Blair BRT

Option 5 is a combination of new road, road widening and new BRT, primarily along Innes Road, BHBP, Navan Road and Brian Coburn Boulevard, as illustrated in **Figure 7-5**. A portion of Innes Road and a segment of Blair Road near the Innes Road intersection would be widened from 4 to 6 lanes, including the addition of 2 shared transit and HOV lanes, keeping 6 GP lanes. This portion would also include the construction of a partial segment of future BRT. The BHBP would be widened from 4 lanes to 6 lanes, including 2 shared transit and HOV lanes, keeping 4 GP lanes. Navan Road from Innes Road to Brian Coburn Boulevard and a portion of Brian Coburn Boulevard to west of Fern Casey Street would be a new 4 lane road, including 2 shared transit and HOV lanes, including 2 GP lanes.

7.1.6 Option 6 – Blair/Innes/Anderson/Renaud Widening

Option 6 is a combination of new road, road widening and new BRT, primarily along Innes Road, Renaud Road, and Anderson Road, as illustrated in **Figure 7-6**. A portion of Innes Road and a segment of Blair Road near the Innes Road intersection would be widened from 4 to 6 lanes, including the addition of 2 shared transit and HOV lanes, keeping 6 GP lanes. Anderson Road and Renaud Road to Brian Coburn Boulevard would be widened from 4 to 6 lanes, including 2 shared transit and HOV lanes, keeping 2 GP lanes. 4 GP lanes as part of the BHBP would be maintained.

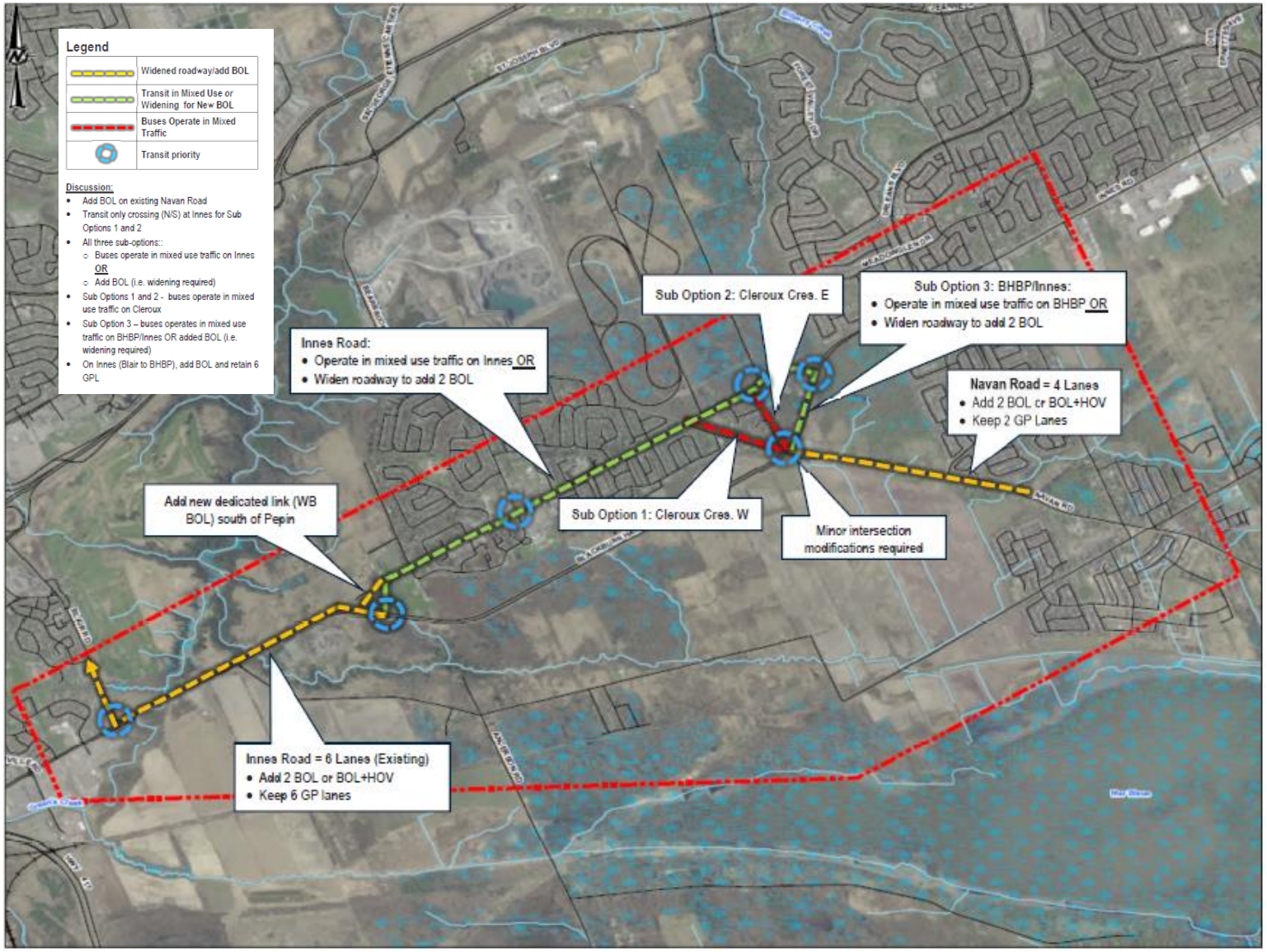

Figure 7-1: Option 1

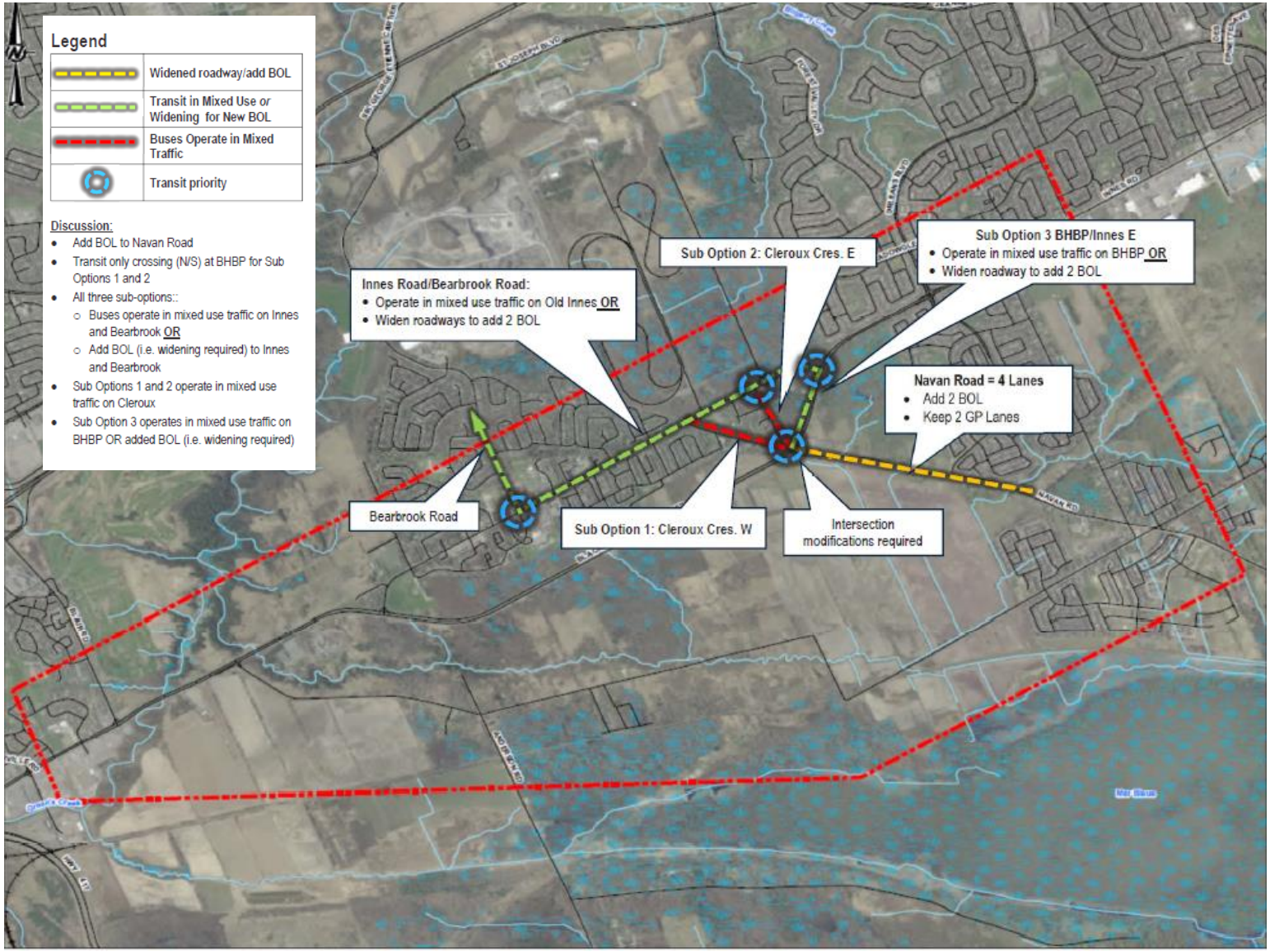

Figure 7-2: Option 2

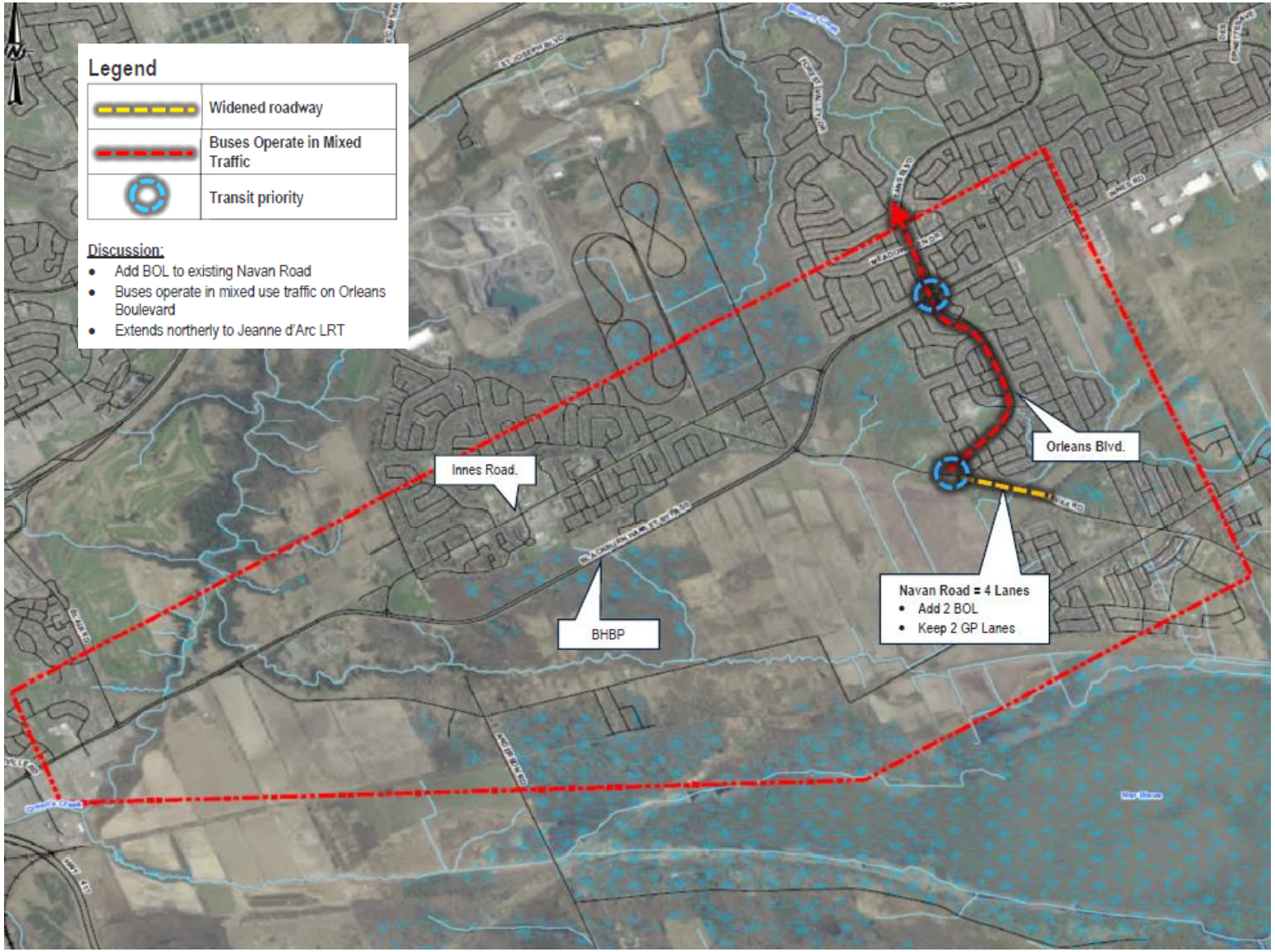

Figure 7-3: Option 3

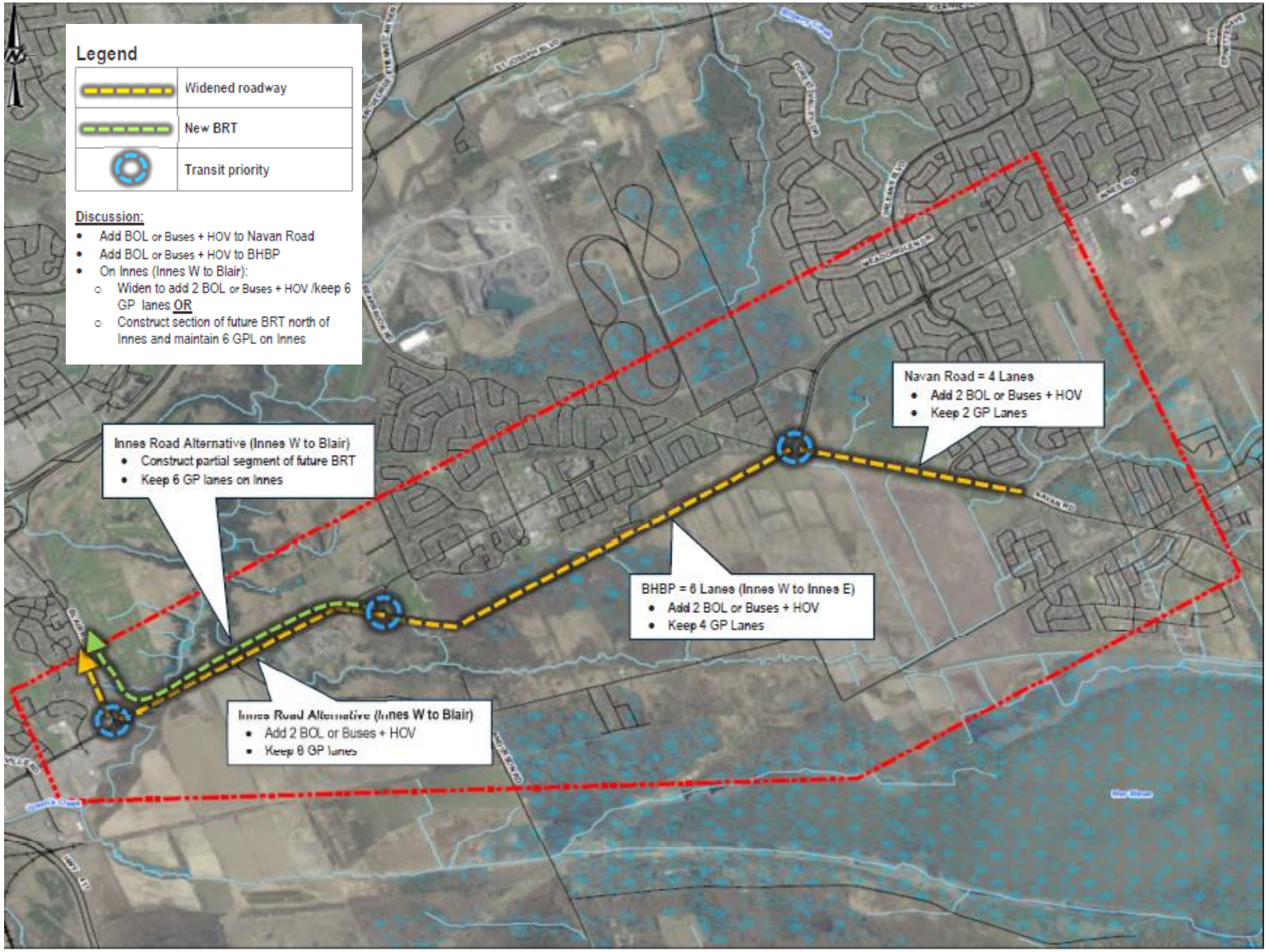

Figure 7-4: Option 4

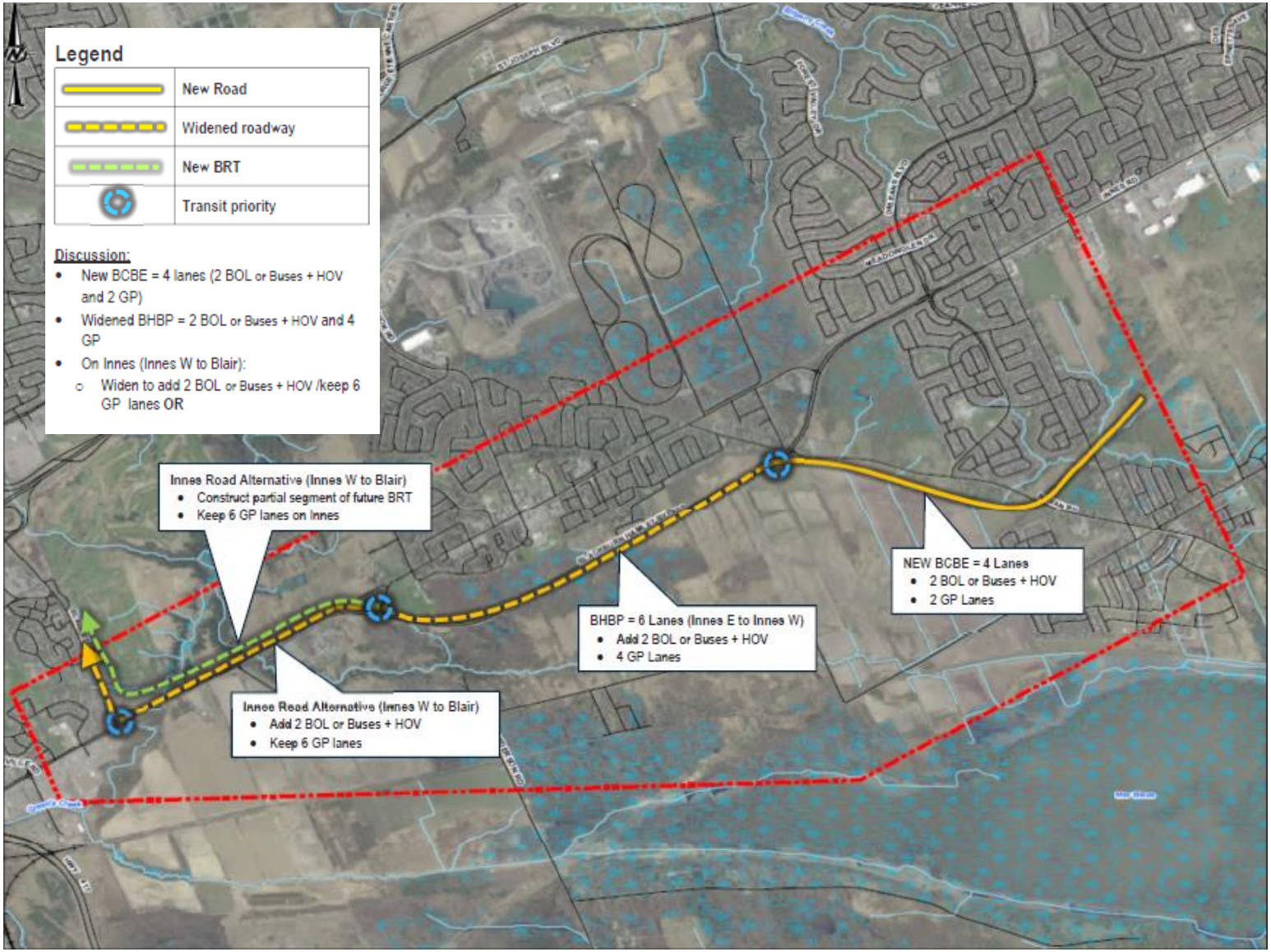

Figure 7-5: Option 5

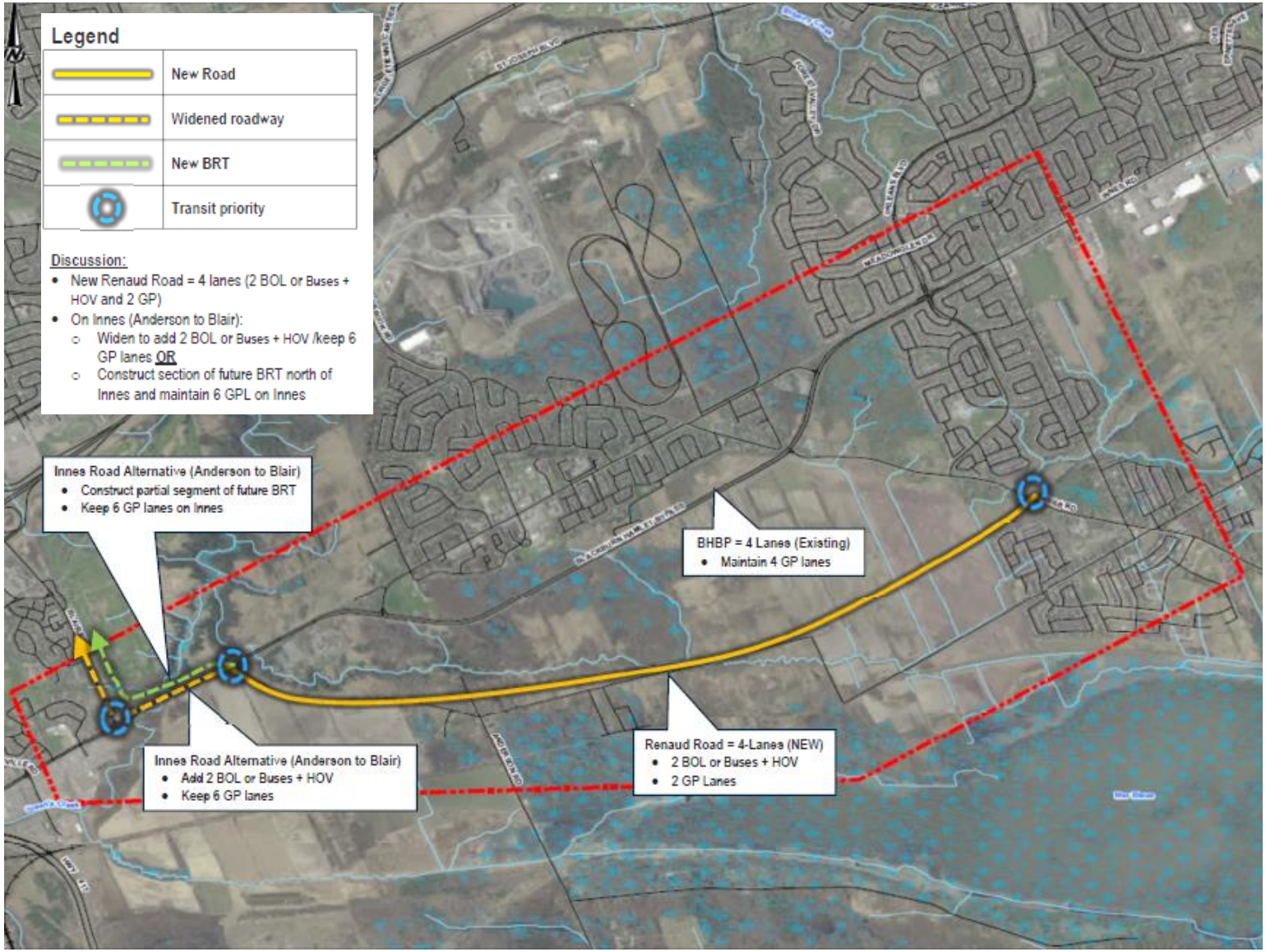

Figure 7-6: Option 6

7.2 Evaluation of Alternative Design Concepts

A high-level comparison of the six Alternative Design Concepts was conducted considering the Natural Environment, Social Environment, Cultural Environment, Transportation and Cost. See **Table 7-1**.

Table 7-1: Evaluation of Alternative Design Concepts

Option	Natural Environment	Social Environment	Cultural Environment	Transportation	Cost	Recommendation
1	—	×	×	✓	×	Do Not Carry Forward
2	✓	×	×	×	✓	Do Not Carry Forward
3	—	—	✓	×	✓	Do Not Carry Forward
4	—	—	—	✓	×	Carry Forward
5	—	✓	×	✓	×	Do Not Carry Forward
6	—	✓	×	✓	×	Do Not Carry Forward

Notes: × = Poor — = Average ✓ = Good

Option 1 provided good performance under Transportation but was considered neutral or poor in comparison to the other Options under all other factors and therefore was not carried forward.

Options 2 and 3 were screened out up front due to their much poorer Transportation performance compared to the other Options. Neither Option provided a significant improvement in transit travel times and/or reliability nor did they provide much if any benefit to general purpose traffic or to active transportation.

Option 6 provided good performance under Transportation and Social Environment but had less construction phasing flexibility and was more of a longer-term option due to Cost and therefore was not carried forward.

Options 1, 4 and 5 all had good performance under Transportation, including good phasing flexibility, and all had some pros and cons under the other factors.

Option 1 had the potential for higher Social Environment impacts associated with potential widening along Innes Road through Blackburn Hamlet and along Navan Road and, accordingly was screened out leaving just Options 4 and 5 for further consideration.

Based on more detailed traffic analysis and considering long term improvement plans, affordability and potential social impacts associated with widening along Navan Road a scaled back version of Options 4 and 5 were carried forward as the Recommended Alternative as detailed in **Section 8** thus providing an alternative that provides optimal transportation benefits while minimizing potential natural, social, and cultural impacts as well as cost. The Recommended Alternative includes widening of Innes Road between Blair Road and the

Blackburn Hamlet Bypass for transit/HOV lanes and active transportation as well as transit priority/active transportation improvements at the Blackburn Hamlet Bypass and Navan Road intersection.

Based on the above evaluation, Option 4 was selected as the preferred Option. Option 4 was further refined to widening only within the specific problem areas identified with substantial congestion and traffic delays along Navan Road, the Blackburn Hamlet Bypass and Innes Road. This change considered long term improvement plans, affordability and reduces potential social impacts associated with widening along Navan Road. This significantly scaled back version of Option 4 was carried forward as the Recommended Alternative as detailed in **Section 8**, thus providing an alternative that provides optimal transportation benefits while minimizing potential natural, social, and cultural impacts as well as cost.

8. RECOMMENDED PLAN

The Recommended Design includes widening of Innes Road from 6 to 8 lanes to accommodate one shared Transit Priority/High Occupancy Vehicle (or HOV) lane per direction from the west end of the Blackburn Hamlet Bypass to east of Blair Road, a distance of approximately 2.0 km, as illustrated on **Figure 8-1**. The existing on-road bicycle lanes are proposed to be replaced by a new north side 4.0 m multi-use pathway to accommodate active transportation users and serve as a bi-directional cycling facility. The new multi-use pathway will extend from Blair Road at Innes Road to the Tauvette Street/Glen Park Drive/Innes Road intersection in Blackburn Hamlet. Property access will typically be limited to right-in/right-out access except at intersections with traffic control signals. New Transit only queue-jump lanes will be provided on each leg of the Navan Road/BHBP intersection. Design criteria are provided in the table below.

Table 8-1: Innes Road Design Criteria

		Existing Condition	Proposed Design
Functional Highway Classification		UAD 90	UAD 90
Design Speed		90 Km/h	90 Km/h
Posted Speed		80 Km/h	80 Km/h
Radius Minimum		Existing	Existing
Stopping Sight Distance		Existing	Existing
Equivalent Minimum "K" Factor	Crest	Existing	Existing
	Sag	Existing	Existing
Grades Maximum		Existing	Existing
Number Of Lanes		6	8
Lane Widths		3 @ 3.75 m	4 @ 3.50 m
Bike Lane		2.0 m	N/A
Sidewalk		N/A	N/A
Multi-Use-Pathway		N/A	4.0m (a)
Median Width		5.0 m	5.0 m
R.O.W. Width		40.5 m	40.5 m

Notes:

a) Innes Road horizontal and vertical alignment are per existing. Only road widening is included in the proposed modifications.

b) The widening of the road by one lane per direction was at the expense of exiting bike lanes. The on-road cycling facility is being replaced with a Multi-Use-Pathway along the north property line on NCC land. The pathway will connect Blair MUP with Innes Road/ Pepin Court.

8.1 Typical Cross-Section

The Typical Cross-Section is shown facing towards the east (just east of Mud Creek) on **Figure 8-2**. The existing urban (curbed) cross-section is maintained by keeping the existing raised median and lanes intact with proposed widening to the outside by relocating the north and south curbs by 1.5 m. The width of property required to accommodate the north multi-use pathway and grading varies.

In the Recommended Plan, existing stormwater drainage pipes can be used where they exist within the Innes Road corridor. Existing pipes and outlets may be improved to super pipes for quality control and oil and grit separator (OGS) units may be added at Greens Creek and Mud Creek outlets. Where no pipes exist, a combination of V-shaped and trapezoidal swales with check dams are recommended.

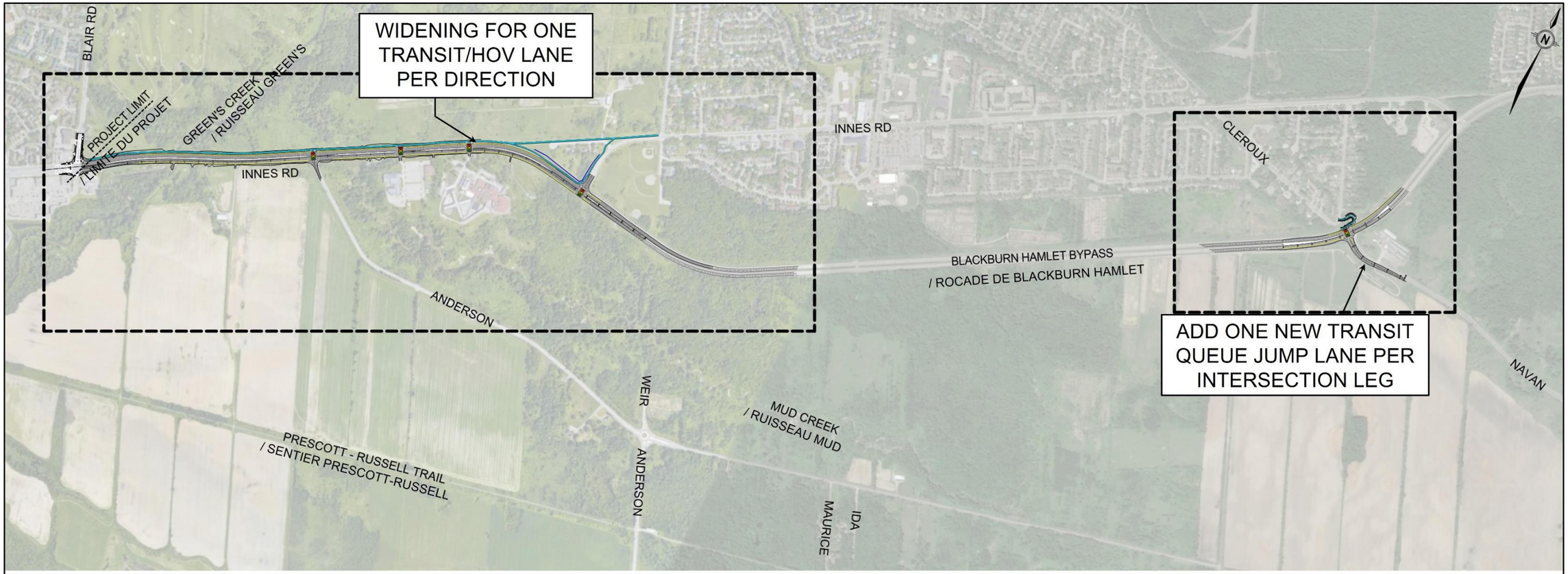

Figure 8-1: Recommended Plan - Overview

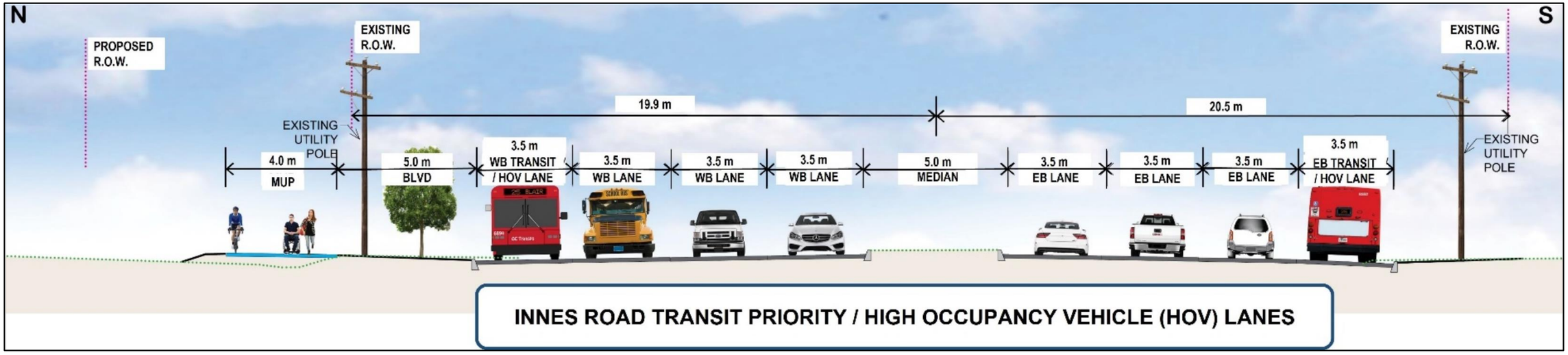

Figure 8-2: Typical Cross-Section Along Innes Road

8.1.1 Blackburn Hamlet Bypass & Navan Road Intersection

The Recommended Plan proposes that new transit only queue-jump lanes be provided on each leg of the Navan Road/Blackburn Hamlet Bypass intersection to help buses avoid congestion at these locations (**Figure 8-3**). A new multi-use pathway connection and noise attenuation barrier, shown in light blue, are proposed between the intersection and Cleroux Crescent to the north. This pathway will provide connectivity between the Blackburn Hamlet community and Navan Road towards the Chapel Hill transit station and beyond.

8.1.2 Innes Road Between Blackburn Hamlet Bypass & Blair Road

The new shared Transit Priority/HOV lanes on Innes Road are proposed to commence at the western limit of the Blackburn Hamlet Bypass and continue to the west to Blair Road. The multi-use pathway that will be added to the north side of Innes Road will connect to Blackburn Hamlet via Pepin Court and via Innes Road. The multi-use pathway will extend to the Tauvette Street/ Glen Park Drive/Innes Road intersection to provide connectivity to the Blackburn Hamlet community and a planned NCC pathway to the north. A 3.0 m high noise attenuation wall is proposed along the south side of the residences located on the south side of Pepin Court.

New traffic control signals are proposed at the church property located at 2214 Innes Road. The shared Transit Priority/HOV Lanes on Innes Road will terminate just east of Blair Road. The proposed multi-use pathway along Innes Road will connect to Blair Road with access to the future multi-use pathway along the west of Blair Road and the east side paved shoulder as identified in the 2021 Blair Road Transit Priority Environmental Study Report.

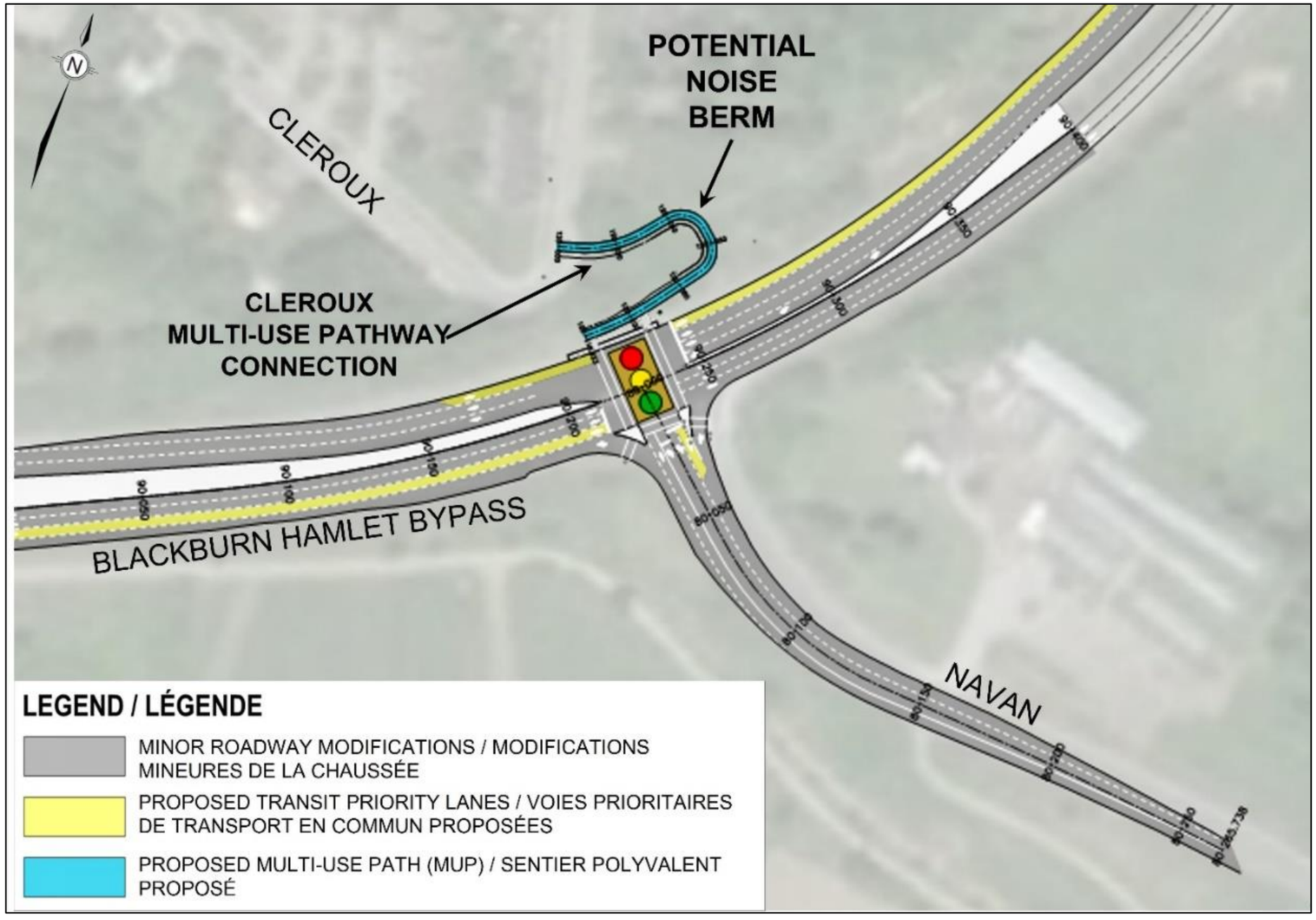

Figure 8-3: Recommended Plan – Blackburn Hamlet Bypass & Navan Road Intersection

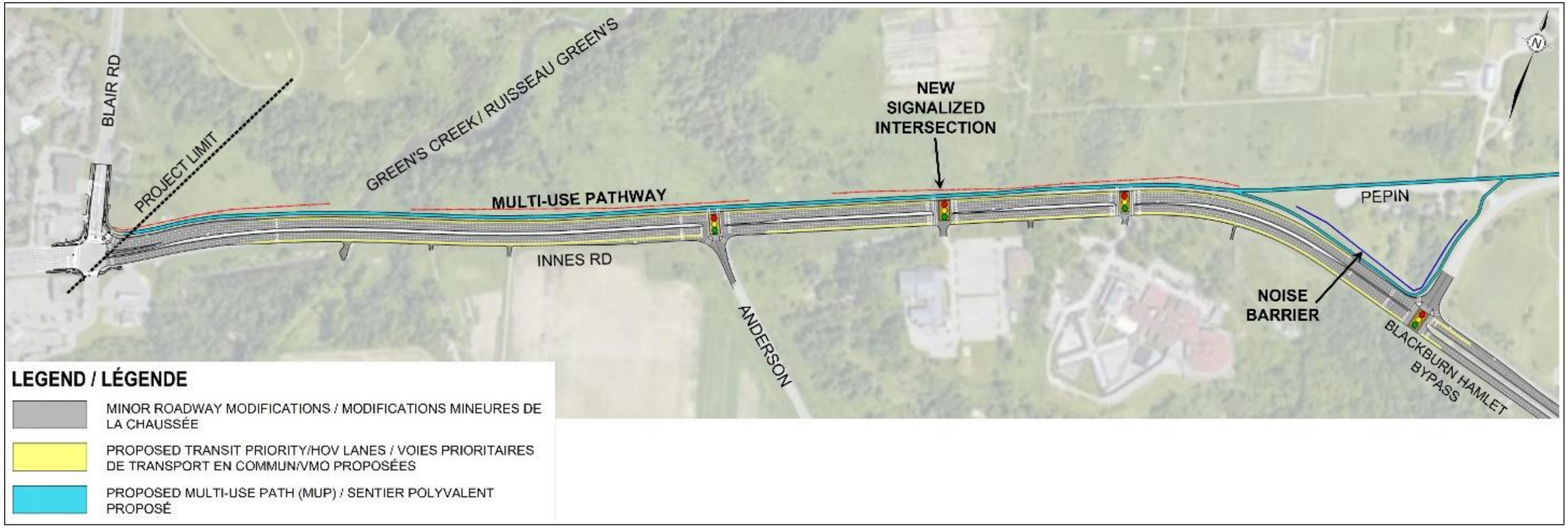

Figure 8-4: Recommended Plan – Innes Road Between BHBP & Blair Road

8.2 Accessibility

The Innes Road/BHBP (Navan Road to Blair Road) Transit Priority Project should be designed to meet the City of Ottawa Accessibility Design Standards (2015a), as well as the *Accessibility for Ontarians with Disabilities Act (AODA).* Pending current standards and policies at the time of detailed design, the following Standards are examples for inclusion:

- Requirements for clear width for exterior paths of travel-sidewalk minimum width of 1.8 m.
- Longitudinal grade kept to 5% or less.
- Crossfall of pedestrian facilities set at 2% maximum.
- Intersections to incorporate appropriate waiting areas at crosswalks, accessible pedestrian signals, and Tactile Walking Surface Indicators (TWSI).
- Bus transit stops, where provided, to include space for accessible ramp deployment.
- Where adjacent to each other, pedestrian surfaces and cycling surfaces to have tactile delineation or separation between them.
- Multi-use pathways, where provided, to provide a smooth surface for users of wheeled mobility devices.
- Consider providing rest areas/benches (~30m) to maximize the usability of the pathways for people with reduced stamina.

8.3 Drainage & Stormwater Management Criteria

Proposed drainage and stormwater management designs should meet the requirements stipulated in the following standards, specifications, and guidelines listed below (or most current versions thereof):

- Ministry of the Environment (MOE), Stormwater Management Planning and Design Manual, March 2003
- City of Ottawa, Sewer Design Guidelines, October 2012
- Ministry of Transportation Ontario (MTO), Highway Drainage Design Standards (HDDS), January 2008
- MTO, Drainage Management Manual (DMM), 1997
- City of Ottawa, Low Impact Development (LID) Technical Guidance Report, February 2021
- Toronto and Regional Conservation Authority (TRCA) and Credit Valley Conservation Authority (CVC) Low Impact Development (LID) Stormwater Management Planning and Design Guide, 2010
- RVCA, Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Ontario Regulation 174/06 under Section 28 of the Conservation Authorities Act, R.S.O 1990, c. C.27), September 2018

The Functional Design Report – Drainage and Stormwater Management (MH, 2021c) is provided in **APPENDIX C: 4**.

8.4 Peak Hour Traffic Analysis

A review of intersection operations along the corridor for the Existing Conditions, Recommended Plan Conditions, and Ultimate Conditions was completed for the morning and afternoon peak hours. Synchro Version 10 software was used to model intersection performance, using signal timing plans from the City of Ottawa.

This analysis reviewed the arrangements at intersections for the functional design of the Interim and Ultimate Conditions. **APPENDIX C: 2** provides a summary of the intersection operations in existing and proposed conditions, along with recommendations for auxiliary lane lengths (i.e., right or left turn lanes) and length of high-occupancy vehicle or transit queue jump lanes that have been considered in the Recommended Plan.

8.5 Property Impacts

An expanded road and transit right-of-way to accommodate the recommended plan will require property from federal landowners. Approximately 1.0 ha of land is required from the NCC for widening along Innes Road. Acquisition of NCC property will be negotiated by the City by means of land purchase, land exchange or land lease. Federal Land Use, Design and Transaction Approval (FLUDTA) will be required for NCC lands. A federal environmental impact assessment will also be required. Discussions will need to occur and be in accordance with the land uses at the time of planned construction.

8.6 Cost Estimate

Project costs were developed in accordance with the Council-approved Project Delivery Review and Cost Estimating process for implementing capital projects. Cost for design, construction, property, public art, and contingencies in 2023 dollars is estimated at $25M.

9. ASSESSMENT & EVALUATION OF IMPACTS

9.1 Scope of the Assessment

The impact assessment includes a determination of the effects of the project on the environmental components identified in the existing conditions. To scope the environmental effects, both the temporal and spatial impact has been assessed.

- Temporal bounds of this assessment include pre-construction, construction, and operation of the project. Construction is anticipated to occur separately for each of the time-horizons as defined above. Implementation (construction) of the Recommended Plan is anticipated to occur within the 2031 timeframe.
- Spatially, this assessment includes those lands within and adjacent to the project limits needed for the construction and operation of the project, including all related works, temporary easements, permanent easements, and any new infrastructure. Spatial boundaries for the project reflect the geographic range and temporal extent over which the project's environmental effects may occur. Boundaries for the Valued Ecosystem Components (VECs) and Valued Social Components (VSCs) were determined on an individual basis and are specific to the anticipated spatial and temporal extent of potential impacts, with some VECs having a narrower spatial footprint than others.

9.2 Assessment & Evaluation Approach

The values and conditions identified in the documentation of existing conditions were used as the basis for assessing the effects of the recommended plan on the natural, physical, social, cultural, built, and economic environments. The impact analysis involved applying the following steps (**Table 9-1**).

Table 9-1: Impact Assessment Approach

Step 1: Interactions	Identify and analyze instances where the project, as described in **Section 8** (Recommended Plan), may interact with existing environmental conditions, as described in **Section 5** (Existing Environmental Conditions) and identification of Potential Environmental Effects.
Step 2: Mitigation	Document built-in mitigation measures **Section 9.3** (Built-In Mitigation Measures) that consist of primarily standard construction practices. Identify opportunities for further mitigation of residual effects, if possible/practical
Step 3: Residual Effects	Identify the residual environmental effects, if any, **Section 9.4** (Assessment & Evaluation of Effects)
Step 4	Determine the significance of the residual environmental effects **Section 9.4** (Assessment & Evaluation of Effects)

Professional judgment and experience formed the basis for identifying environmental effects and mitigation measures. The analysis was based on comparing changes to the existing environment during all phases of the project including pre-construction, construction, and operation.

9.2.1 Determination of Significance

The assessment and evaluation of effects was based primarily on comparing the existing environment with the anticipated future environment, during and after construction. The prediction of effects considered:

- The interaction between the project and the environmental values.
- The effects of the project activities on the environmental values.
- The combined effects of multiple activities and/or multiple effects.

Within this context, consideration was given to:

- The magnitude, spatial extent, and duration of effects.
- The proportion of a species population or the number of people affected.
- Direct or indirect effects.
- The degree to which the effect responds to mitigation.
- The level of uncertainty about the possible effect.

In this assessment, “residual” environmental effects are defined as changes to the environment caused by the project, and vice versa, when compared to existing conditions and considering all built-in-mitigation measures, best management practices and site-specific mitigation measures.

Potential residual environmental effects are assessed as to their significance, including spatial and temporal considerations.

Significant: An effect that may exhibit one or more of the following characteristics: widespread; permanent transcendence or contravention of legislation, standards or environmental guidelines or objectives; permanent reduction of species diversity of population of species; permanent loss of critical/productive habitat; permanent alteration to community characteristics or services, land use or established patterns; which is severe and undesirable to the community as a whole; permanent alteration to groundwater flow direction or available groundwater quality and quantity; and/ or permanent loss of archaeological/heritage resources.

Not Significant: An effect that may exhibit one or more of the following characteristics: not widespread; temporary or short-term duration (i.e., only during construction); recurring effect lasting for short periods of time during or after project implementation; not permanent, so that once the stimulus is removed, the integrity of the social/environmental components is resumed.

Negligible/Moderate Residual Effect: Effects that are reversible; small/localized/limited to the construction phase of the project; a nearly zero or hardly discernable effect; impacting a population at a localized area.

"Positive" Residual Effects refer to those that exhibit a beneficial outcome.

The above definitions of significance were adopted for use in this assessment because many of the impacts cannot be quantified in absolute terms, although changes and trends can be predicted. The definitions provide guidance and are intended to minimize personal bias.

9.3 Built-In Mitigation Measures

Mitigation measures refers to those means employed to eliminate, reduce, control, or offset the adverse effects of a project, including restitution for any damage caused by those effects through replacement, restoration, compensation, or any other means. In this assessment, "built-in mitigation" is defined as the actions and design features that have been incorporated in the pre-construction, construction, and operational phases, with the specific objective of lessening the significance or severity of environmental effects that may be caused by the project. In addition to design features, built-in-mitigation measures for this project include standard construction practices and Best Management Practices (BMPs) as presented below.

The project will be designed and implemented with the benefit of contemporary planning, engineering, and environmental management practices. There should be adherence to the legislation, policies, regulations, guidelines, and best practices of the day at the detail design stage. Where possible, mitigation measures will be prescribed in the construction contracts and specifications. Examples of practices that should be employed, based on current standards, are described below. These measures can be considered "built into" the subsequent Recommended Plan. *All mitigation measures will need to be reviewed at the time of detailed design and construction to assess applicability, validity, and legislative changes.*

9.3.1 Natural Environment

9.3.1.1 Environmental Protection Plan

It will be the responsibility of the Contractor to ensure that no contamination, waste, or other substances, which may be detrimental to aquatic life or water quality, will enter a watercourse as either a direct or indirect result of construction. In this regard, any floating debris resulting from construction which accumulates on watercourse beds and watercourse banks is to be immediately cleaned up and disposed of. Any spills or contamination, waste or other substances which may be detrimental to aquatic life or water quality will also be immediately cleaned up.

Any construction works which will cause or be the cause of discharge to the watercourse are to be prohibited unless appropriate approvals are granted by governing authorities. At all times, construction activities are to be controlled in a manner that will prevent entry of deleterious materials to watercourses. Measures included in the plan may include, but will not be limited to:

- The construction access, work areas and associated requirements for removal of riparian vegetation, will be minimized to the extent required for the construction activities. These areas will then be delineated in the field using properly installed protective silt fencing.
- Any temporarily stockpiled soil, debris or other excess materials, and any construction-related materials, will be properly contained (e.g. within silt fencing) in areas separated at least 30 m from the watercourses.
- All construction materials, excess materials and debris will be removed and appropriately disposed of following construction.
- All clearing of riparian vegetation required for construction purposes will be conducted in accordance with relevant municipal specifications and best management practices.
- Re-vegetation and re-planting along disturbed areas adjacent to watercourses will occur as soon as possible following disturbance. Restoration planting plans for the realigned channel sections will incorporate a diverse mix of native woody and herbaceous vegetation, consistent with the site locations, conditions, and functions along a watercourse (e.g., bank stabilization, cover).
- No equipment should ford or otherwise enter any watercourse except as specified in the contract or unless authorized by the appropriate environmental agency/permit.
- Machinery arriving on site must be in a clean condition and maintained free of fluid leaks, invasive plants, and noxious weeds.

9.3.1.2 Spills Prevention & Response Plan

A Spills Prevention and Response Plan should be developed and implemented during construction. The plan will highlight spills response and reporting procedures for the construction period with procedures to be initiated immediately in the event of a sediment release or spill of a deleterious substance.

Considerations for this plan may include, but will not be limited to:

- All construction-related activities will be controlled to prevent entry of any petroleum products, debris, or other potential contaminants/deleterious substances, in addition to sediment as outlined above, to the watercourses.

- No storage, maintenance or re-fueling of equipment will occur within 30 m of the watercourses or associated wetlands and ditchlines; these activities will be undertaken in properly situated and fully contained areas removed from the given watercourses.
- A Spills Prevention and Response Plan should be developed by the Contractor and kept on site at all times. All materials necessary for containment, including a supply of silt control fabric, will be readily available on the site.
- The Ontario Spills Action Centre (1-800-268-6060) will be notified immediately of any "spills", including (but not limited to) sediment and/or fuel/lubricant. Additional agencies may require notification should the Response Plan or specific permits/approvals state spill notification is a requirement. Spills or discharges of pollutants or contaminants will be reported immediately to the landowner and any affected regulatory authorities (i.e., RVCA, MNRF, MECP, NCC, DFO etc.).
- Clean up of any spills should be initiated quickly to ensure the protection of the environment to the extent possible. An adequate supply of clean-up materials is to be kept on-site with a work crew that is fully trained to prevent and respond to accidental spills.
- Proper spill control equipment/items (spill kits, Safety Data Sheets, absorbents, containers, caution signs/tape, etc.) will be readily available in areas where large quantities of hazardous materials may be stored. An emergency spill kit will be kept on site in case of fluid leaks or spills from machinery.

9.3.1.3 Erosion & Sediment Control Plan

The purpose of the Erosion and Sediment Control Plan is to determine the degree of erosion and sedimentation that may occur under normally anticipated weather conditions during the life of the project, and to develop and implement mitigation strategies to control any unforeseen areas determined to have a pre-disposition to the problem. Measures may include, but not be limited to the following:

- Perimeter silt fence will be installed between the work areas, and all reaches of those watercourses where works are required, including ditch and drainage works that drain to them. The fencing will be properly installed and regularly inspected and maintained. It will be left in place and maintained until all surfaces contributing drainage to these watercourses/drainage features are fully stabilized.
- All exposed and newly constructed surfaces will be stabilized using appropriate means in accordance with the characteristics of the soil material and slope conditions.
- Exposed surfaces will be fully stabilized and re-vegetated as quickly as possible following completion of the works.
- An Environmental Inspector experienced in working around watercourses will be responsible for ensuring the erosion and sediment control measures are functioning effectively and being maintained, and all other general mitigation measures are being implemented as intended. The Environmental Inspector will ensure all environmental mitigation and design measures are properly installed/constructed and maintained, and appropriate contingency and response plans are in place and implemented if required.
- The following erosion and sediment control measures should be implemented to protect sensitive natural features within the project area:
- NSSP OC_EN_02: Erosion and Sedimentation Control
- OPSS 804: Construction Specification for Seed Cover

- OPSS 805: Construction Specification for Temporary Erosion and Sediment Control Measures

During construction, the Contractor should inspect and record the status and effectiveness of the erosion and sediment control measures regularly. The Contractor will make all necessary repairs if any damage occurs. The Contractor will ensure that effective erosion and sediment control measures are maintained until revegetation of disturbed areas is achieved.

Erosion and sediment control measures are to remain in place until the site of the project is re-stabilized following construction. This plan includes the identification of planting and slope rounding specifications within the contract tender; identifying and specifying seeding and sodding locations; identifying areas requiring slope benching or retaining structures in the detailed design process; and construction and post-construction monitoring and mitigation practices.

9.3.1.4 Dewatering Management Plan

A Dewatering Management Plan will identify methods of management and environmental protection measures and procedures relevant for the management and/or discharge of water/ waste waters which are directly derived from construction activities. A Dewatering Management Plan must be in place for excavations. Contaminated water must be contained and treated prior to disposal. No contaminated groundwater should be discharged to the environment. During construction, there may be a requirement for dewatering activities. A Dewatering Management Plan should include, but not be limited to, the following:

- How groundwater control for the Project will be performed in compliance with Environmental Laws, Regulations, and best practices.
- Procedures for conducting all monitoring as required in the Project permits, licenses, authorizations, and approvals.
- Additional impact assessments and acquisition of appropriate approvals prior to discharging groundwater into adjacent natural environments from an area of known or suspected groundwater contamination.
- Procedures for addressing any complaints received related to groundwater control activities.
- No groundwater from an area of known or suspected groundwater contamination should be discharged to the environment without the completion of an impact assessment and the appropriate approvals.
- Reporting procedures to document how all groundwater management activities and best practices have been implemented.

If improperly abandoned wells are encountered, these would be decommissioned in accordance with the regulations. The presence/conditions of wells within the anticipated radius of influence of dewatering will need to be assessed in more detail as part of detailed design or for preparation of supporting documents for a Permit to Take Water (PTTW) application/ Environmental Activity and Sector Registry (EASR) registration as applicable.

Parts of the study area are supplied with municipal water and private water supply wells are used elsewhere for drinking and agricultural purposes. If encountered, groundwater supply well integrity may be at risk due to construction activities. Monitoring and Contingency Plans should be developed to provide temporary alternate water supply should the need arise.

9.3.1.5 Stormwater Management Plan

Stormwater management will consist of quality and quantity control of runoff consistent with the MECP guidelines, and City of Ottawa Sewer Design Guidelines (2012) and should provide an enhanced level of sediment removal.

Given the sensitive nature of both Mud Creek and Greens Creek, water quantity control (post to pre) and erosion threshold protocol should be followed as general stormwater criteria through detail design. As per enhanced water quality target of MOECC, 80 % Total Suspended Solids (TSS) removal will be required for water quality treatment. During preliminary and detailed design, erosion threshold exceedance analysis will be required.

Stormwater management plans should consider, among other matters, the maintenance, restoration, and protection of downstream aquatic ecosystems as necessary based on site specific requirements identified through aquatic habitat impact assessments, including conformance to any existing rehabilitation plans, maintenance of temperature regimes, and as per federal or provincial agency permit/approval requirements. These considerations may include, but will not be limited to:

- Measures for managing water flowing onto the site during rain events and periods of high flow, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area (natural area of attenuation) or construction of a settling basin or other filtration system which should be completed at a minimum setback of 30 m from the receiving watercourse (where possible).
- Following the management of stormwater, ensure water is clean and free of fine particulate matter before being discharged to a watercourse. Ensure discharge is done in a manner that does not cause erosion or other damage to adjacent lands/channel banks.

Any works or fill within the RVCA Regulation Limit will need to address a cut fill balance in accordance with the requirements and approvals from the Conservation Authority.

9.3.1.6 Excavated & Imported Materials Management Plan

This plan describes the management of all excavated and imported materials generated as part of construction activities, i.e. soil, rock, solid waste, liquid waste, hazardous waste, and contamination. Management of excavated and imported materials includes, but is not limited to, excavation, handling, transportation, testing, on-site re-use, off-site re-use, disposal, and/or ultimate disposition. The Excavated and Imported Materials Management Plan should be written by a Qualified Person within the meaning of Section 5 of Ontario Regulation 153/04. The Excavated and Imported Materials Management Plan should be written with due consideration for Ontario Regulation 406/19 – On-site and Excess Soil Management.

9.3.1.7 Management of Contaminated Materials

The MECP, the NCC (if on NCC lands) and the City's Construction Manager are to be notified immediately upon discovery of any contaminated material encountered within the construction area. If contaminated materials or contaminated groundwater are encountered within the construction limits, these are to be removed and disposed of in accordance with all applicable acts and regulations. Contaminated materials if encountered should not be placed within areas

where they may enter surface water features. Treatment and discharge of contaminated groundwater is to be in accordance with applicable legislation and regulations (e.g., Provincial Water Quality Objectives (MOECC, 1994) or the Canadian Council of Ministers of the Environment's Canadian Environmental Quality Guidelines) to ensure that it can be discharged without causing an environmental impact/impairment/adverse effect.

Contaminated soil may be encountered and possibly contaminated groundwater. Groundwater supply wells that may be at risk due to construction activities should be monitored and Contingency Plans developed to provide temporary alternate water supply should the need arise.

9.3.1.8 Geotechnical Considerations

Geotechnical investigations will be required to confirm groundwater and subsurface conditions and potential impacts that will need to be considered in the detailed design phase of the project.

9.3.1.9 Landscape Plan

A Landscape Plan to compensate for vegetation and tree removal will be prepared during the detailed design and implemented during the construction phase. The *Landscape Plan* will clearly identify existing plant material to be retained, removed or relocated on site and will propose vegetation to be planted on site. The plan will identify species including its common and botanical names, size, total quantity, and its condition or special requirements. The Landscape Plan should consider the recommended Landscape Strategy (**Section 9.4.2.2**) and findings of the Cultural Heritage Assessment Report in any work pertaining to cultural heritage resources.

9.3.1.10 Protection of Terrestrial Natural Features

Due diligence to protect the terrestrial natural features within the study area should include implementation of industry standard best management practices and mitigation measures to reduce or eliminate potential negative effects because of project construction.

Clearing of vegetation should be kept to a minimum and existing trails, roads, or cut lines should be used to avoid disturbance to vegetation and prevent soil compaction. Recommended mitigation measures to protect terrestrial habitat and vegetation include:

- Surplus material resulting from vegetation removal operations shall be managed in accordance with OPSS 180: General Specification for the Management of Excess Materials and Ottawa Specification 201 - Clearing and Grubbing.
- Tree not planned for removal must be protected according to Ottawa Specification Section 32 01 90.33 - Tree Preservation.
- In the event of accidental damage to trees, or unexpected vegetation removal, vegetation shall be replaced/restored with native species according to **Non-Standard Special Provision (NSSP) 1396: Construction Specification for Planting, Ottawa Specification Section 32 93 10 – Trees, Shrubs and Ground Cover Planting and/or Section 32 90 11 – Bare Root & Naturalization Planting** and **F-8047 Hedgerows, Nursery Stock and Reforestation.**
- Disturbed vegetation/soils within impacted areas shall be re-established as soon as weather/conditions permit to provide stabilization to exposed soils and minimize

sedimentation into the watercourses within the study area according to **OPSS 206: Construction Specification for Grading**; and **OPSS 802: Construction Specification for Topsoil** and **Ottawa Specification F-8041 Section 32 91 19 13 – Topsoil Placement and Grading.**

- Following completion of grading and topsoil application, disturbed areas will be re-seeded with a standard roadside seed mixture as specified in **OPSS 804: Construction Specification for Seed and Cover** and **Ottawa Specification F-8041 Seeding and Mulching.**
- During ditching or culvert replacement works, any tree roots greater than 25 mm in diameter shall be cut off cleanly according to the following **F-05 – Tree Removal and Pruning**, **Standard Special Provision (SSP) 032S09: Special Provision for Tree Trimming** and **Ottawa Specification F-8047 Section 32 93 43.01 – Tree Pruning.**
- Develop a Tree Protection Plan which identifies locations to be preserved as specified in F-8011- Tree Protection, City of Ottawa's Tree Protection Fencing detail, OPSS 565: Construction Specification for the Protection of Trees and OPSD 220.01: Barrier for Tree Protection.
  - Ensure that trees larger than 10 cm DBH that are to be protected are included in this Plan.
- To allow for rapid regeneration within disturbed areas, the following steps will be taken:
  - Close cut mature trees in very poor or dead condition within 10 m of the road to avoid possible windfalls toward the road or construction area.
  - Retain all suitable fully branched deciduous trees within 3 m of the newly constructed ditchline, where possible.
- Close cut young, spindly deciduous trees to allow regeneration.
- Retain original ground on remaining areas to allow for the existing tree and shrub seedling stock to establish in response to post-construction conditions. Develop a *Tree Protection Plan* identifying trees for protection, removal and retention and references the City's Tree Protection Fencing detail *(F-8011), OPSS.MUNI 801: Construction Specification for the Protection of Trees and OPSD 220.01: Barrier for Tree Protection.*
- During ditching or culvert replacement works, any tree roots greater than 25 mm in diameter should be cut off cleanly according to the following *F-05 – Tree Removal and Pruning, Standard Special Provision (SSP) 032S09: Special Provision for Tree Trimming and Ottawa Specification F-8047 Section 32 93 43.01 – Tree Pruning*.
- Surplus material resulting from vegetation removal operations should be managed in accordance with *OPSS.MUNI 180: General Specification for the Management of Excess Materials and Ottawa Specification 201 - Clearing and Grubbing*.
- In the event of accidental damage to trees, or unexpected vegetation removal, vegetation should be replaced/restored with native species according to *Non-Standard Special Provision (NSSP) 1396: Construction Specification for Planting, Ottawa Specification Section 32 93 10 – Trees, Shrubs* and *Ground Cover Planting and/or Section 32 90 11 – Bare Root & Naturalization Planting* and *F-8047 Hedgerows, Nursery Stock and Reforestation.*
- Disturbed vegetation/soils within the impacted areas should be re-established as soon as weather/conditions permit to provide stabilization to exposed soils and minimize sedimentation into the watercourses within the study area according to *OPSS.MUNI 206: Construction Specification for Grading*; and *OPSS.MUNI 802: Construction Specification for Topsoil* and Ottawa Specification *F-8041 Section 32 91 19 13 – Topsoil Placement and Grading*.

- Following completion of grading and topsoil application, disturbed areas will be re-seeded with a standard roadside seed mixture as specified in *OPSS.MUNI 804: Construction Specification for Seed and Cover and Ottawa Specification F-8041 Seeding and Mulching*.

9.3.1.11 Protection of Wildlife

Harassment and/or harm to wildlife during construction is prohibited, as prescribed by **NSSP 001A860: Prevention of Wildlife Harassment** and as described in the **City of Ottawa *Protocol for Wildlife Protection during Construction* (2015c)** and **D-032A/B Appendix A – Wildlife Protocol for Road Construction/Rehabilitation Projects**. The City of Ottawa protocol is a compilation of best practices that serves as a guide and a common frame of reference for addressing wildlife protection during construction (City of Ottawa, 2015c). This protocol is intended to help reduce the direct impacts of development on wildlife that occur during construction and promotes best management practices relating to sensitive timing windows for clearing, pre-stressing, site clearing, construction site management, wildlife encounters, wildlife-proofing, and owner awareness.

9.3.1.12 Protection of Migratory/SAR Birds

To avoid contraventions under the *Migratory Bird Convention Act* (1994), Environment Canada recommend vegetation removals occur outside of the breeding bird season (April 15th – August 31st). If tree removal activities are necessary within the breeding bird season, a qualified avian biologist should conduct a nest survey prior to tree clearing to confirm the presence or absence of bird nests.

The MBCA provides legal protection of migratory birds and their nests in Canada. There is also a high probability for several SAR birds (including Bobolink, Eastern Meadowlark and Evening Grosbeak) to be present within the project area. The following mitigation measures are recommended to minimize the impacts to migratory/SAR birds within the study area:

- All vegetation and tree removal operations and/or clearing should be completed between September 01 and April 14 of any year, outside of the breeding bird active season (ECCC 2018) and nests or eggs of protected migratory birds should not be disturbed or destroyed as per *NSSP 001A870: Migratory Bird Protection – General*
- If vegetation removal is required during the breeding bird season for this region (April 15 – August 31 within a ‘simple habitat’ (habitat that contain few likely nesting spots or a small community of migratory birds), a nest search may be completed during the nesting period by a qualified biologist prior to construction. The biologist needs to confirm that the proposed works would not affect the nest or young of a protected species or wait for the young to fledge.
- If breeding birds and/or nests are encountered within the construction area, the Contractor will consult an Avian Specialist, and works will not continue in the location of the nest until after September 01 (or until the nest is no longer active). Species specific buffers (or setback distances) may be established by the Avian Specialist using guidance provided by Environment and Climate Change Canada (2019; refer to the following website for more information: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/reduce-risk-migratory-birds.html#toc5.

9.3.1.13 Protection of Significant Wildlife Habitat

Mitigation measures can be applied to mitigate effects to species' habitat from site operations and alterations include the following:

- Harassment and/or harm to wildlife during construction is prohibited, as prescribed by **NSSP 001A860: Prevention of Wildlife Harassment and** The City of Ottawa's *Protocol for Wildlife Protection during Construction* (2015c) and D-032A/B Appendix A – Wildlife Protocol for Road Construction/Rehabilitation Projects**.**
- Exposed soils should be revegetated as soon as possible using a seed mix composed of native species which are appropriate for the site conditions, in accordance with **OPSS 804: Construction Specification for Seed and Cover and Ottawa Specification F-8041 Section 32 92 19 13 – Mechanical Seedin**g.
- All vegetation and tree removal operations and/or clearing should be completed as per the details provided in the above section "Vegetation and Terrestrial Habitat Protection".

9.3.1.14 Protection of Species at Risk

To ensure compliance under Section 9 and/or Section 10 of the ESA, and to protect SAR and SAR habitat during development and operations of the proposed project activities, the general mitigation measures provided in the **City of Ottawa's Special Provision, D-032B – Appendix B** are recommended. Refer to **Attachment 6** for the full details of the City of Ottawa's Recommended Mitigations Measures (#1 - #22) from D-032B – Appendix B. The City of Ottawa's SAR Mitigations #1, #2, and #4 provide recommendations that can be applied to construction activities to reduce risks to SAR. These include:

- A worker awareness program should be provided to all on-site personnel that includes species at risk identification and habitat characteristics and provides general species-specific guidance with respect to appropriate actions to be taken whenever these species are encountered.
- A daily pre-construction search of the machinery and the work area should be implemented to identify presence of species at risk, as animals may be found hiding or basking around equipment, rocks, debris piles etc.
- If endangered or threatened species are observed in or near the study area, work should stop immediately, a photograph should be taken of the species (if possible) and the SAR should be allowed to move out of the work area on its own. The MECP and ECCC should be notified (as required).

In addition, the **D-032A/B Appendix A – Wildlife Protocol for Road Construction/ Rehabilitation Projects** is recommended.

The federal and provincial Species at Risk are reviewed on a regular basis and both the status, and the verification of presence should be updated prior to construction. Should any SAR habitat be determined to be impacted by the project works, appropriate mitigations must be implemented on a species-specific basis to avoid impacts. The SAR legislation (provincial and federal) are updated on a regular basis and should be consulted during the detailed design stage to identify any new species under the protection of the Act or any new Management Plans. Permits/approvals from MECP/ECCC will be obtained as needed.

9.3.1.15 In & Near Water Works

Below is a list of standard mitigation measures recommended for inclusion within the appropriate "Site Specific" mitigation plans for in and near-water works. These measures must be refined and updated according to results of the detail design impact assessment.

Dewatering and Flow Management

- Adherence to in-water/channel bank timing window (works permitted) from July 1st to March 14th for Mud Creek and Greens Creek.
- Appropriate 'temporary flow passage' measures will be developed and implemented to isolate the work areas. These measures will be developed with specific consideration of flow conditions and timing and duration of works and designed to avoid erosion and sediment entrainment and mobilization.
- Only clean materials free of fine particulate matter will be placed in the water for temporary construction measures (e.g., coffer dams will be constructed of 'pea gravel' bags, geotextile fabric, sheet pile or other clean material).
- Any hoses employed in temporary flow passage (or any water withdrawal from fish-bearing watercourses) will be properly screened to prevent ingress of fish. The following measures should be followed to ensure fish protection during dewatering activities (as per DFO *Measures to Protect Fish and Fish Habitat*).
- During any temporary dewatering required for works, appropriate energy dissipation and settling/filtration measures will be used for discharge of dewatering water to ensure no erosion, scour, or sediment release occurs in the watercourses/drainage features. The Dewatering and Flow Management Plan will include properly sized, designed, and sited temporary filtration facilities. Discharge points for release of dewatering discharge will be sited and designed to prevent erosion and ensure only clean flow is released to the receiving watercourses.
- If alterations to any of the flow management or related mitigation measures provided in the Contract are required, notify the respective agencies (NCC, RVCA, DFO, and MNRF) of the proposed changes for approval.

Fish Salvage and Relocation

- Any fish stranded within the temporary work zone which has been isolated for the in-water works, or for sections of channel that will be abandoned, will be rescued using appropriate techniques by qualified Fisheries Biologist(s) and released 'downstream of'/ away from the temporary work zone.
- Relevant permits (e.g., MNRF Fish Collection License, Permits to Take Water, permits under Ontario Regulations 174/06 and 170/06,) will be obtained as required for dewatering activities.
- Additional "Site specific" mitigation measures recommended for areas where in-water work is anticipated include, but are not limited to, the following:
- Where replacement of rock reinforcement/armouring (i.e., installation of rip-rap) is required to stabilize eroding or exposed areas, ensure that appropriately sized, clean rock is used, and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment; and

- Restore bed and banks of the watercourse to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.

9.3.2 Social Environment

9.3.2.1 Noise, Air Quality & Vibration

The City's Construction Manager will be responsible for preparing and implementing a mitigation strategy with the intent of satisfying the requirements of Ontario Regulations 419 for dust emissions, MECP NPC-115 and City of Ottawa By-laws for noise, and MECP NPC-119 for ground vibrations (MOE, 1978a and 1978b).

Air Emissions BMPs

Suggested methods to control air emissions include, but are not limited to:

- Monitor wind conditions and plan operations to take advantage of calm wind periods.
- Minimize site storage of granular material in height and extent.
- Locate storage piles in sheltered areas that can be covered.
- Provide movable windbreaks.
- Use water spray and suppression techniques to control fugitive dust.
- Cover haul trucks and keep access routes to the construction site clean of debris.

Noise and Vibration BMPs:

For noise and vibrations, common control methods include but are not limited to:

- Limit speeds of heavy vehicles within and approaching the site.
- Provide compacted smooth surfaces, avoiding abrupt steps and ditches.
- Keep equipment properly maintained and functioning as intended by the manufacturer/
- If required, implement a blast design program prepared by a blast design engineer.

9.3.2.2 Health & Safety Plan

The preparation of an Occupational Health and Safety Plan by the contractor before any work begins will be required, to ensure that proper protocols and recommendations are in place to protect workers against personal injury or loss of life. The plan should be completed in accordance with federal and provincial regulations.

9.3.2.3 Lighting Plan

A *Lighting Plan* should be completed in accordance with municipal standards, and in consultation with the NCC. The Plan will be prepared during the detailed design process. This plan will include lighting fixtures and illumination along the various sections of the corridor. A lighting audit of the preferred lighting design plan may be conducted to ensure clear sight lines and appropriate illumination.

9.3.2.4 Communications Plan

The purpose of the *Communications Plan* is to keep the public informed about the work in progress and the construction activities. Residents and other stakeholders must be kept aware of scheduled road disruptions, interruptions to other services and other construction related details in advance so that their activities can be planned with reduced disruption. The plan should detail how to communicate the information to the public, what information should be disseminated, and in which project stages the communications should take place.

9.3.2.5 Construction Waste Management Plan

During construction there will be some excess materials that will require removal away from the project site. These may include but are not limited to concrete rubble, asphalt, waste steel/ metal structural components, earth, and road right-of-way appurtenances such as signs, lighting, and utility poles. During the detailed design a *Construction Waste Management Plan* will be developed to ensure that surplus material is recycled wherever practical and to describe the methods to be used by the contractor for disposal of all other surplus material in accordance with provincial or local municipal practices and guidelines.

9.3.2.6 Cultural/Archaeological Resources

If undocumented archaeological resources are impacted by project work, all activities impacting these resources must cease immediately, MHSTI and the NCC must be notified, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the *Ontario Heritage Act* and the Standards and Guidelines for Consultant Archaeologists.

If human remains are encountered, all activities must cease immediately and the local police as well as the Cemeteries Regulation Unit of the Ministry of Government and Consumer Services must be contacted. In situations where human remains are associated with archaeological resources, MHSTI and the NCC should also be notified to ensure that the site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*. If a discovery occurs on federal lands, the appropriate federal agency should also be notified.

9.3.3 Transportation

9.3.3.1 Traffic Management, Access & Pedestrian Control Plan

A Traffic Management, Access and Pedestrian Control Plan will be developed to manage transportation functions for all travel modes, including equipment and material deliverables at various times during the construction period.

The intent of this plan is to ensure continued travel within the study area, throughout construction. This plan is to be developed during the detailed design/pre-construction phase and implemented in the construction phase. Any pedestrian/cycling detours, traffic detours, turning movement restrictions, and/or lane reductions associated with the project will be identified. The Contractor will be required to develop the Traffic Management, Access and Pedestrian Control Plan for all detours, which will be monitored by the City.

9.3.3.2 Emergency Response Plan

The preparation of an Emergency Response Plan will be completed by the Contractor to allow full access of emergency services during the construction period so that at any given time there is a method to access the site and all adjacent land uses. The plan should include provisions for providing temporary services to end users in the event of a construction related service outage or other service disruption.

9.4 Assessment & Evaluation of Effects

This section describes the potential effects, prescribed mitigation measures, residual effects and their significance for the recommended plan.

9.4.1 Natural Environment

9.4.1.1 Geotechnical (Design)

Potential Project Interaction

Construction of new infrastructure where the subsurface conditions generally consist of fill overlying a thick deposit of firm to very stiff silty clay. The groundwater levels are likely to varies with seasonal fluctuations.

Potential Environmental Effect

The silty clay beneath this site has a limited capacity to support additional stresses caused by foundation loads and/or grade raises.

Proposed Mitigation Measures

Lightweight fill (LWF) materials should be considered for any infilling or embankment exceeding 2.5 m in height, thereby reducing the stress increase on the compressible clay, and mitigating the anticipated settlement.

Significance of Residual Effect

Negligible/Moderate – Potential for localized stresses on geotechnical conditions mitigated using LWF.

9.4.1.2 Groundwater (Construction)

Potential Project Interaction

Various construction activities, including those for the widening of Innes Road and the BHBP may require dewatering during construction.

Potential Environmental Effect

In general, lowering of the groundwater level may increase the effective stress in the overlying soil, resulting in consolidation and settlement of overlying structures, utilities, and surface features. That increase in stress can lead to consolidation of sensitive silty clay soil.

Proposed Mitigation Measures

The impact of groundwater lowering should be assessed during detail design for any potential impacts to utilities, roadway, and surface features in the area. Further hydrogeological assessment may be required to determine the dewatering radius of influence during detailed design and confirm the extent of settlement and need for LWF.

Significance of Residual Effect

Not Significant – Potential for temporary, short-term (construction), localized groundwater impacts to be mitigated via future study and verifying limits for LWF requirements and dewatering management.

9.4.1.3 Unstable Slopes & Ravines (Design)

Potential Project Interaction

The proposed road widening will likely require some limited encroachment into ravines which may be associated with Greens Creek.

Potential Environmental Effect

Encroachment in ravines associated with the watercourses poses potential fluvial geomorphological risks/impacts to Greens Creek or associated outlets.

Proposed Mitigation Measures

Detailed and site-specific erosion control measures considered feasible will be developed during detailed design as required. The clay soil at this site is susceptible to erosion particularly at the outside bends of the valley slopes. Surface water should not be directed to flow over the creek slopes without erosion protection measures. To the extent possible, limit the magnitude of the foundation stresses since higher stresses will result in increased magnitudes of settlement.

The RVCA should be consulted with respect to impacts on any areas of slope in-stability and the risk of landslides at locations where the recommended alignment is close to Greens Creek.

The City will undertake more detailed investigations and assessments to manage and confirm the Limits of Hazard Land (LOHL) setbacks. This will allow for an assessment of the dynamic creek conditions at the time of construction.

Significance of Residual Effect

Negligible/Moderate – Potential for geomorphological impacts to be verified and LOHL adjusted as necessary for final design inputs.

9.4.1.4 Surface Water (Construction)

Potential Project Interaction

Potential pollutant release and run-off related to various construction activities, including but not limited to sediment release and accidental spills or leaks from construction machinery.

Potential Environmental Effect

Potential for short-term localized pollutant release into watercourses related to crossings and work adjacent to the road corridor during construction.

Proposed Mitigation Measures

Best Management Practices and Built-In Mitigation Measures such as those described in **Section 9.3**, including but not limited to Environmental Protection Plan, Contaminant and Emergency Spill Response Plan, Dewatering Management Plan, Stormwater Management Plan, and Near/In-Water Works Site Specific Mitigation Measures.

Significance of Residual Effect

Not Significant – Potential for temporary, short-term (construction), localized surface water impacts to be mitigated via best management practices and built-in mitigation measures.

9.4.1.5 Surface Water – Stormwater Management

Potential Project Interaction

Widened roadway and project components will increase the impervious surfaces within the study area.

Potential Environmental Effect

Increase in impervious surfaces (due to widening) will lead to recurring, increases in stormwater runoff peak and volume following rain events with enough rainfall to generate runoff into adjacent watercourses.

Proposed Mitigation Measures

Stormwater management will consist of quality and quantity control of runoff consistent with the MECP guidelines, and City of Ottawa Sewer Design Guidelines (2012) and should provide an enhanced level of sediment removal.

Given the sensitive nature of Greens Creek, water quantity control (post to pre) and erosion threshold protocol should be followed as general stormwater criteria through detail design. As per enhanced water quality target of MOECC, 80 % Total Suspended Solids (TSS) removal will be required for water quality treatment. During preliminary and detailed design, erosion threshold exceedance analysis will be required.

Stormwater management plans should consider, among other matters, the maintenance, restoration, and protection of downstream aquatic ecosystems as necessary based on site specific requirements identified through aquatic habitat impact assessments, including conformance to any existing rehabilitation plans, maintenance of temperature regimes, and as per federal or provincial agency permit/approval requirements. These considerations may include, but will not be limited to:

Measures for managing water flowing onto the site during rain events and periods of high flow, as well as water being pumped/diverted from the site such that sediment is filtered out prior to

the water entering a waterbody. For example, pumping/diversion of water to a vegetated area (natural area of attenuation) or construction of a settling basin or other filtration system which should be completed at a minimum setback of 30 m from the receiving watercourse (where possible).

Following the management of stormwater, ensure water is clean and free of fine particulate matter before being discharged to a watercourse. Ensure discharge is done in a manner that does not cause erosion or other damage to adjacent lands/channel banks.

Any works or fill within the RVCA Regulation Limit will need to address a cut fill balance in accordance with the requirements and approvals from the Conservation Authority. The City and the Conservation Authority should consider and review the status and efficacy of developing stormwater management controls such as those noted below:

- Option 1: New perforated storm sewer systems under the widened sections of Innes Road. These new systems would be connected to the existing storm sewer networks with oil and grit separators providing quality control treatment. The capacity of the existing system should be confirmed during the detail design stage.
- Option 2: Median can be converted to a Low Impact Development (LID) feature such as rain garden or infiltration trench with subdrains to capture runoff from the roadway through curb cuts. Subdrains would be connected to the existing storm sewer network and would not need any new storm systems as in Option 1.
- Option 3: Enhanced grass swales with rock check dams installed on the north side of the roadway.

Significance of Residual Effect

Negligible/Moderate – Potential for recurring, short-term surface water impacts (rain events) to be mitigated via quantity and quality design elements and future permits/authorizations.

9.4.1.6 Fish & Aquatic Species (Construction)

Potential Project Interaction

Both land-based and limited in-water activities are anticipated to result from the proposed construction works, including excavation, grading, vegetation clearing, use of industrial equipment, change in timing, duration and frequency of flow, and wastewater management.

Potential Environmental Effect

Short-term, localized sediment release may result from run-off associated with various construction activities. Sedimentation of fish habitat may decrease water quality in the short-term, as well as cause respiratory distress and reduced feeding efficiency in fish.

Proposed Mitigation Measures

Undertake detailed fish and fish habitat field investigations as required to update / confirm the existing conditions. This may include a Headwater Drainage Feature Assessment using the Evaluation, Classification and Management of Headwater Drainage Features Guidelines Protocol (TRCA, 2014).

Review of aquatic SAR background information (i.e. DFO/CA aquatic SAR mapping) and SAR listings (ESA and SARA) to ensure that any updated SAR occurrences or changes to relevant legislation are identified and addressed.

Fish passage and natural channel flow regimes are proposed to be maintained at culvert water crossings. Details to be confirmed in detailed design.

Best Management Practices and Built-In Mitigation Measures such as those described in **Section 9.3**, including but not limited to Erosion and Sediment Control Plan, Environmental Protection Plan, Stormwater Management Plan.

Adherence to in-water/channel bank timing window (works permitted) from July 1st to March 14th.

Complete *DFO Aquatic Effects Assessment* using Pathways of Effects (PoE) diagrams if proposed works to occur below the high-water mark.

Operation of machinery and shoreline/bank re-vegetation and stabilization should be conducted as per *DFO Measures to Protect Fish and Fish Habitat* and relevant environmental specifications.

Potential opportunities to reduce the severity of impacts to be confirmed at detail design. These may include but will not be limited to the following considerations:

- Natural channel bank stabilization (i.e. plantings, woody structures)
- Incorporation of natural fluvial geomorphology design features

Significance of Residual Effect

Negligible/Moderate – appropriate mitigation measures will be implemented and adhered to for the duration of construction. Permits, licenses, and authorizations will be obtained prior to commencing any in-water/near-water work.

9.4.1.7 General Wildlife

Potential Project Interaction

Site development (construction and operation) will result in the reductions and disturbance of natural areas within the study area.

Potential Environmental Effect

The project will result in the reduction and disturbance of natural areas within the Greenbelt, an increase in habitat fragmentation and reduction of habitat connectivity, potential increases in wildlife vehicle collisions and wildlife mortality, edge effects (noise, road salt and other vehicle pollutants, lights, reduction of core habitat, etc.).

Proposed Mitigation Measures

Further field study is required to identify and assess impacts during detail design. In addition to best management practices and built-in mitigation measures, the following mitigations are recommended:

- *Ecological Restoration and Enhancement Plan* including installation of key habitat features and wildlife friendly lighting as determined in detailed design phase.
- It is proposed to vegetate swales with a diverse assortment of robust native or non-invasive vegetation that may provide general wildlife habitat and foraging opportunities. Flowering plants are proposed to be added for interest and for pollinator habitat.
- It is proposed that short and salt/drought tolerant vegetation be planted in swales and filter strips.

Significance of Residual Effect

Negligible/Moderate – implementation of proposed mitigation measures including an *Ecological Restoration and Enhancement Plan* will identify a series of measures to limit, and where required, offset the impacts of the final project.

9.4.1.8 Significant Wildlife Habitat (SWH)

Potential Project Interaction

There is potential for candidate SWH to be present within the project limits. Forest and swamp communities within the project limits may have the potential to support bat life processes, such as reproduction, rearing, hibernation, migration or feeding. Wetland communities located directly within the project footprint area may support breeding or hibernation habitat for SAR amphibian or turtle species. Agricultural and meadow communities located directly within the project footprint area may support Bobolink (*Dolichonyx oryzivorus*) and Eastern Meadowlark (Sturnella magna) breeding and foraging habitat, both Threatened species protected under Schedule 1 of SARA.

Potential Environmental Effect

The project will result in localized reduction and disturbance of natural areas within the Greenbelt, an increase in habitat fragmentation and reduction of habitat connectivity, increases in wildlife vehicle collisions and wildlife mortality, edge effects (noise, road salt and other vehicle pollutants, lights, reduction of core habitat, etc.).

Proposed Mitigation Measures

Further surveys are required during detail design and construction planning to confirm the presence/absence of seasonal concentration areas; the presence/absence of rare vegetation communities or specialized habitat for wildlife; the presence/absence of habitat for Species of Conservation Concern; and the presence/absence of animal movement corridors.

Best Management practices such as wildlife exclusion fencing, wildlife crossings should be considered based on the results of further surveys.

Significance of Residual Effect

Negligible/Moderate – implementation of proposed mitigation measures including an *Ecological Restoration and Enhancement Plan* will identify a series of measures to limit, and where required, offset the impacts of the final project.

9.4.1.9 Species at Risk Vegetation (Butternut)

Potential Project Interaction

There is potential for Butternut trees to be found within the project area, based on the confirmed candidate habitat present within wooded areas, and other treed vegetation communities. The Butternut is listed as an Endangered species both federally and provincially and it is prohibited to harm or remove this species under the ESA.

Potential Environmental Effect

Any vegetation clearing (including tree removals) anticipated to occur within the project area resulting from ultimate construction and staging activities has a high potential to impact existing Butternut.

Proposed Mitigation Measures

During Detail Design, on-site field investigations including tree inventories will be conducted to confirm the presence or absence of Butternut within the project area. A 50 m buffer from the limits of construction will also be incorporated into the field investigations, to account for suitable areas for Butternut, or other SAR trees that may be indirectly affected by construction.

If Butternut is identified on site during the field investigations, a Butternut Health Assessment will be completed for each specimen to determine whether it is retainable (resistant to the Butternut Canker). The results of this assessment may allow for a conditional exception for the removal of a Butternut under Ontario Regulation 242/08. It is recommended that work, including equipment operation and material storage is not carried out within 50 m of any Butternut tree.

The proper installation of tree protection fencing, or sediment fencing will clearly delineate the project boundaries and allow for laydown areas, minimizing any indirect impacts to vegetation located outside of the construction zone. Consideration to trees located outside of but within close proximity to the project area should be given when installing tree protection fencing, to minimize damage to their critical root zones.

To avoid impacts to bat species and breeding birds, tree removal activities must be completed outside the species active seasons (i.e. between October 1 and April 8). Vegetation clearing should not extend past the limits of the new road expansion area.

Impacts to Butternut are possible, however are expected to be minimal as the proposed project impact area is primarily located along grassland, crops, and pastureland. It is anticipated that any Butternut which need to be removed due to the project can be compensated for through new plantings in the general area.

If there are impacts identified that require removals, management and mitigation should be considered in accordance with the adoption of the Recovery strategy developed/in use at the time of construction (https://www.ontario.ca/page/butternut-recovery-strategy#section-0).

Significance of Residual Effect

Negligible/Moderate - Impacts to Butternut are possible. It is anticipated that any removals can be compensated for through new plantings in the general area or through known and accepted mitigation measures including financial compensation as outline in the Ontario regulations.

9.4.1.10 Species at Risk Insects (Monarch Butterfly)

Potential Project Interaction

There is a probability of occurrence for Monarch to be found within the general project area, based on the confirmed candidate habitat present within cultural meadows and grassland communities. The Monarch is currently designated as a Special Concern species and is not afforded species or habitat protection under the ESA. However, Monarch habitat is protected under the *Provincial Policy Statement (2020)*, Potential Environmental Effect.

Any vegetation clearing and land stripping anticipated to occur within the project area resulting from ultimate construction and staging activities has a potential to impact Monarch species and habitat.

Proposed Mitigation Measures

During Detail Design onsite field investigations should be carried out to confirm the presence of Monarch/habitat, including a general search of candidate habitat (meadows, grasslands). The findings will help determine appropriate mitigation measures to ensure conservation of habitats where possible.

Site restoration activities should include the use of native seed mixes along disturbed areas where appropriate. These seed mixes should include pollinator plants, milkweed and butterfly weed to provide habitat and foraging plants for the Monarch.

To minimize incidental impacts to Monarch, areas requiring vegetation clearing/stripping should be maintained (i.e., mowed) prior to and during construction to prevent the growth of flowers or milkweed attractive to Monarchs.

Significance of Residual Effect

Negligible/Moderate – consideration of incidental impacts to Monarch will be identified during detail design and confirmed closer to the time of construction.

9.4.1.11 Species at Risk Amphibians & Reptiles

Potential Project Interaction

There is a moderate to high probability for several SAR amphibians and reptiles (including Blanding's Turtle, Snapping Turtle, Western Chorus Frog and Spotted Turtle) to be found within the project area, based on confirmed, or potential candidate habitat present within wooded areas, crop and pasture, settlement, and wetland areas.

Potential Environmental Effect

The vegetation clearing and grubbing anticipated to occur within the project area, encroachment on wetlands, and the installation of roadway/culvert infrastructure resulting from ultimate construction and staging activities has a high potential to impact or displace SAR amphibians and reptiles.

Proposed Mitigation Measures

During Detail Design onsite field investigations to target reptiles and amphibians must be carried out to confirm the presence of SAR and SAR habitat as well as associated Significant Wildlife Habitat within the project area. The findings will help determine appropriate best management practices and mitigation measures to ensure conservation of habitats where possible.

Field investigations targeting Turtle Nesting Areas or Turtle Overwintering Areas should also be completed during the design phase to confirm the presence of potential suitable habitat within the project area. Confirmed nesting and overwintering areas are afforded protection under the Provincial Policy Statement. If a SAR turtle is observed at any of the potential nesting sites, that area is considered habitat for SAR and is protected under the ESA and permits may be required depending on the nature of impact.

Vegetation clearing and work within or adjacent to watercourse or wetland areas should occur outside the peak activity period for reptiles which extends from May 1 – September 30.

Wildlife Exclusion Fencing (WEF) should be considered based on the results of the targeted reptile and amphibian studies. Temporary and/or permanent WEF should be installed following recommendations outlined in *Best Management Practices for Mitigating the Effects of Roads on Amphibians and Reptiles Species at Risk in Ontario (MRNF, 2016)*, and the *Wildlife Protocol for Road Construction/Rehabilitation Projects* to protect SAR species as well as exclude SAR from entering construction work areas.

During construction, frequent (i.e., weekly) inspections of WEF should be conducted to ensure mitigation measures are properly maintained throughout the construction phase, minimizing accidental harming of amphibian and turtle species within the construction work areas.

As a result of new infrastructure, there is potential for habitat fragmentation following construction. To mitigate impacts to movement patterns of reptiles and amphibians, the design of culverts must consider wildlife passage with a focus on size and openness ration to ensure crossings meet species requirements.

Significance of Residual Effect

Negligible – consideration of temporary localized construction impacts, and reptile/amphibian crossing will be confirmed during detail design. The study findings will help confirm appropriate best management practices and mitigation measures to ensure conservation/enhancement of habitats.

9.4.1.12 Species at Risk Birds

Potential Project Interaction

There is a probability for several SAR birds (including Bobolink, Eastern Meadowlark and Evening Grosbeak) to be present within the project area, based on confirmed, or potential candidate habitat present within wooded areas, crop and pasture, grassland, and wetland areas.

Potential Environmental Effect

Any vegetation clearing (including tree removals) anticipated to occur within the project area from ultimate construction and staging activities has a high potential to impact SAR birds through loss of habitat and nesting areas.

Proposed Mitigation Measures

During Detail Design, onsite field investigations must be carried out to confirm the presence of SAR birds and associated Significant Wildlife Habitat within the project area. The Forest Bird Monitoring Program developed by Environment Canada and the Canadian Wildlife Service, and the Ontario Breeding Bird Atlas (OBBA) Guide for Participants outline the methods for conducting breeding bird surveys in Ontario. The results of these studies will determine appropriate mitigation measures required for confirmed species and habitats.

Several provincial and federal legislations protect the destruction of bird species and their habitats, including the *Migratory Birds Convention Act* (MBCA). The MBCA protects breeding migratory birds, their nests and young in Canada. To remain compliant with the MBCA, it is recommended that any vegetation removal take place outside the breeding bird season for this region (April 15 – August 31). If the vegetation communities could be considered 'simple habitats' (habitats that contain few likely nesting spots or a small community of migratory birds), a nest search may be completed during the nesting period (April 15 – August 31) by a qualified biologist prior to construction. The biologist needs to confirm that the proposed works would not affect the nest or young of a protected species or wait for the young to fledge.

Significance of Residual Effect

Negligible/Moderate – timing windows, best management practices and built-in mitigations will be incorporated during detail design. The study findings will help confirm appropriate best management practices and understood mitigation measures at the time of design/construction.

9.4.1.13 Species at Risk Mammals

Potential Project Interaction

There is a high probability for SAR bats (including Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis and Tri-colored Bat) to be found within the project area, based on confirmed potential foraging and roosting habitat within wooded areas and man-made structures.

Potential Environmental Effect

The vegetation clearing (including tree removals) anticipated to occur within the project area from ultimate construction and staging activities has a potential to impact SAR bats.

Proposed Mitigation Measures

Field investigations should be completed prior to construction within appropriate forested communities that may support bat species. These should include a bat cavity tree survey during leaf off season, where potential tree cavities for bats may be observed. Specific criteria will assist in identifying a candidate bat tree, including size, tree species and general location. If necessary, an acoustic monitoring program may be initiated to confirm the presence of SAR bats within the project study area. The results of these studies will determine future steps, and mitigation measures taken to protect SAR bats.

To avoid construction impacts to bats (including SAR), limit construction to daytime hours, and shield lights downward should night works be required.

Removal of forest stands which potentially contain bat cavity trees must be completed during the SAR bats inactive season which extends from October 1 through April 30.

Vegetation clearing should not extend past the limits of the new road expansion area.

Significance of Residual Effect

Negligible/Moderate – timing windows, best management practices and built-in mitigations will be incorporated during detail design and confirmed by further study.

9.4.2 Social Environment

9.4.2.1 Land Use – Greenbelt Core Natural Areas & Natural Link Areas

Potential Project Interaction

New infrastructure/construction activities may encroach on Greenbelt lands.

Potential Environmental Effect

Increased footprint in Greenbelt land designated areas including Core Natural Areas and Natural Link Areas.

Effect

Approximately 1.0 ha. of Greenbelt Area may be impacted based on the recommended ultimate project footprint (i.e., limits of grading plus a 2.0 m buffer).

Proposed Mitigation Measures

Overall protection/enhancement of the Greenbelt may include general BMPs during construction such as the prevention of introduction of invasive species within the project area is highly important, especially around significant, and sensitive natural features. Introduction of invasive

species (ex: Wild Parsnip) has the potential to reduce species diversity, encroach on wildlife habitat and out-compete native species.

To mitigate this potential, all equipment must arrive onsite clean (construction site should include a wash station for vehicles entering the project area), and any invasive growth within the project area or adjacent lands should be controlled (ex: invasive plants can be pulled by hand and disposed of at a municipal landfill site).

To reestablish vegetation within Greenbelt Core Natural Areas, it is proposed to install erosion blankets with native seed mix coupled with plantings of trees and shrubs to restore disturbed areas as well as exposed areas along watercourses and wetland areas. Seed mixes for these areas should include species which will thrive in that specific soil type and include pollinator plants such as milkweed and butterfly weed to provide habitat for Monarch.

There is potential for habitat fragmentation following construction. To mitigate impacts to movement patterns of reptiles and amphibians, the design of culverts must consider wildlife passage with a focus on size and openness ration to ensure crossings meet species requirements.

Significance of Residual Effect

Negligible/Moderate – with careful consideration of restoring temporary and permanently disturbed areas within the Greenbelt Natural Link Areas, and compensating where required, the anticipated impact to the Greenbelt should be low.

9.4.2.2 Visual Aesthetics/Landscape

Potential Project Interaction

Expanded infrastructure will be built in a primarily agricultural and rural landscape.

Potential Environmental Effect

Increased pavement associated with the transitway infrastructure may impact established views and existing landscape character.

Proposed Mitigation Measures

Three key impact/mitigation zones have been identified based on existing landscape features.

Design principles identified for the Landscape Strategy have been recommended to maintain a landscape character rooted in the existing land uses. It is recommended that the design incorporate landscaping elements to enhance existing views and vistas, screen undesirable views, and locate the infrastructure to mitigate impacts on sensitive environments. Creating an identifiable character, providing rest areas and benches along pathways, and adopting principles of Crime Prevention through Environmental Design Principles will enhance the user experience.

Areas that are proposed to receive particular attention as part of the Landscape Strategy include intersections, grade separations, the Mud Creek realignment and the area of the existing Chapel Hill Park and Ride lot and proposed transit station. Additional planting is

proposed along the north edge of the Park and Ride lot to provide visual screening between it and the residences located to the north.

Significance of Residual Effect

Positive – incorporation of design principles creating an identifiable character and rest areas will enhance the existing Greenbelt experience for many users.

9.4.2.3 Land Ownership

Potential Project Interaction

New transit right-of-way will require property from federal landowners.

Potential Environmental Effect

Property will need to be acquired from the NCC. This includes 1.0 ha. for the recommended widening along Innes Road. Discussions will need to occur and be in accordance with the land uses at the time of planned construction.

Proposed Mitigation Measures

Acquisition of NCC property will be negotiated by the City by means of land purchase, land exchange or land lease. Federal Land Use, Design and Transaction Approval (FLUDTA) will be required for NCC lands.

Significance of Residual Effect

Negligible/Moderate – local landowners will be financially compensated.

9.4.2.4 Air Quality (Construction)

Potential Project Interaction

Varied construction activities, including soil/ground disturbance, are expected to create isolated and short-term local air quality impacts.

Potential Environmental Effect

Short-term and isolated construction related impacts may be a nuisance/annoyance for individuals. The impacts will be controlled, minor and intermittent over short cycles of activity.

Proposed Mitigation Measures

BMPs including a Communications Plan, Complaints Protocol and Air Quality BMPs as summarized in **Section 9.3.2.1**.

Significance of Residual Effect

Not significant – short-term, localized nuisance for some adjacent land users.

9.4.2.5 Air Quality (Operation)

Potential Project Interaction

The general trend is that the concentrations of all pollutants marginally deteriorate with the project implementation.

Potential Environmental Effect

Over time, pollutant concentrations are expected to improve with vehicle environmental controls and newer engine technologies, therefore the project undertaking will have a negligible impact on air quality. For details related to the highest 24-hour NOx concentrations for future conditions without and with the project, respectively, refer to **APPENDIX E: 3**.

Proposed Mitigation Measures

None required.

Significance of Residual Effect

Not Significant – the project undertaking will have a negligible impact on air quality.

9.4.2.6 Noise & Vibration (Design)

Potential Project Interaction

A widened roadway for shared transit and HOVs will result in changes to existing noise levels within the study area. The proximity to sensitive receivers however is likely to be minimal/not perceptible. Vibration levels are not expected to be perceptible.

Potential Environmental Effect

Future noise levels, under the recommended plan scenario, are not anticipated to be above 60 dBA

Proposed Mitigation Measures

Any requirements for noise mitigation will be confirmed based on final/detailed design.

Significance of Residual Effect

Negligible – future noise levels will be mitigated with noise walls if required.

9.4.3 Cultural Environment

9.4.3.1 Archaeological Resources

Potential Project Interaction

Potential construction activities include the use of excavators, dump trucks and heavy traffic as well as vegetation removal.

Potential Environmental Effect

Ground disturbance has the potential to disturb unexpected archaeological resources.

Proposed Mitigation Measures

An archaeological Management Plan is to be developed in case of unexpected discoveries of archaeological resources.

Significance of Residual Effect

Negligible/Moderate – potential effects on archaeological resources can be managed through accepted mitigation measures/BMPs.

9.4.3.2 Cultural Heritage Resources – 2090 Innes Road

Potential Project Interaction

Potential construction activities include the use of excavators, dump trucks and heavy traffic as well as vegetation removal. The project will result in widening of existing roads in the vicinity of 2090 Innes Road. The exact locations of construction staging areas and temporary workspaces have not yet been determined.

Potential Environmental Effect

No anticipated impact to cultural heritage property located at 2090 Innes Road (**APPENDIX F: 3**).

Proposed Mitigation Measures

The project is located a minimum of 115 m away from the built heritage resource (farmhouse). No further cultural heritage study or mitigation required.

Significance of Residual Effect

Negligible/Moderate – indirect impacts can be fully mitigated with no permanent and negative effect if the proposed mitigations are implemented.

9.4.3.3 Cultural Heritage Resources – 2750 Navan Road

Potential Project Interaction

Potential construction activities include the use of excavators, dump trucks and heavy traffic as well as vegetation removal. The project will result in a new roadway, transitway, connections, park and ride lot and widening of existing roads. The exact locations of construction staging areas and temporary workspaces have not yet been determined.

Potential Environmental Effect

No anticipated impact to cultural heritage property located at 2750 Navan Road (**APPENDIX F: 3**).

Proposed Mitigation Measures

The project is located a minimum of 425 m away from the built heritage resource (i.e., the chapel). No further cultural heritage study or mitigation required.

Significance of Residual Effect

Not Significant – indirect impacts can be fully mitigated with proposed mitigation measure and no permanent or negative effect.

9.4.4 Built Environment

9.4.4.1 Traffic Operations (Construction)

Potential Project Interaction

Construction activities have the potential to cause short-term, temporary, and localized disruptions in traffic operations especially during the peak hours.

Potential Environmental Effect

Traffic disruptions may be an annoyance and inconvenience for road and transit users. Increased delays may result in idling vehicles, contributing to temporary and localized increased pollution.

Proposed Mitigation Measures

BMPs:

- Emergency Response Plan
- Traffic Management, Access, and Pedestrian Control Plan
- Communications Plan

Significance of Residual Effect

Not significant – short-term, localized disruption/inconvenience for some users through construction.

9.4.4.2 Traffic Operations (Operation)

Potential Project Interactions

Following construction, the operational capacity of the road network should be improved. The project has the potential to:

- Reduce neighbourhood cut-through traffic.
- Address Volume to Capacity ratio and future traffic demands in the AM and PM peaks.
- Enhance emergency access and connections to communities.
- Enhance connectivity to park and ride and transit station facilities for all modes of travel.

It is anticipated that following construction, the reliability of transit services will improve and the resulting shift of riders from cars to buses should somewhat improve traffic congestion.

Potential Environmental Effects

A positive environmental effect is anticipated. Following construction, the reliability of transit services will improve and the resulting shift of riders from cars to buses should somewhat improve traffic congestion.

Proposed Mitigation Measures

None required.

Significance of Residual Effect

Positive – potential for improved traffic congestion and reduced neighbourhood cut-through traffic.

9.4.4.3 Transit Operations (Construction)

Potential Project Interaction

Construction activities have the potential to cause short-term, temporary, and localized disruptions in transit operations especially during the peak hours. This includes potential disruptions related to construction detours and lane closures.

Potential Environmental Effect

Transit disruptions may be an annoyance and inconvenience for road and transit users. Increased delays may result in idling vehicles, contributing to temporary and localized increased pollution.

Proposed Mitigation Measures

During the detailed design phase, a plan to manage traffic and transit service during construction will need to be developed in consultation with City Operations, the local communities, and other affected stakeholders.

Significance of Residual Effect

Not significant – short-term, localized disruption/inconvenience for some users through construction.

9.4.4.4 Transit Operations (Operation)

Potential Project Interaction

Following construction, the operational capacity of the transit network will be improved. The project has the potential to:

- Reduce the travel time from Chapel Hill Park and Ride to Blair Station and in general through the study area.

Potential Environmental Effect

A positive environmental effect is anticipated. Following construction, the reliability of transit services will improve and the resulting shift of riders from cars to buses should somewhat improve traffic congestion.

Proposed Mitigation Measures

Best management practices, and review of required accessibility and mobility requirements during detail design related to benefit enhancement measures that may be employed.

Significance of Residual Effect

Positive – potential for improved travel times and reliability in transit services.

9.4.4.5 Active Transportation (Construction)

Potential Project Interaction

Construction activities have the potential to cause short-term, temporary, and localized disruptions to the active transportation network (pedestrian and cycling).

Potential Environmental Effect

Disruptions to the active transportation network (pedestrian and cycling) may be an annoyance and short-term deterrent for network users. Any long-term inconvenience to active transportation users may result in shifting trips to the vehicular mode through the construction period, temporarily increasing pollution.

Proposed Mitigation Measures

BMPs:

- Emergency Response Plan
- Traffic Management, Access, and Pedestrian Control Plan
- Communications Plan

Significance of Residual Effect

Not significant – short-term, localized disruption/inconvenience for some users through construction.

9.4.4.6 Active Transportation Network (Operation)

Potential Project Interaction

Improvements to the active transportation network, following construction, includes potential for:

- Enhanced community connections.
- New active transportation facilities (including the addition of a new mup).

Potential Environmental Effect

A positive environmental effect is anticipated. Following construction, the active transportation network is expected to have new community connections and network facilities.

Proposed Mitigation Measures

None required.

Significance of Residual Effect

Positive – potential for enhancements to the active transportation network including new community connections and network facilities.

9.4.4.7 Sewer Infrastructure

Potential Project Interaction

The Innes Road corridor has a large storm sewer (750 mm to 900 mm diameter) and a large sanitary sewer (525 mm diameter) which fall within the widening of Innes Road. Adjustments or relocations may be required to accommodate the proposed alignment.

The Greens Creek Collector Sanitary Sewer (3000 mm diameter) crosses the corridor just east of Blair Road. An access shaft is located approximately 10 m north of Innes Road. The Greens Creek Collector and access chamber do not fall within the grading limits of the proposed alignment although may require protection during construction.

Potential Environmental Effect

Short-term localized service interruptions may occur for various utility services due to component relocations prior to various construction activities. Permanent sewer relocation will be required in some locations.

Proposed Mitigation Measures

Coordination with various stakeholders will be required to confirm locates, protection requirements and relocations. Anticipated component relocations include but are not limited to the following:

- Sewer and manhole adjustments or relocations for the sanitary sewer on the north side of Innes Road.
- Sewer, manholes and catch basin adjustments or relocations for the storm sewer on the south side of Innes Road.

Significance of Residual Effect

Not significant – no adverse residual effects anticipated.

9.4.4.8 Water Infrastructure

Potential Project Interaction

There is a 400 mm diameter watermain under traffic lanes on the south side of Innes Road which falls within the interim widening of Innes. Adjustments or relocations may be required to accommodate the proposed alignment.

Potential Environmental Effect

Short-term localized service interruptions may occur due to component relocations prior to various construction activities. Permanent watermain infrastructure relocation will be required in some locations.

Proposed Mitigation Measures

Coordination with the Drinking Water Services and Asset Management Branch to confirm protection requirements and relocations.

Significance of Residual Effect

Not significant – no adverse residual effects anticipated.

9.4.4.9 Utilities – Hydro Ottawa

Potential Project Interaction

There are existing Hydro Ottawa overhead power lines and utility poles on the south side of Innes Road which may be in conflict with project works near the Innes Road and Blair Road intersection.

Potential Environmental Effect

Some relocation of Hydro Ottawa infrastructure will be required.

Proposed Mitigation Measures

Construction should not reduce line clearances or limit access to Hydro Ottawa infrastructure at any time. Any construction activities must maintain the electrical clearance from the transmission line conductors as specified in the *Ontario Health and Safety Act* for the respective line voltage. Allocate appropriate lead-time in the project schedule to collaboratively work through anticipated conflicts with Hydro Ottawa infrastructure along Innes Road and develop relocation plans.

Significance of Residual Effect

Not significant – no adverse residual effects anticipated.

9.4.4.10 Utilities – Telecoms

Potential Project Interaction

There is existing shallow buried telecommunication infrastructure on the south side of Innes Road which may need to be relocated to accommodate road widening.

Potential Environmental Effect

Short-term localized service interruptions may occur due to component relocations prior to various construction activities. No adverse environmental effects are anticipated if telecommunication infrastructure is properly located, and excavation is carried out safely.

Proposed Mitigation Measures

Coordination with the utility provider to confirm protection requirements and relocations.

Significance of Residual Effect

Not significant – no adverse residual effects anticipated.

9.4.4.11 Areas of Potential Environmental Concern

Potential Project Interaction

Due to the relatively long development history, there is a potential to encounter impacted soil and/or groundwater in/on sites as identified in the Phase 1 Environmental Site Assessment (**APPENDIX C: 3**). The Phase I Environmental Site Assessment identified areas of potential concern including: fuels spills; dumping/waste storage, and former retail fuel outlets.

Potential Environmental Effect

Ground disturbance and/or changes to groundwater in areas of potential environmental concern may cause pollutants to migrate and/or become fugitive dust, thus creating a larger area of impact if left unmanaged. Unexploded ordinance may be a hazard if encountered.

Proposed Mitigation Measures

A Phase II ESA is recommended to confirm/assess if the above noted potential concerns will require additional management during the construction. An unexploded ordinance survey in the vicinity of the bombing range should be undertaken to remove potential dangers.

BMPs:

- Management of Contaminated Materials in accordance with legislation
- Dewatering Management Plan
- Excavated and Imported Materials Management Plan

Significance of Residual Effect

Not significant – effects are predicted to not be significant with implementation of known mitigation measures and implementation of the Phase I ESA recommendations, including completion of Phase II Environmental Site Assessments and BMPs as identified, as the project progresses.

9.4.5 Climate Change Adaptation

In December 2017, the Ministry of the Environment and Climate Change (MOECC) released guidelines titled "Considering Climate Change in the Environmental Assessment Process" which lay out the Ministry's expectations for project proponents to consider including the potential effects of a project on climate change, and the potential effects of climate change on a project. The City of Ottawa's Climate Change Master Plan lays out a framework to reduce greenhouse gas (GHG) emissions in accordance with Council's reduction targets and respond to the current and future effects of climate change.

This EA considered the project's potential impact on GHG emissions; assessed the resiliency or vulnerability of the project to changing climate conditions; and, identified potential climate change adaptations and future monitoring requirements based on regional climate and severe weather projections to 2050 and beyond.

Climate change presents both challenges and opportunities, particularly in relation to infrastructure design, implementation, and operations/maintenance. There are two categories of response to climate change risk, namely:

a) Mitigation refers to human interventions to reduce GHG emissions.
b) Adaptation refers to any activity designed to reduce the negative impacts of climate change and/or takes advantage of new opportunities.

The recommended plan provides new infrastructure for sustainable modes of active transportation and transit, while encouraging carpooling through HOV lanes, thus reducing greenhouse gas emissions. The landscaping plan will include offsetting of any loss of existing trees and vegetation, which will ensure that study area planting continues to provide a carbon sink.

Some of the potential hazards identified for this project include extreme rain impacts to the roadway/transitway, bridges, and culverts; freezing rain impacts to overhead wires, roadways, and walkways; extreme heat impacts to public health; and extreme wind impacts to landscaping and emergency access routes. To mitigate these impacts, adaptation options for the project may include engineering and technological solutions, as well as policy, planning, management, and maintenance approaches (**Table 9-2**). For example, more frequent storm events with increased runoff of roadway drainage may require larger roadside ditches and/or storm sewers. Increased frequency of extreme heat days may require additional shading and rest areas/benches along pathways and/or landscaping protection at the Chapel Hill Park and Ride transit station or at bus stops along Innes Road.

It is recommended that additional climate lens assessment be undertaken and that climate change adaptation measures be considered during detailed design including those related to flood design, stormwater management, selection of plant species for landscaping and erosion protection. This will be particularly important in relation to the natural channel design for the

realignment of Mud Creek. To account for increases in rainfall intensities due to climate change the design of culverts should be based on projected future rainfall events and the design of storm sewers should be checked against the 100-year storm plus 20%. It is also proposed that sustainable design principles be followed including consideration of low carbon material selection and sourcing which should be based on a GHG emissions assessment of the project based on the City's carbon calculator or similar tool.

Table 9-2: Preliminary Recommendations for Climate Change Adaptation

ID #	Infrastructure Component	Potential Functional Design/ Environmental Assessment Considerations	Potential Preliminary Design/Detail Design Considerations	Potential Maintenance/Operations Considerations
1	**Roadway Pavement**	▪ Increased risk of freeze-thaw damage to pavements. ▪ Document issues for consideration at Preliminary/Detail Design.	▪ Assess risk and consider modifications during pavement design.	• Assess/monitor climate change implications for maintenance/operations planning and standards (e.g., increased ditch erosion and debris accumulation due to increased severe weather events; increased freeze-thaw; increased freezing rain). • Develop Standard Operating Procedures (SOPs) for: a. Monitoring b. Response Plans c. Contingency/Back-up Plans d. Restoration/Lessons Learned
2	**Roadway Drainage**	▪ Increased peak runoff could result in larger roadside storm sewers and/or ditches. ▪ Potential for increased erosion risk along Mud Creek.	▪ Consider climate change implications during design (e.g., peak design storms, stress testing of designs, IDF curves for future conditions). ▪ Consider additional erosion protection of ditches and outlets, as well as natural channel design for the realigned Mud Creek.	
3	**Bus Stops**	▪ Projected increases in extreme heat days may require adjustment of bus-stop shelter design and provision of shading. ▪ Document issues for consideration at Preliminary/Detail Design.	▪ Extreme heat should be considered when choosing materials and designing bus shelters and landscaping.	
4	**Landscaping**	▪ Projected changes to average temperatures, extreme heat days and water balance cycle (drought) may influence landscaping design and life cycle. ▪ Document issues for consideration at Preliminary/Detail Design.	▪ Design should consider future climate change conditions (landscaping composition, tolerance to changing climate, growth rates, invasive species). ▪ Tree planting plan should consider implications of broken off limbs or downed trees.	

9.5 Cumulative Effects

The Joint Study to Assess Cumulative Effects of Transportation Infrastructure on the National Capital Greenbelt (AECOM, 2012) was undertaken in partnership by the NCC and the City of Ottawa to identify projects within the TMP and other transportation projects that could have an impact on the environmental integrity of the federal Greenbelt lands. The fundamental notion behind Cumulative Effects Assessment (CEA) is that if proposed projects are evaluated individually, the broader perspective may be overlooked.

The Blackburn Hamlet Bypass Extension EA projects (Delcan, 1999a and 1999b), approved by the NCC "with conditions", were included in the above 2012 Joint Study of Cumulative Effects.

9.6 Sustainability Statement

Sustainability refers to meeting the needs of the present without compromising the ability of future generations to meet their needs. The concept of sustainability is composed of economic, environmental, and social components. Specifically, this study has considered the following sustainability components:

- Provision of multi-use pathways and accessible transit stations.
- Collaboration with agency, businesses, and the public throughout the study process.
- Evaluation of alternative solutions and designs with natural, social, and cultural environmental considerations.
- Climate mitigation and adaptation/resilience.

The design and implementation of the infrastructure (road and transit) within a single corridor serves to reduce the physical infrastructure footprint and discourage Single Occupancy Vehicle (SOV) travel. Principles outlined in the City's "Basis for Sustainable Road Corridors" will also be utilized for sustainable road corridors in the rural area including:

- Community Connector
- Green Space
- Multi-Modal Routes
- Drainage
- Access Provider

By incorporating sustainability principles throughout the planning and design stages, the project will provide a greater sustainability return at lower cost, compared to inclusion of sustainability opportunities late in the project development process. Given the preliminary stage of the project, it will be important to consider sustainability moving forward, including incorporation/action on the recommendation for climate adaptation strategies, as identified in **Section 9.5**.

9.7 Limitations

This evaluation is limited to the physical and temporal boundaries of the project, as defined in **Sections 5.1** and **9.1** of this Report. Any other changes or activities that may occur in the future are not considered to be within the scope of this study. The current assessment does not consider potential impacts due to gross human error in the normal operation and/or

unpredictable accidental effects that may result. Such incidences are considered outside the scope of reasonable predictability of the purpose of the assessment for this project.

All known available project information has been reviewed to verify and disclose the existence of environmental concerns associated with its activities. The accuracy of discussions, conclusions and recommendations presented herein are limited to the extent of the resources available.

10. FUTURE COMMITMENTS

10.1 Property Acquisition

The preferred options for the BHBP/Innes Road (Navan Road to Blair Road) Transit Priority Project and for the recommended improvements, are primarily within an existing right-of-way. Some additional lands are required from the NCC.

The acquisition of temporary property needs, including temporary construction easements, will proceed as definitive property plans are developed.

10.2 Construction Phasing

Phased implementation of this project may be examined by considering the cost of the project, consideration of other projects (such as the Blair Road Transit Priority Project), and land and budget availability. The City may consider the following possible construction phasing:

- Initial implementation of the proposed transit queue jump lanes and multi-use pathway connection at the BHBP/Navan Road intersection, followed by
- Subsequent implementation of the BHBP/Innes Road widening to accommodate one new transit/HOV lane per direction and the new north side multi-use pathway.

Detailed implementation and staging plans will be developed in advance of construction.

10.3 Required Approvals

This Environmental Study Report under the *Ontario Environmental Assessment Act, R.S.O. 1990* does not constitute approval under other legislation required to construct the project. Specific approvals will be required for components of the project.

The Recommended Plan requires NCC Greenbelt lands to implement this project.

Although this EA study is following the requirements of the EA Act of Ontario and NCC approval is not required for this legislated process, NCC approval will be required during implementation of the Recommended Plan and is subject to the "*Federal Land Use, Design and Transaction Approval Process".*

The following is a list of approvals and permits that may be required and associated agencies that should be consulted moving forward. This list is representative of the types of permits and agencies that may be required and will be finalized during detailed design. Additional approval requirements will be considered and discussed with the approval agencies.

10.3.1 Federal Approvals

10.3.1.1 NCC Federal Land Use, Design & Transaction Approvals

A request for Federal Land Use Approval to the NCC will be required at a future date when funds are committed for more detailed design, and a construction timeframe is proposed. The project would also trigger a federal level environmental effects analysis per the Impact Assessment Act (IAA).

The City will be required to conduct a federal environmental effects analysis that document the environmental effects indicated within the IAA for the NCC to assess potential impacts and proposed mitigation measures, construction monitoring and follow-up studies.

10.3.1.2 Authorization Under the Fisheries Act

Based on assessment of specialized works such as culvert extensions, it is anticipated that such works will require review by the Department of Fisheries and Oceans to confirm if death of fish or harmful alteration, disruption, or destruction (HADD) of fish habitat can be avoided or mitigated or if a Fisheries Act Authorization is required to proceed.

10.3.1.3 Species at Risk Act Permits

The need for Species at Risk Permits will be confirmed at a future date based on details of recommended field studies, detailed design, and construction details as well as the Species at Risk identified in the Act at the time of design/construction. The permits are currently administered by Environment and Climate Change Canada and included species are updated annually.

10.3.2 Provincial

10.3.2.1 Environmental Activity & Sector Registry or Permit to Take Water

Environmental Activity and Sector Registry (EASR) and/or Permits to Take Water (PTTW) may be required if the construction involves taking, dewatering, storage, or diversion of water in excess of 50 m^3/day - administered by the Ontario Ministry of the Environment, Conservation and Parks.

10.3.2.2 License to Collect Fish for Scientific Purposes

License to collect fish for scientific purposes will be required from the Ontario Ministry of Natural Resources and Forestry (MNRF). MNRF is responsible for fish collection and transport in Ontario under the provincial *Fish and Wildlife Conservation Act*.

10.3.2.3 Permit Under the Endangered Species Act

The existing habitat conditions along the preferred corridor were assessed and determined that potential for terrestrial natural heritage features that support SAR and/or provide SAR habitat exists within the study area. The need for Species at Risk Permits will be confirmed at a future date based on details of recommended field studies, detailed design, and construction details. The permit is administered by the Ontario Ministry of the Environment, Conservation and Parks

and the need for any permits will be dependent on the species identified at the time of construction.

10.3.2.4 Environmental Compliance Approval

Environmental Compliance Approvals (ECAs) are administered by the Ontario Ministry of the Environment, Conservation and Parks. Approvals may be required in accordance with the *Ontario Water Resources Act* and/or *Environmental Protections Act* for discharges related to air, noise, waste, and sewage. Where changes to OGS may be required along Innes Road, ECAs may be required.

10.3.2.5 Well Abandonment

To determine if a well needs to be abandoned, the City should refer to *Regulation 903* (Wells Regulation), as amended under the *Ontario Water* Resources *Act* and the Wells Regulation Well Abandonment: When to Plug & Seal a Well technical bulletin.

10.3.3 Municipal

Municipal permits, licenses, and authorizations may be required for the construction period, including for utility relocates, noise bylaw exemptions, road modification approvals, road cut permits and encroachment permits.

10.3.3.1 Development, Interference with Wetlands & Alterations to Shorelines & Watercourses Approval

As the proposed works fall within natural areas regulated by the RVCA, permission for the proposed works maybe required from RVCA under *Ontario Regulation 174/06 – Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* (*O.Reg. 174/06*).

10.4 Notice of Completion

The Notice of Completion will be issued to complete the screening requirements for this Schedule C project. The review period associated with the Notice of Completion is 30 calendar days.

The Notice will advise the public and review agencies of their rights regarding requesting an Order and will clearly state the review period and date by which submissions and/or requests are to be received. Requests for an order requiring a higher level of study (i.e., requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g., require further studies), may only be submitted on the grounds that the requested order may prevent, mitigate, or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name. Requests should specify what kind of order is being requested (request for conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate, or remedy potential adverse impacts on Aboriginal and treaty rights, and any information in support of the statements in the request. This will ensure that the Ministry is able to efficiently begin reviewing the request.

If no request is received within the review period specified in the Notice, the proponent may proceed to design and construction of the project.

10.5 Follow- Up Programs

10.5.1 Monitoring

Verification of the accuracy of the prediction of environmental effects is completed via monitoring. Monitoring measures have been incorporated to determine what effects occur with project implementation. Mitigation measures may be modified in subsequent stages of design to improve their effectiveness and best management practices at the time of implementation. Monitoring measures should include inspection and surveillance, and compliance monitoring.

The identified environmental impacts are to be monitored during and after construction. The City of Ottawa is to ensure that experienced and appropriately trained staff manage and supervise the construction of the project. The contractor will be required to maintain and replace, as required, certain construction items pertaining to environmental impact mitigation (e.g., erosion and sediment control devices) during construction, as well as a specified post-construction period.

The City of Ottawa will monitor traffic volumes and roadway operations and make adjustments (e.g., traffic signal timing) to ensure the corridor effectively handles traffic conditions, particularly as it relates to interim plan implementation. The City of Ottawa will be responsible for regular long-term monitoring and maintenance of the roadworks, bridges and culverts, stormwater management facilities, and landscaping within the right-of-way.

10.6 Revisions to Schedule C Project Files

Changes to the project as described may arise in terms of study area conditions, the development of new technology or mitigation measures, cost control, or the identification of previously unknown information. These changes may be consistent with this ESR in that they:

- Do not fundamentally affect the identified impact or mitigation measures,
- Do not change the landowner notification requirements, and
- Do not include additional approval agencies.

Significant modifications to Schedule C projects, as presented to the public during the screening process and as set out in the Notice of Completion should be reviewed by the proponent. Similarly, if the period of time from filing the Notice of Completion to the commencement of construction for the project exceeds ten years, the proponent must review the planning and design process to ensure that the project and the mitigating measures are still valid in the current planning context.

11. CONCLUSIONS

The Blackburn Hamlet Bypass and Innes Road Transit Priority Measures EA Study has the potential to change the surrounding natural and social environments, including rural features associated with the City's Greenbelt. The purpose of this environmental assessment is to anticipate reasonably foreseeable potential changes to the human and biophysical

environments and recommend measures to mitigate the negative effects and enhance or broaden the positive environmental effects.

In this study, the existing conditions were documented, alternative solutions and designs were identified and evaluated, and a Plan of the preferred design was developed. Throughout the process, the study benefited from public and agency engagement including meetings with the Agency and Public/Business Consultation Groups, and three public open houses. The study also was subject to a civic dialogue, which culminated in the City of Ottawa Transportation Committee recommendations and Council approval. Through these meetings, the Study Team was able to identify and mitigate localized impacts for both users and residents/landowners immediately adjacent to the proposed project.

During the construction phase, the overall corridor will be an active construction site. Traffic disruptions, noise, dust, and visual interruptions will be inevitable. Ongoing communications by the City of Ottawa with the NCC and the affected public will go a long way in alleviating potential concerns and ensuring that timely information about the project is shared. Once complete, there will be many positive effects such as the enhanced transit, pedestrian and cycling facilities. While the project has the potential to have effects on the human and biophysical environments during construction in the vicinity of the project, these effects can be largely mitigated with prescribed design features and best management practices.

New infrastructure in an existing natural environment can result in potential negative impacts to the existing environment. Site-specific project mitigation measures have been included to reduce the overall effects of the project. Permanent effects can be largely mitigated with prescribed design features, site-specific mitigation measures and on-going agency/regulatory engagement. Determination of off-setting measures, the recommendation for remediation plans and additional studies will be required at detailed design and will be developed in consultation with regulating authorities. Through incorporating the mitigation measures recommended by this study, no significant adverse environmental effects are expected to result.

In accordance with the provisions of the Municipal Class Environmental Assessment Schedule C Process, the study results are documented in this Environmental Study Report, which will be made available for public review once finalized. During this period, there will be an opportunity for an individual or group to provide a written submission to the Minister of the Environment, Conservation and Parks. A request for a Part II Order requiring a higher level of study (i.e., requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g., require further studies), may be made to the Ministry of the Environment, Conservation and Parks but only on the grounds that the requested Order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered.

Informed by this Environmental Study Report, this project will culminate in the completion of detailed designs, specifications, and tender documents, as well as other associated approvals for the initial stage of construction. The detailed project mitigation features and plans will be created during the detailed design phase. The project will then be tendered and constructed in accordance with the plans and details.

12. CLOSURE

The City of Ottawa retained Morrison Hershfield to conduct the work described in this report, and this report has been prepared solely for this purpose.

This document, the information it contains, the information and basis on which it relies, and factors associated with implementation of suggestions contained in this report are subject to changes that are beyond the control of the author. The information provided by others is believed to be accurate and may not have been verified.

Morrison Hershfield does not accept responsibility for the use of this report for any purpose other than that stated above and does not accept responsibility to any third party for the use, in whole or in part, of the contents of this document. This report should be understood in its entirety, since sections taken out of context could lead to misinterpretation.

We trust the information presented in this report meets Client's requirements. If you have any questions or need addition details, please do not hesitate to contact one of the undersigned.

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APPENDIX A – Annex

APPENDIX B – Record of Consultation

APPENDIX C – Built Environment

APPENDIX D – Natural Environmental Records

APPENDIX E – Social Environmental Records

APPENDIX F – Cultural Environment

APPENDIX G – Corridor Evaluation Summary