Appendix B

Existing Conditions Report

Transportation

City of Ottawa

EXISTING CONDITIONS REPORT
Confederation Line East Extension Light Rail Transit (Blair Station to Trim Road)
Planning and Environmental Assessment Study

Prepared by:

AECOM
302 – 1150 Morrison Drive
Ottawa, ON, Canada K2H 8S9
613 820 8282 tel
613 820 8338 fax
www.aecom.com

In Association with:

Parsons
Houle Chevrier Engineering Ltd.

Project Number:

60323982

Date:

August 2015

AECOM
302 – 1150 Morrison Drive
Ottawa, ON, Canada K2H 8S9
www.aecom.com

613 820 8282 tel
613 820 8338 fax

August 12, 2015

Angela Taylor, P. Eng.
Senior Project Engineer
City of Ottawa
110 Laurier Avenue West
Ottawa, Ontario, K1P 1J1

Dear Mrs. Taylor:

Report No: 60323982

Regarding: EXISTING CONDITIONS REPORT
Confederation Line East Extension Light Rail Transit (Blair Station to Trim Road)
Planning and Environmental Assessment Study

Our Existing Conditions Report for the East LRT Extension has been revised with your comments. It draws on the work completed for the OR 174-CR 17 EA Study with updates to supplement the previous information where the proposed project was expected to result in additional impacts. It will be included in the Environmental Project Report.

Sincerely,
AECOM Canada Ltd.

Valerie McGirr, P. Eng.
Manager, Ottawa office
Valerie.mcgirr@aecom.com

VM:vm
Encl.
cc: Parsons
HCEL

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AECOM: 2012-01-06

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Revision Log

Revision #	Revised By	Date	Issue / Revision Description
0	KR	January 2015	Draft for review
1	SF, VM	July 2015	Final Draft
2	CG	August 2015	Final

Signatures

Report Prepared By:

Kelly Roberts, Environmental Planner

Report Reviewed By:

Valerie, McGirr, Project Manager

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List of Acronyms

AADT ..... annual average daily traffic
AAQC..... Provincial Ambient Air Quality Criteria (AAQC)
AQI..... Air Quality Index
ACG ..... Agency Consultation Group
ACPDR ..... Advisory Committee on Planning, Design and Realty
ANSI..... Area of Natural and Scientific Interest
AOO ..... Algonquins of Ontario
BCG ..... Business Consultation Group
CEAA ..... Canadian *Environmental Assessment Act*
CO..... carbon monoxide
CofA ..... Certificate of Approval
COSEWIC..... Committee on the Status of Endangered Wildlife in Canada
COSSARO..... Committee on the Status of Species at Risk in Ontario
CR..... County Road
CRT..... Clarence Rockland Transit
CWS..... Canada-Wide Standards
dBA ..... decibels
dbh..... Diameter at Breast Height
DFO ..... Department of Fisheries and Oceans
DND ..... Department of National Defence
DSD ..... Development Services Department – City of Ottawa
EA ..... Environmental Assessment
EAA..... *Environmental Assessment Act* (Ontario)
ELC ..... Ecological Land Classification
ESA..... Environmentally Sensitive Area
ESA..... Environmental Site Assessment
ESR..... Environmental Study Report
EPR..... Environmental Project Report
FLUDA ..... Federal Land Use Design and Approval
GHG..... Greenhouse Gases
GRA ..... Government Review Agencies
ha ..... hectare(s)
HC..... hydrocarbons
HOV ..... High Occupancy Vehicle
HLUI..... Historic Land Use Inventory
km ..... kilometre(s)
km/h ..... kilometres per hour
LACAC ..... Local Architectural Conservation Advisory Committee
MAH ..... Ministry of Municipal Affairs and Housing
m ..... metre(s)
mg/m^3..... milligrams per cubic metre
mm ..... millimetre(s)
mm/s ..... millimetres per Second
MAH ..... Ministry of Municipal Affairs and Housing
MNRF..... Ministry of Natural Resources and Forestry (formerly Ministry of Natural Resources)
MOECC..... Ministry of the Environment and Climate Change (formerly Ministry of the Environment)
MTCS..... Ministry of Tourism, Culture and Sport
MTO ..... Ministry of Transportation of Ontario
NCC ..... National Capital Commission
NCR ..... National Capital Region
NHIC ..... Natural Heritage Info Centre
NOx ..... nitrous oxides
NSA..... Noise sensitive areas
OCP ..... Ottawa Cycling Plan
OMB ..... Ontario Municipal Board
OP ..... Official Plan
OPP..... Ottawa Pedestrian Plan
OPA..... Official Plan Amendment
OR..... Ottawa Road
UCPR ..... United Counties of Prescott Russell
OWRA ..... Ontario *Water Resources Act*
PCG ..... Public Consultation Group
pcus..... passenger car units
PFCC ..... Plan for Canada's Capital
POH ..... Public Open House
ppb ..... parts per billion
PPHPD..... people per hour in the peak direction
ppm ..... parts per million
PPV ..... Peak Particle Velocity
PPS ..... Provincial Policy Statement
PWQO..... Provincial Water Quality Objectives
ROW ..... Right-of-Way
RPAM..... Real Property Asset Management – City of Ottawa
RSO ..... Revised Statute of Ontario
RTTP..... Rapid Transit and Transit Priority
RVCA ..... Rideau Valley Conservation Authority
SAR..... Species at Risk
SARA ..... *Species at Risk Act*
SNC..... South Nation Conservation Authority
SWM ..... Stormwater Management
SWMF ..... Stormwater Management Facility
TDM ..... Transportation Demand Management
TOD..... Transit Oriented Development
TPAP..... Transit Project Assessment Process
TSP ..... total suspended particulates
v/c..... ratio of traffic volume to roadway capacity
VKT ..... Vehicle-Kilometres Travelled
vph ..... vehicles per hour
YOY..... Young of Year

Glossary

Air Quality Index (AQI) – a rating scale for outdoor air quality in Ontario. The lower the AQI, the better the air quality.

Area of Natural and Scientific Interest (ANSI) – an area identified by the Ontario Ministry of Natural Resources and Forestry as having provincially significant representative ecological or geological features.

Alighting – a term used in transit planning that refers to "getting off" or disembarking from a bus or train.

Alternative Solutions – Alternative way of solving an identified need or addressing an opportunity within the scope of an environmental assessment.

Alternative Designs – Alternative ways of implementing the preferred alternative solution(s) within the scope of an environmental assessment***.***

Class Environmental Assessment – a planning process approved under the *Environmental Assessment Act* for a class or group of undertakings. Projects implemented under the Class EA process may be implemented without further EA approvals if they are undertaken in accordance with the approved process.

Environmental Assessment (EA) – a decision-making process used to promote good environmental planning by assessing the potential effects of certain activities on the environment.

Environmental Assessment Act (Ontario) (EAA) – In Ontario, the EA process is defined and legislated in the Environmental Assessment Act (EAA). The purpose of the Act is to provide for the protection, conservation, and wise management of Ontario's environment.

Environmental Site Assessment – an investigation undertaken to identify existing and potential environmental contamination of a site based on: an assessment of past, present and adjacent land uses; review of existing physical conditions; review of government and agency records; and a visual inspection of the site for signs of contamination and the presence of hazardous material.

Environmental Project Report (EPR) – documentation of the project in accordance with the requirements of Ontario's Transit Project Assessment Process (TPAP)***.***

High Occupancy Vehicle (HOV) – vehicles carrying a number of people that meets or exceeds a minimum number for eligibility to used designated road lanes.

Individual Environmental Assessment – environmental assessment that requires submission to the Minister of the Environment and Climate Change in accordance with the *Environmental Assessment Act.*

L_{eq}(T): L_{eq}(16), L_{eq}(8), L_{eq}(1)" – the A-weighted level of a steady sound carrying the same total energy in the time period T as the observed fluctuating sound. The time period T is given in hours.

Mitigation – a measure for the elimination, reduction, or control of the adverse environmental effects of the project, including restitution for any damage to the environment caused by such effects through replacement, restoration, compensation, or any other means***.***

Modal share – the ratio of the number of trips by a specific travel mode to the number of trips by all modes***.***

Park and Ride – parking areas, usually located at transit stations that allow for convenient transfer from private vehicles to transit***.***

Part II Order – an order to comply with Part II of the *Environmental Assessment Act* (previously known as a Bump-up request). This is an appeal process where a request is made to the Minister of the Environment and Climate Change requiring a proponent to comply with Part II of the Environmental Assessment Act.

Public/Business Consultation Groups (PCG/BCG) – groups providing input to the Study Team consisting of representatives from directly affected Community Associations, interested community groups and businesses***.***

Screenline – a line that crosses all major transportation facilities in a corridor. These lines are typically drawn along a feature (river or railway) that limits the number of crossing points***.***

Agency Consultation Group (ACG) – a group providing technical input to the Study Team consisting of representatives from government agencies and approval bodies***.***

The Split – a large four-way interchange between Highway 417, OR174 and the Aviation Parkway in Ottawa.

Transit Project Assessment Process (TPAP) - a planning process approved un the Environmental Assessment Act and defined in sections 6 through 17 in Ontario Regulation 231/08. It is a focused impact assessment process that includes consultation, assessment of impacts, identification of mitigations measures and documentation

Transportation Demand Management (TDM) – strategies that encourage individuals to reduce the number of trips they make, use more environmentally-friendly travel modes, travel outside of peak demand periods and reduce average trip length.

Transportation Master Plan – Municipal planning document that establishes future infrastructure and program needs supporting policies for the regional transportation system.

Terms of Reference (ToR) – document required for an Individual EA to set out a framework that will guide and focus the preparation of the EA. The ToR are submitted to the Ministry of the Environment and Climate Change for public and government agency comment and review and require the approval of the Minster of the Environment and Climate Change***.***

1. Introduction

1.1 Project Context

The City of Ottawa is the proponent of a Planning and Environmental Assessment Study to fulfill the requirements of Ontario's Transit Project Assessment Process (TPAP) for the Eastern Light Rail Transit project (Blair Station to Trim Road) in accordance with *Regulation 231/08* under Ontario's *Environmental Assessment Act*.

This **Existing Conditions Report** will provide the background and an overview of the study including the location and rationale for the proposed project; environmental assessment requirements; and the existing and future social, transportation, infrastructure and utilities, economic, natural and physical conditions within the study area. These conditions will be referenced within the Environmental Project Report to assess the effects of the proposed Eastern Light Rail Transit (Eastern LRT) project.

AECOM, in association with Parsons, MMM Group Limited (MMM) and Houle Chevrier Engineering Limited (HCEL) were retained to undertake this study.

1.2 Project Background

The Eastern LRT from Blair Station to Trim Road project is identified in the City of Ottawa 2013 Transportation Master Plan (TMP) to extend the Confederation Line further east to Orléans. The 2013 TMP envisions the Eastern LRT facility along the Ottawa Road 174 (OR174) corridor. Within this road corridor, a multi-jurisdictional Environmental Assessment (EA) Study is currently underway on a proposed widening of the OR174, extending from the Highway 417/174 Split to the County Road 17 (CR17) and Landry Road in Clarence-Rockland in the United Counties of Prescott-Russell.

Co-locating the Eastern LRT within the OR174 road corridor will have ramifications on the OR174 widening options, and both projects will need to be coordinated and undertaken concurrently. For each proposed integrated solution (OR174 widening and Eastern LRT), a comprehensive review of environmental conditions and potential impacts will need to be assessed and evaluated to understand the impacts and tradeoffs associated with each solution.

Information on the OR174 corridor has been made available for the Eastern LRT Planning and EA Study from the OR174 widening, to avoid duplication of effort. Where necessary, this information has been supplemented through on-site surveys and/or detailed studies. This Existing Conditions Report will summarize the social, transportation, infrastructure and utilities, economic, natural and physical conditions for the Split to Trim Road.

1.3 Environmental Assessment Requirements

1.3.1 Provincial Requirements

In June of 2008, the Transit Projects Regulation (*Ontario Regulation 231/08*) was created to apply to public transit projects. The process under the Regulation requires public sector proponents to assess the impacts of their project, identify mitigation measures, undertake consultation and make available information or documentation completed for the pre-planning work which led to the selection of the recommended plan for the transit project.

In accordance with *Ontario Regulation 231/08* (*O.Reg. 231/08*), an Environmental Project Report (EPR) will be completed and made publicly available. As part of the assessment process, the EPR will be placed on public record for comment and review prior to Ministry of the Environment and Climate Change (MOECC) approval. If there are concerns of provincial interest that cannot be resolved, a written objection may be made and sent to the Minister of the Environment for consideration.

1.3.2 Federal Requirements

Federal Canadian Environmental Assessment Act (CEAA) requirements are unlikely to be triggered based on the 2012 CEAA legislation. However, if federal lands are required, environmental impact assessments / evaluations may be required by the federal department or authority having jurisdiction to ensure that there are no significant adverse environmental effects caused by the project. The National Capital Commission (NCC) owns land in the area and will be involved throughout the study process. More information on the Canadian Environmental Assessment Act can be found at: www.ceaa.gc.ca.

2. Existing Conditions Overview

This report summarizes the studies and investigations undertaken to document the existing transportation, social, physical and biological conditions of the study area. The existing conditions represent the baseline information for the corridor against which the potential environmental effects of the project are assessed. Overall, the data was collected and analyzed for key environmental parameters in order to:

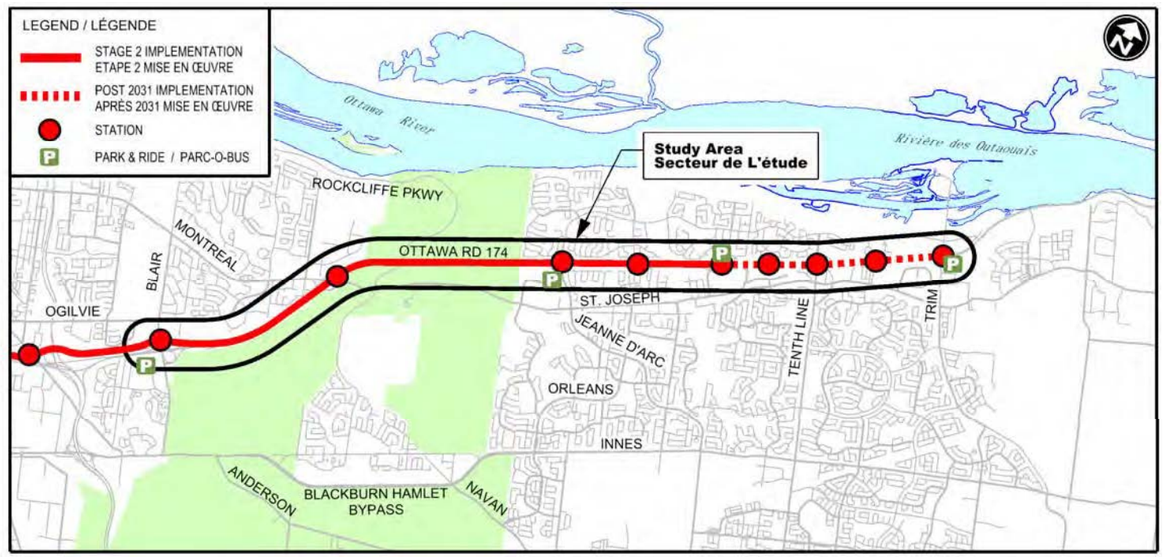
- Provide an understanding of existing conditions;
- Identify major constraints that will contribute to the development of alternatives;
- Allow for future predictions of how the proposed project may cause these environmental conditions to change;
- Allow for future predictions of how adverse effects can be mitigated and beneficial effects enhanced; and
- Provide a basis for designing monitoring programs.

2.1 Study Area Boundaries

The study area (Figure 2-1) boundaries are not rigidly defined. Instead they remain flexible to accommodate the extent of potential environmental effects associated with the particular 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.

Some components will require examination of a broader area beyond these limits to address environmental impacts, operational issues, and to coordinate with relevant on-going studies and projects. Where broader study area boundaries have been used, they have been identified in context.

Figure 2-1: Eastern LRT Planning and EA Study Area



2.2 Methods of Investigation

This *Existing Conditions Report* was prepared by a multidisciplinary team of land use planners, biologists, geologists, archaeologists, cultural landscape planners, transportation planners, municipal engineers, and experts in air quality, noise and vibration. This team of specialists collected, consolidated, reviewed and screened all available information with a view towards establishing the basis for development, analysis and evaluation of alternative solutions.

The inventory considered available background material and where necessary, supplemented this information through on-site surveys and/or detailed studies. The inventory is of sufficient detail to enable the analysis and evaluation of alternative transportation solutions, designs and mitigating measures.

The general methodology involved the following elements:

- The submission of requests for data, drawings, reports to affected agencies;
- Contacting and meeting with affected parties as required;
- Consolidating, reviewing and analysing relevant material for each element;
- Conducting air photo interpretation and field verification as required;
- Identifying elements or criteria that could be considered potential evaluation criteria; and
- Preparing a draft baseline report to be reviewed by participants to help ensure thoroughness, reliance and reflectivity of agencies and public interests.

Specific methods of investigation are discussed in further detail in the respective sections.

3. Social Environment

3.1 Administrative Boundaries

The social environment encompassing the study area is comprised of diverse components. The components relate to several factors both influencing and influenced by people's use and interaction.

- There are 4 Municipal Wards and several Community Associations which encompass or are in the immediate vicinity of the study area.
- Surrounding lands are owned by a combination of government and private proprietors.
- Planning policies are determined by three levels of government, namely, the Federal Government (National Capital Commission), Province of Ontario, and the municipality.
- Land use planning designations in the Study Area are a combination of residential, commercial, institutional, recreational, open space and natural features.

3.2 Planning Policies

3.2.1 Federal Land Use Policy

Plan for Canada's Capital, 1999

The Plan for Canada's Capital (PFCC) is the federal government's lead policy statement on the physical planning and development of the National Capital Region (NCR). It provides the general orientation and policies for federal lands in the NCR. The last version of the document, adopted in 1999, is currently being revised.

The vision for the NCR is as "a place where city and nature meet". Among the key objectives stemming from this vision is the protection of the Greenbelt, which is crossed by the study corridor/OR174. The document's planning concept defines the Greenbelt as "*a diverse rural mosaic of farms, working forests, natural areas, research establishments and recreational areas*" that provides "*rural-related visitor attractions, farm vacations, interpretation areas and an extensive network of recreational pathways*".

Greenbelt Master Plan, 2013

The Greenbelt Master Plan, 2013, follows from the Horizon 2067 PFCC. It provides more specific policy directions to guide the National Capital Commission (NCC) in the planning, development, management, preservation and evolution of the Greenbelt. The 2013 Greenbelt Master Plan is an update to the 1996 plan, reflecting changes in urban development since the previous plan, as well as the directions for its future as expressed through recent community and stakeholder consultations. The final revised Greenbelt Master Plan was approved in November 2013 and will be reviewed every 10 years to ensure the continued protection of the Greenbelt.

Consultations on the 1996 Greenbelt Master Plan revision held in 2009 brought certain concerns to light with regards to transportation impacts on the Greenbelt. Road and infrastructure expansion were viewed as major impacts to Greenbelt lands. Should they occur, road widening is preferred to new corridors. The importance of enhancing public transit, walking and cycling access to the Greenbelt and to clearly establish the location of future LRT stations and associated parking facilities in the Greenbelt were also raised.

The Greenbelt Master Plan (2013) seeks to protect natural systems, agriculture and opportunities for outdoor recreation and education. The plan also seeks to contribute to sustainability and quality of life in the Capital. The facilities accommodated within the Greenbelt must operate and perform sustainably, and in harmony with natural, cultural and social features.

Within the 2013 Greenbelt Master Plan it is noted that transportation is more than just about moving people swiftly between destinations, it is also a key component of the Capital experience, providing travellers with the opportunity to enjoy and explore the diversity of the natural environments and setting. The Plan indicates that transportation infrastructure alignments should avoid severing the most highly vulnerable Core Natural Areas and habitats, and land removals and disturbance of adjacent habitats should be minimized. The NCC will promote and give preference to sustainable, safe and active transportation infrastructure that is consistent with the vision, roles, goals and policies as outlined in the Plan. The proponents of any future new transportation infrastructure or improvement of existing infrastructure will require a thorough assessment, including a cumulative effects component.

The Greenbelt Master Plan designates *Greenbelt Edges*, or lands at the edge of the greenbelt. The objective of *Greenbelt Edge* is to distinguish the Greenbelt from neighbouring urban and rural communities. These edges should contrast with adjacent areas to highlight the Greenbelt's presence, but in a manner that is complementary with rural or natural character of edges. On lands abutting *Greenbelt Edges*, vegetated buffers, rural characteristics and non-intrusive lighting on roads are desirable.

Policies related to transportation within the plan further discourage the placement of park-and-ride facilities within the Greenbelt, and give priority to transport demand management measures with priority given to sustainable low-carbon and non-carbon transportation initiatives over schemes that create more capacity for vehicles.

The Greenbelt Master Plan, 2013 concept plan identifies the OR174 corridor as one of seven *Capital Arrival & Scenic Entry Routes*, a major route to and from the NCR that should be designed to enhance the visitor perception and experience of the Capital. The Plan notes that although not as impressive as the approach from the west, the views from the Highway 417 along the eastern approach are representative of agricultural and natural landscapes. The Plan identifies one Visitor Destination in the vicinity of the 174: Green's Creek (Toboggan Hill) Natural Area. The Creek can be explored along a Greenbelt Recreational Pathway that follows the Creek. From the Ottawa River, the pathway meanders southward and crosses OR174 on the Sir George-Étienne Cartier Parkway (formerly Rockcliffe Parkway) overpass. The pathway meets up with a small NCC visitors parking lot located to the south west of the intersection of Sir George-Étienne Cartier Parkway and St-Joseph Boulevard. The pathway continues south along the Greenbelt. Two "views" have also been identified along the OR174 corridor.

The 2013 Greenbelt Master Plan presents policies designed to apply to the features of the *Capital Experiences and Recreation* network, Greenbelt resources, Greenbelt integrity, profile and leadership, facilities, ecological corridors, transportation, infrastructure and residences.

The Greenbelt Master Plan presents a series of Sector Plans. Within a series of Sector Plans actions and guidelines are intended to assist users in the interpretation of the Land Designations and Experience Network Elements envisioned for the lands. The Sector Plans also outline implementation strategies for specific areas and sites, including Sector 7 – Green's Creek. The Plan identifies sector specific initiatives with early NCC engagement in the planning process including for projects such as the widening of OR174.

The protection and enhancement of visual quality of the Scenic Entry Route along OR174 corridor has been identified as a guideline/action within the 2013 Plan. Additionally, farmland to the north of OR174 has been identified as having potential for sustainable agriculture with the potential for opportunity of establishing a farmstead partnership. Best management practices and restoration of stream/riparian areas to meet provincial and federal standards have also been identified as guidelines and actions for the Sector Plan.

Further objectives for the corridor include: efforts to conserve features and functions of core natural areas; support sustainable agriculture; promotion of Green's Creek Core Natural Area as a Visitor Designation; and limiting non-federal development within the Greenbelt (**Figure 3-1**).

Figure 3-1: Greens Creek/Blackburn Sector Implementation Strategies

3.2.2 Assessment of Cumulative Effects of Transportation Infrastructure on the Greenbelt

This joint study of the NCC and City of Ottawa 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. The projects were placed into two categories with Category 1 projects having the greatest potential contribution to cumulative effects, especially within Core Natural Areas and Natural Area Linkages. The study named 14 Category 1 projects and 16 Category 2 projects and provided a management plan for the treatment of each category along with suggested supporting activities to further minimize adverse cumulative effects.

At the conclusion of this study, the City and the NCC reviewed the rationale and status of each project and determined the final categories to be assigned. The widening of OR174 through the Greenbelt is considered a Category 2 project. Extension of the LRT from Blair Station to Trim Road was not one of the 30 identified projects as the cumulative effects study was done prior to its consideration as part of the 2013 TMP. The Cumulative Effects Study did recognize that a process would be required to assess new projects identified over time. Measures that minimize, compensate or off-set contributions to cumulative effects on the Greenbelt will be required as part of changes to the OR174-ELRT corridor, particularly the elimination/ minimization of adverse effects in the Green's Creek Core Natural Area.

3.2.3 Provincial Policy Statement (2014)

The Provincial Policy Statement (PPS), issued under Section 3 of the Planning Act, provides policy direction on matters of public interest related to guiding growth and development in Ontario. The PPS provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural environment. The Planning Act states that planning decisions "shall be consistent with" policy statements issued under the Act. The PPS 2014 policies set out the government's land use vision for how we settle the landscape, create built environments, and manage land and resources over the long term to achieve livable and resilient communities. The policies that are applicable are as follows:

- A coordinated and integrated approach should be taken when dealing with planning matters within municipalities, across lower, single, and/or upper-tier municipal boundaries, and with other orders of government, agencies and boards;
- Coordinate planning matters with Aboriginal communities;
- Infrastructure should be provided in a coordinated, efficient and cost-effective manner to accommodate projected needs;
- Consideration should be given to significant environmental resources and natural features and areas shall be protected for the long-term;
- Significant built heritage resources and significant cultural heritage landscapes shall be conserved;
- Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs;
- Connectivity within and between transportation systems should be maintained and, where possible, improved including connections that cross jurisdictional boundaries;
- Transportation and land use considerations should be integrated at all stages of the planning process; and
- Land use patterns, density and mix of uses should be promoted that minimizes the length and number of vehicle trips and support the development of viable choices and plans for public transit and other alternative transportation modes, including commuter rail and bus.

The 2014 PPS includes the following with particular regard to transportation systems:

- A coordinated and integrated approach to planning shall include other levels of government, agencies and boards;
- Planning for infrastructure should be coordinated with land use planning so that they are financially viable over the life cycle and available to meet current and projected needs;
- Efficient use shall be made of existing planning infrastructure including the use of transportation demand management where feasible;
- Infrastructure should be viewed in the context of a multi-modal transportation system;
- Land use patterns should give consideration to active transportation modes; and
- Major goods movement facilities and corridors shall be protected for the long term.

When planning for corridors and rights-of-way for significant transportation and infrastructure facilities, consideration will be given to the significant resources in Section 2 of the PPS: Wise Use and Management of Resources. These include the protection of natural heritage, water, agricultural, mineral and cultural heritage and archaeological resources for their economic, environmental and social benefits to Ontario's long-term prosperity.

New development proposed on adjacent lands to existing or planned corridors and transportation facilities should be compatible with, and supportive of, the long-term purposes of the corridor and should be designed to avoid, mitigate or minimize negative impacts on and from the corridor and transportation facilities.

3.2.4 City of Ottawa Planning Policies

City of Ottawa Official Plan, 2013

On November 2, 2013, as a result of the Official Plan's five year review, Ottawa City Council passed the Official Plan Amendment #150, Infrastructure Master Plan, Transportation Master Plan, Ottawa Cycling Plan, and the Ottawa Pedestrian Plan.

The City of Ottawa Official Plan, 2013 (OP) and its supporting Master Plans provide a vision of future growth for the City and sets the policy framework to guide its physical development over the plan horizon to the year 2031. The OP serves as a basis for, and provides guidance on, a wide range of municipal activities.

One of the key concepts of the Official Plan with respect to transportation is the accommodation of the *"movement of people during the morning and afternoon peak period*". A clear objective of the OP is "*a substantial increase in the use of public transit and where possible reduced dependence upon the automobile use throughout the day…Planning for walking, cycling and transit means sharing roads and other public spaces among all users and managing the supply of parking so that enough is provided without negatively affecting transit use".*

The share of travel by sustainable modes is targeted at 50% of the total trips in the city projected by 2031, an increase from the 2011 level of 45%. To achieve this target, a substantial increase in travel by transit will be required, since transit will be providing a larger share of trips and trips will increase overall as the population grows.

City Council has adopted a complete streets policy in order to balance the multiple roles of roads and to offer safety, comfort and convenience to all users, including pedestrians, cyclists and transit users. The City will protect corridors for and develop the Rapid Transit Network of existing and proposed corridors, which operates on grade-separated, fully exclusive rights-of-way such as light rail corridors, as well as segregated lanes within a road right-of-way.

The City's Rapid Transit and Transit Priority Network as illustrated on Schedule D of the 2013 OP illustrates Light Rail Transit in the OR 174 corridor, from the Split to Trim Road. Park and Ride lots have been identified at Jeanne D'Arc, Place D'Orléans and Trim Road. Greater details on the transportation policy framework and goals are described in the section Ottawa Transportation Master Plan and related sections below.

OR174 crosses the Urban Policy Area within the confines of the study area. The divider between the Urban and Rural Policy Areas lies just east of the community of Orléans, generally just beyond Trim Road and the Cardinal Creek Community which is currently under development.

Within the designated urban area, growth is directed to locations with significant development potential, specifically those designated *Central Area, Mixed-Use Centres Mainstreets, and Town Centres* and the *Community Core in Riverside South*. These areas are located on the Rapid Transit Network as defined on Schedule D. Many of these designations are located adjacent to the OR174 study area. The Plan sets minimum density requirements (Table 3-1:), which is defined as people and jobs per gross hectare, for the following locations included in the study area.

Table 3-1: Ottawa Minimum Density Requirements (OP, 2013)

Designation	2012 Density	Minimum Target Density
Blair 174 Mixed Use Centre	97	200
Cyrville Mixed Use Centre	35	200
Orléans Town Centre	45	120
Transit-Oriented Development Areas	As determined in individual plans	

OR174 is considered a public utility and municipal service in the OP and as such, is generally permitted in all land use designations. On the lands adjacent to OR174, the following land use designations exist.

Within the Urban Policy Area, the OR174 corridor crosses two former town centres now designated *Mixed-Use Centre* in the OP. *Mixed-Use Centres and Town Centres "occupy strategic locations on the Rapid Transit Network and act as central nodes of activity within their surrounding communities and the city as a whole. These centres are a critical element in the City's growth management strategy, being areas with potential to achieve high densities and compact mixed-use development oriented to rapid transit".* A broad variety of transit-supportive land uses are permitted and encouraged in this designation including offices, large institutional, retail, entertainment and community recreation as well as high and medium density residential.

The first mixed use centre is Blair, which includes a shopping centre and office complexes in the north east and southwest corners of the 417/Blair Road interchange. The second is Orléans Town Centre, located at the southern end of Champlain Street in the community of Orléans and includes Place d'Orléans Shopping Centre, lower-intensity retail to the east and west of the Shopping Centre and also includes medium-rise Apartments. The Orléans *Mixed Use Centre* maintains its designation as a *Town Centre* in the OP. A third *Mixed-Use Centre*, Cyrville, is located just to the west of the OR174/Highway 417 interchange outside of the study area. Cyrville includes an office development node as well as some medium density residential at the Cyrville Transit Station. St. Laurent Shopping Centre, a *Major Urban Facility* is located just west of the Split and the *Mixed Use Centre.*

The OR174 corridor is adjacent to three designated *Employment Areas*. (Other employment land uses are included in designated mixed use centres and general urban areas in the study area.) The first Employment Area is located at the Split (East Industrial), another along the eastern edge of the Beacon Hill North community (Canotek Park), and the last at the eastern boundary of Orléans (Taylor Creek). *Employment Areas* are designated in part by their ability to accommodate jobs and are strategically located to have access to 400 series highways and multi-lane arterials. The *Employment Area* designation permits a variety of industrial and employment-generating uses, such as warehousing and distribution, manufacturing, communications, storage, construction, office, institutional, and research and development uses.

Lands located within the boundary of the NCC Greenbelt, adjacent to the OR174 corridor are designated *Natural Environment Area*, *Greenbelt Rural* and *Agricultural Resource Area*. Limited low-intensity, agricultural, recreational and conservation uses are permitted and exist in these areas.

The majority of lands within the adjacent residential communities along the OR174 corridor are designated *General Urban Area*. The *General Urban Area* designation permits the development of a full range and choice of housing types with a combination of conveniently located employment, retail, service, cultural, leisure, entertainment and institutional uses to meet the demand of the community.

Beyond the study area to the east, the OR174 corridor is largely within a *General Rural Area* designation. Much like the greenbelt lands along this corridor, low-intensity agricultural, recreation and conservation uses are permitted with limited opportunities for rural based commercial and residential uses.

The study area also includes some lands designated *Major Open Space*. *Major Open Space* include lands that are large parks, open space corridors along the Ottawa River, parkway corridors and corridors reserved for rapid-transit and major roads. Land uses and activities that do not adversely impact the natural, environmental, cultural and open characteristics of the area are permitted in this designation.

Existing Land Use in Ottawa

The OR174 corridor within the Eastern LRT study area is part of the Ottawa urban area (Figure 3-2). At the west end of the study area, in the vicinity of Blair Station, the study area includes Gloucester Centre, a community scale commercial development. A second major commercial development is Place D'Orléans Shopping Centre (regional scale), located at the southern end of Champlain Street in the community of Orléans.

The OR174 corridor also crosses three major employment/light industrial zones. There is one in the vicinity of Blair Station, another along the eastern portion of neighbourhood of Beacon Hill North, and the last in the eastern portion of Orléans. A small, secondary industrial/commercial zone (Youville Drive) comprised of low density car oriented businesses is also located at the western entrance of Orléans at the edge of the Greenbelt.

In between the urban land uses just described are several low density residential areas that are located adjacent to OR174. In the community of Gloucester, neighbourhoods include Pineview, just southeast of the split, and Beaconhill South just east of Blair Road. In Orléans, the neighbourhoods of Convent Glen, Queenswood Village, Queenswood Heights and Chatelaine Village border the OR174 corridor.

There are several natural environmental features along the study area. There is a small forested area and water feature located at the split. Between Blair Road and the Greenbelt Boundary, the southern edge of OR174 borders the Greenbelt and Green's Creek natural and recreational areas.

3.2.5 Ottawa Transportation Master Plan 2013

The 2013 Ottawa Transportation Master Plan (TMP) contains several policies and guidelines which are relevant to the project. The TMP builds on the work of previous plans carried out in 2003 and 2008. OR174 is classified as a city freeway in the urban road network, from the split to a few kilometers east of Trim Road, after which it turns into an arterial road until the City's boundary. On city freeways, direct access to adjacent lands is prohibited, while on arterial roads, direct access to adjacent lands is possible.

The TMP outlines the goals to transform Ottawa's transit system. Recommended actions include expanding the Rapid Transit and Transit Priority (RTTP) network and integrating the RTTP network into the community. Actions may include encouraging quality development close to rapid transit stations; making rapid transit stations convenient, comfortable and accessible to all users including pedestrians and cyclists; and meeting or exceeding municipal, provincial, and federal guidelines and legislation for people with disabilities.

The successful implementation of an expanded RTTP network will include LRT, BRT, and O-Train facilities in addition to the on-road transit priority measures. The 2013 TMP notes the City's strategic approach to expanding its RTTP network in response to future transportation needs and towards the goal of achieving an ultimate RTTP network.

Transit

The 2013 TMP identifies an expected growth rate in peak period transit trips by 2031, and the 2031 RTTP Network Concept (Figure 3-3) was developed to both accommodate the growing demand and provide a level of service that will attract it. While the entire network concept may not be fully implemented by 2031, it is important for the City to protect lands that would be required for this eventual implementation, such as through the transfer of transit corridor rights of way through planning application approvals, or the purchase of surplus railway ROW and selected utility corridors as they become available.

The 2013 TMP recommends the implementation of a subset of the 2031 RTTP Network Concept, called the Affordable RTTP Network (Figure 3-4) that will provide as many of the identified benefits as possible within the City's projected funding envelope. These projects were strategically selected to maximize gains in transit ridership within available funds.

The Affordable RTTP network includes LRT, BRT, and O-Train Projects. Instead of phasing these extensions over time to 2031, a single project, dubbed Stage 2, is proposed that will bring LRT rail west, south and east to Orléans, along with resulting operational savings well in advance of the previous schedule proposed in the 2008 TMP. Future updates of the TMP will review and confirm these project priorities.

The following projects have been identified in the 2031 Affordable RTTP Network projects list. They have been identified to provide fast, reliable service between the Place d'Orléans and downtown Ottawa and reduce bus vehicle hours on the OR174.

- Affordable: Extension of the LRT Confederation Line (currently under construction) from its eastern terminus at Blair Station to Place D'Orléans. (2014-2031);
- Concept: Eastern extension of LRT service following OR174 between Blair Station and Trim Road.

Road Network

The TMP points to the need to build new roads or widen some existing ones to avoid unacceptable levels of congestion. For OR174 specifically, the Plan identifies the following road network projects that are required to address local capacity, operational and safety issues:

- Widen OR174 from four to six lanes between Highway 417 and Trim Road; and
- Widen OR174 from two to four lanes between Trim Road and the City boundary.

The estimated costs to implement the road widening, according to the TMP, is $70.6M and $77.1M, respectively.

The AM peak period analysis presented in the TMP indicates that the Green's Creek screenline is projected to be operating at a v/c ratio of 1.22 at the 2031 time horizon with no additional capacity, and v/c of 1.03 even with the proposed widening of the OR174 corridor as outlined above. Despite the performance benefits, the TMP indicates that the widening of the OR174 Corridor is considered outside of the affordability envelope at 2031, and therefore it does not form part of the Affordable Road Network.

Figure 3-2: Land Use

Figure 3-3: Rapid Transit and Transit Priority Network – 2031 Network Concept

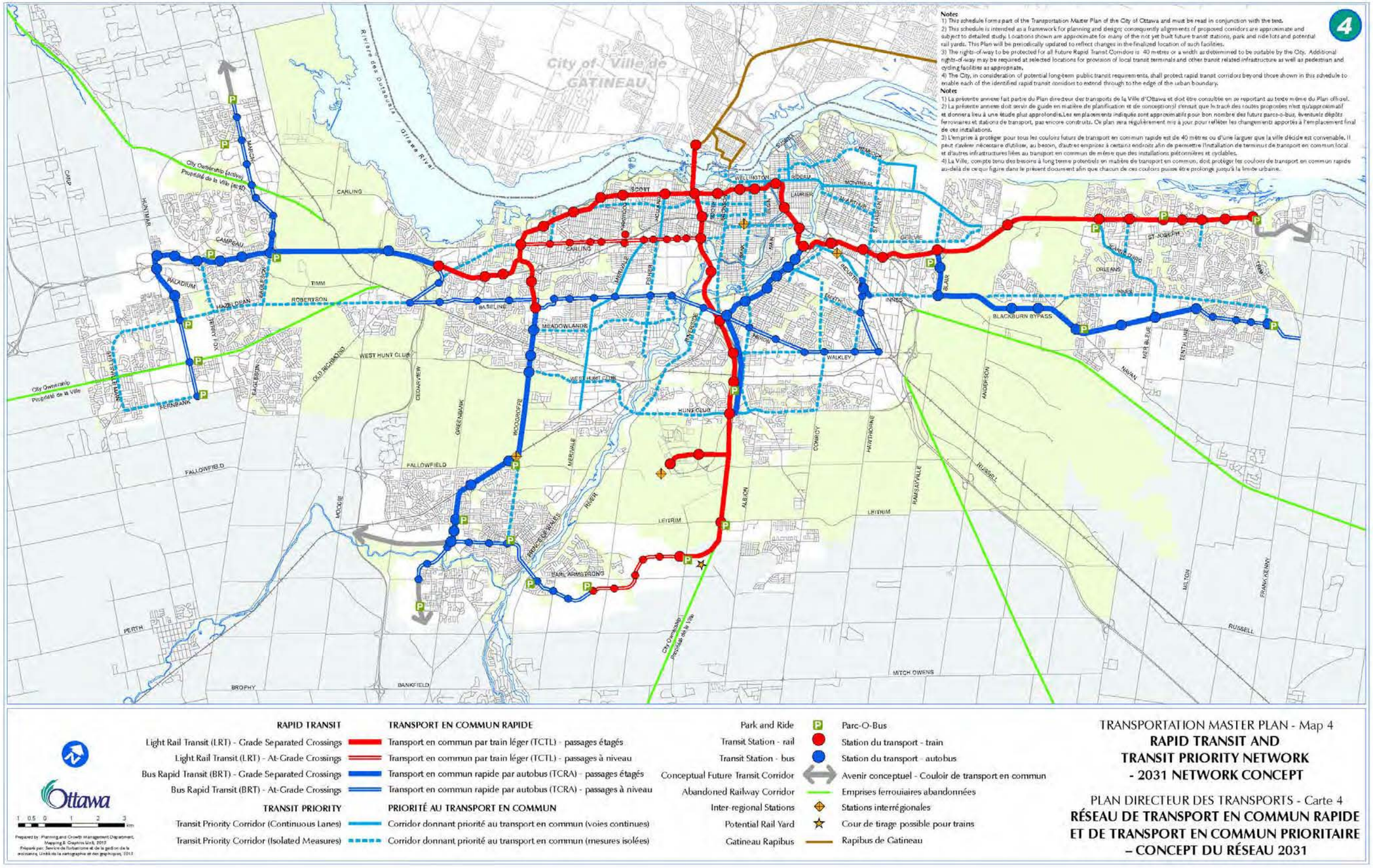
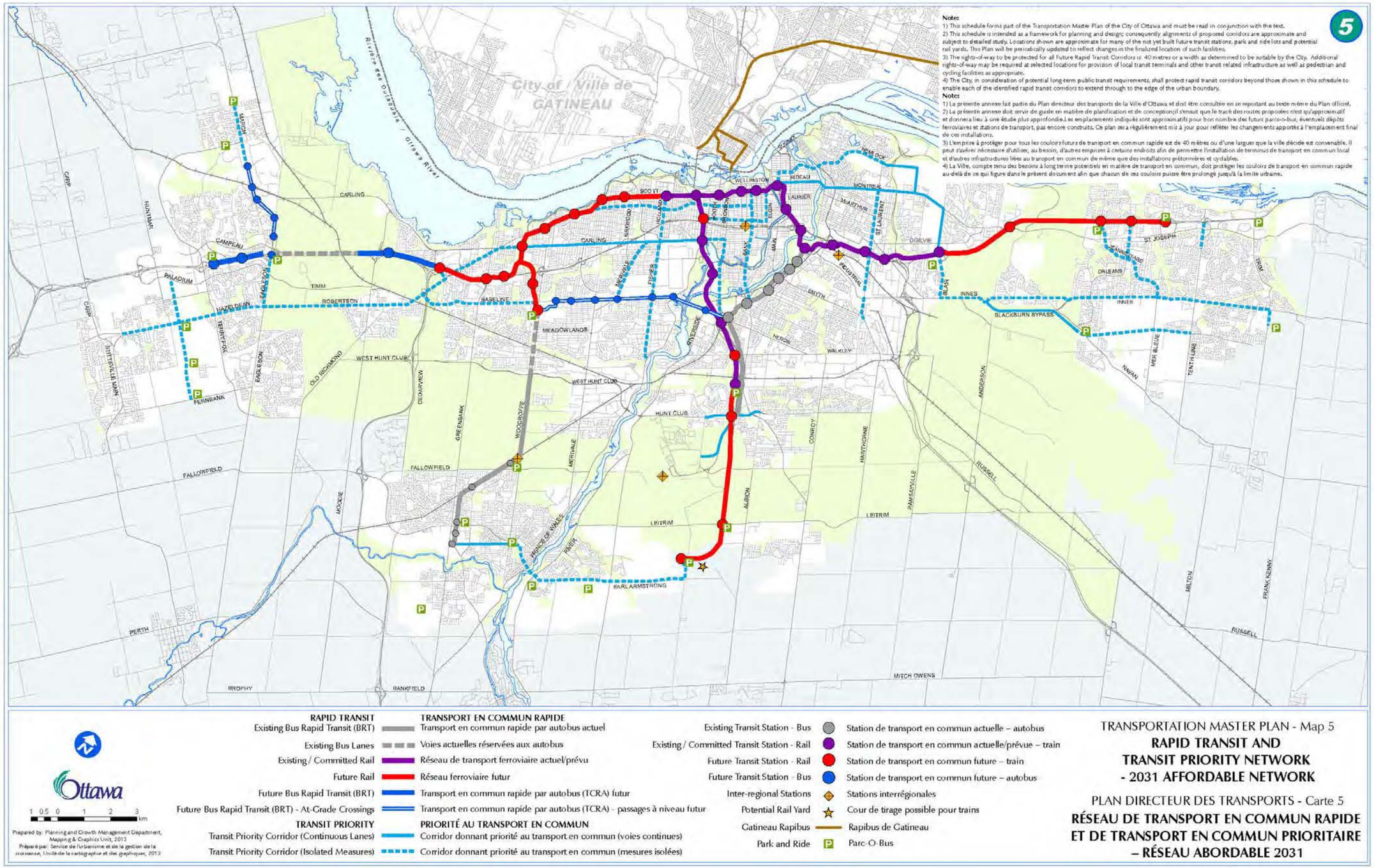


Figure 3-4: Rapid Transit and Transit Priority Network – 2031 Affordable Network



3.2.6 Pedestrian Master Plan, 2013

The Ottawa Pedestrian Plan (OPP 2013) aims to make walking year-round a viable, comfortable and realistic means of travel and an integral part of the transportation system in Ottawa. To achieve its vision, it provides guidelines for targeted improvements and recognizes achievements in improving walkability since the 2009 Pedestrian Plan.

The Pedestrian Plan has contributed to setting targets for increased levels of pedestrian activity in 2031. The Plan includes development and definition of proposed projects to expand Ottawa's pedestrian network by completing high-priority missing links, providing pedestrian linkages in Transit-oriented Development (TOD) areas and adding new multi-use pathways to the network.

The Plan defines the current City priorities for links to transit, schools and parks. Regardless of population or employment, ensuring good walking facilities to promote safe trips to parks and schools and to encourage the use of rapid transit is a main priority. In the determination of project priority, the City used a refined and updated methodology that took into account links that would provide maximum benefits in terms of increasing walking modal share and providing access.

The 2013 Pedestrian Plan mapped the "walkability" of all areas within the city's urban boundary. Given its comprehensive scale, the Walkability Map can act as a tool for guiding the focus for improvements to the walking realm (Figure 3-5). Areas with low walkability could be used as candidates for improvements to community infrastructure or improvements to the mix of land uses.

3.2.7 Ottawa Cycling Plan, 2013

The City of Ottawa's Cycling Plan (OCP 2013) is a long-term strategy to strengthen and support cycling within the city. It identifies a comprehensive cycling network and supportive operational activities and recommends policies to guide cycling facility planning, design, implementation and maintenance. The Plan has as a vision to develop a city-wide, connected network of cycling facilities actively used by all types and ages of cyclists to meet their transportation needs. The 2013 Plan identifies a target for city-wide cycling mode share in 2031 of 8% inside the Greenbelt and 5% city-wide.

Currently, there are no bike facilities along OR174 within the Ottawa City limits. Several paths do, however, connect to cross OR174 (Figure 3-6).

- In Beacon Hill, there is one City owned Pathway crossing just west of the Blair interchange (using the pedestrian bridge to Blair Transit Station), while a Shared Use Lane crosses at Blair and a Bicycle Lane crosses at the Montreal Road interchange.
- In the Greenbelt, an NCC owned Capital Pathway crosses OR174 at Sir George Etienne Cartier Parkway (on the overpass).
- In Orléans, a Shared Use Lane crosses OR174 at Orléans Boulevard (on the overpass), while a few City owned pathways are located in the vicinity of OR174 on both sides but do not cross it.

The 2013 Ottawa Cycling Plan identifies the infrastructure that is needed to support its cycling vision. Within the Ultimate Network Concept a number of spine routes, local routes and pathways have been prioritized for implementation by 2031. City-wide routes, "spine routes" follow major roadways (typically arterials) and may provide a reserved space for cyclists. These provide access along major corridors, connecting the Cross-Town bikeways and major off-road bike paths to local neighbourhood local routes and Neighbourhood Bikeways. Community cycling routes are designed to provide access from residential streets and shopping areas to the more major spine and bikeway routes that will allow travel for longer distances through the city. The local routes will typically be on-road facilities, and could be painted bike lanes, or shared lanes with mixed traffic, depending on the configuration of the road.

The Plan recommends that major transit projects include funding for cycling linkages identified within the Ottawa Cycling Plan 2013 Network Implementation or Ultimate Network Concept Plans

The proposed network concept includes:

- TOD area cycling routes within a 7-15 minute cycling distance from a Confederation Line Station assuming the provision of a very low stress cycling facility.
- In Beacon Hill there is a Major Pathway west of the Blair interchange, with connections up to Innes Road and west along the Transitway to St. Laurent Mall. A Spine Route has been identified along Blair Road from the Sir George Etienne Cartier Parkway to Innes Road crossing OR174; pathway links and local routes would connect this spine route to the Blair Rapid Transit Station. A city-wide route is proposed on Montreal Road and would cross OR174 at the interchange; and
- In Orléans, several spine routes cross the OR174 including at the Jeanne d'Arc interchange; at Orléans Boulevard; at Tenth Line Road; and at Trim Road, leading to the Trim Rapid Transit Station. A major pathway, where the existing city-wide facility on Orléans Boulevard at Champlain Street (community route/ bicycle Lane) leads to Place d'Orléans.

Figure 3-5: Ottawa Pedestrian Plan

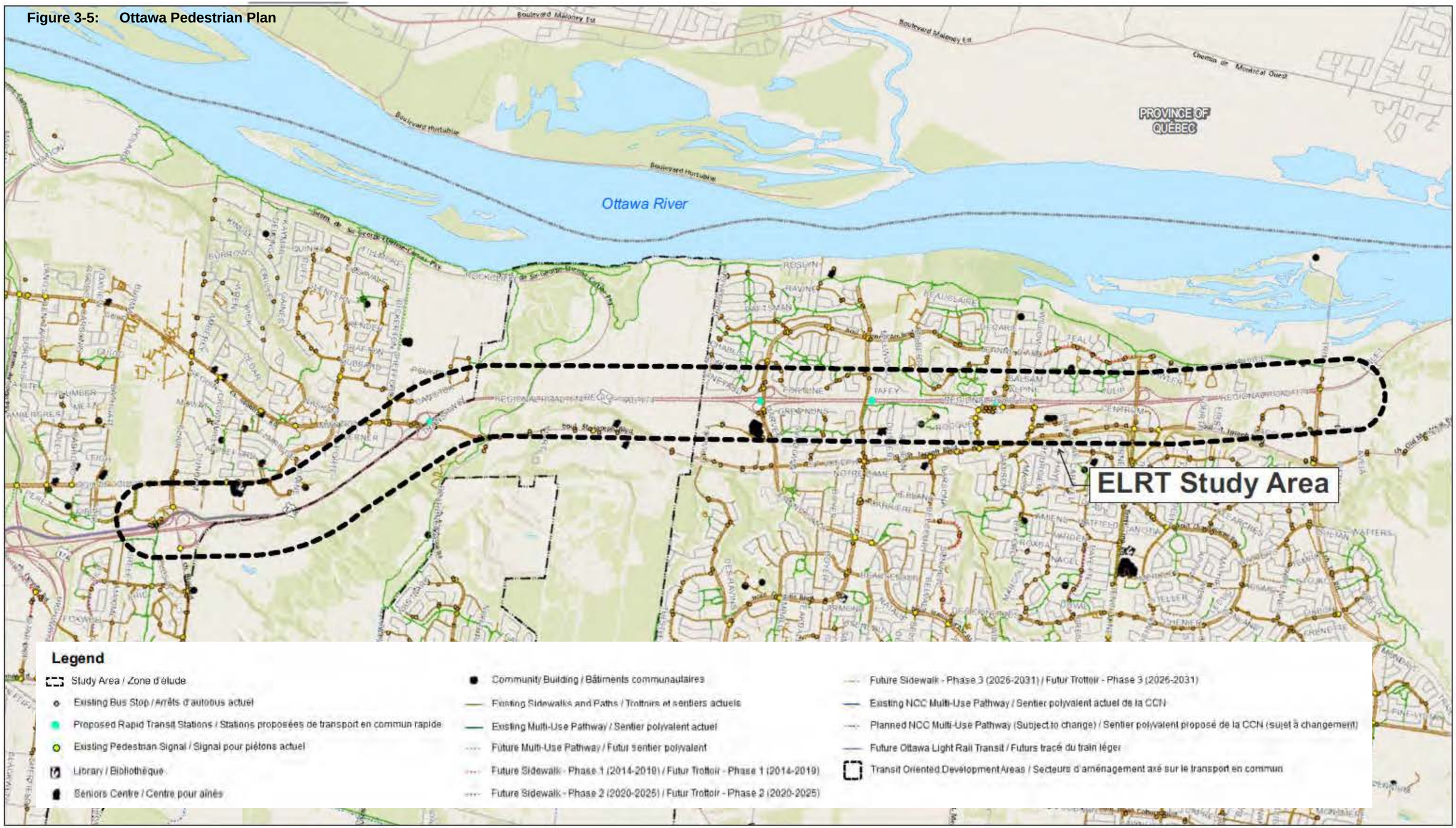
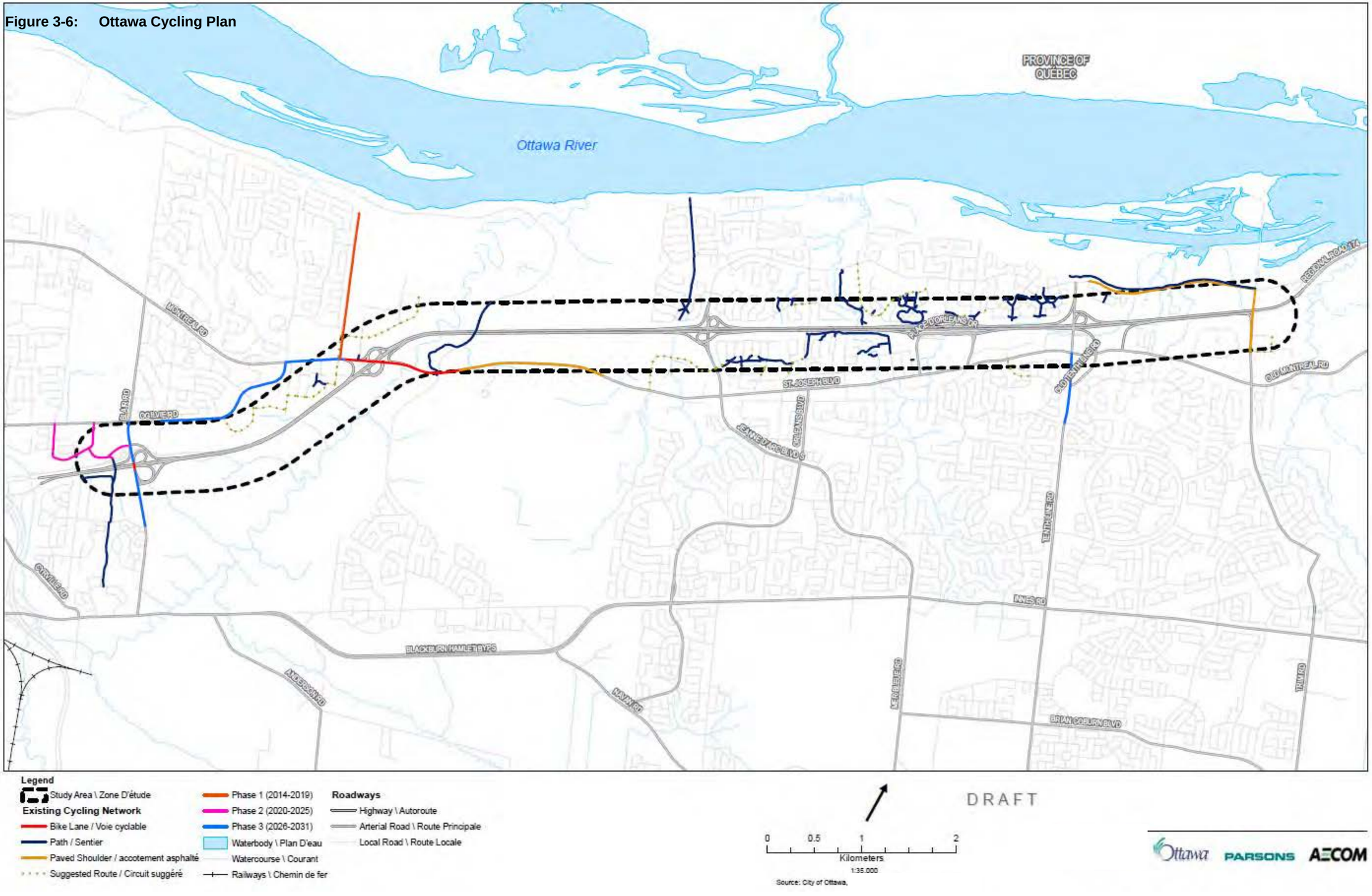


Figure 3-6: Ottawa Cycling Plan



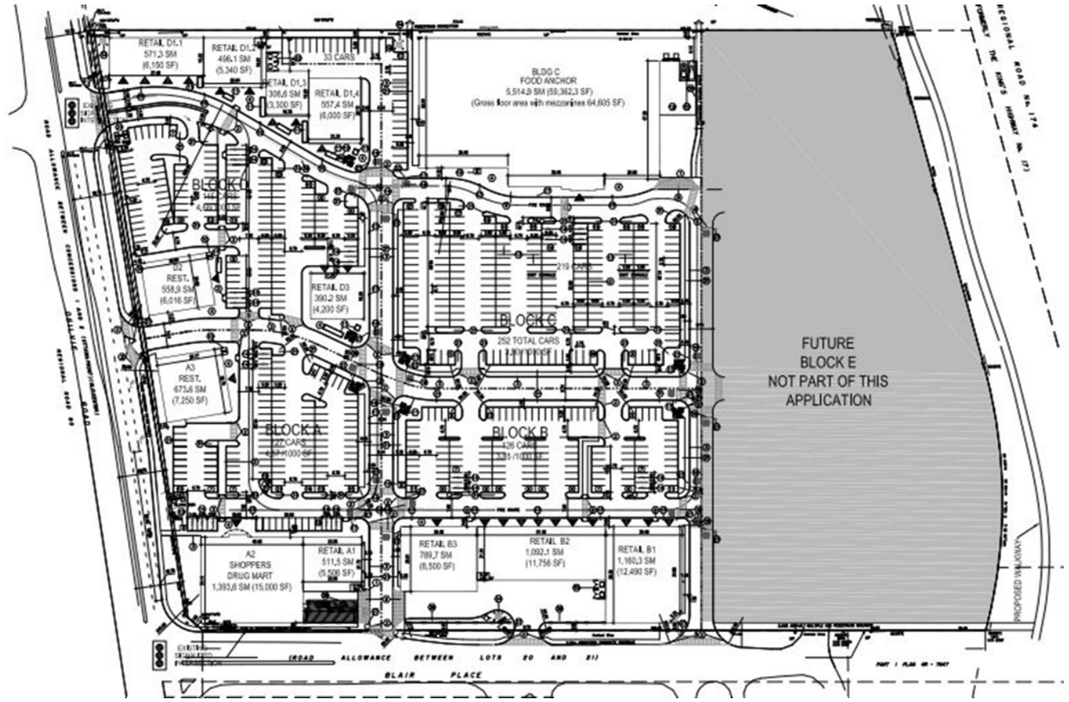
3.3 Development Projects within the Study Area or Nearby

Throughout the study area, there are development projects within and nearby that have been considered in the design and community integration of the ELRT. The status and design of each of these development opportunities are described in the following sections, and identified on Figure 3-9 on the subsequent page.

3.3.1 Blair Station to Green's Creek

There is one development site near the study area from Blair Station to Green's Creek: 2012 Ogilvie Road (Figure 3-7). The proposed redevelopment of this 7.8 ha site will occur in two phases. Phase 1, located in the northern portion of the parcel along Ogilvie Road, will consist of 155,000 ft^2 of retail space and has had a Site Plan Control application approved. Phase 2, which has not obtained approvals, will likely consist of up to 125,000 ft^2 of office and apartment space between Phase 1 and Highway 174. This development has been done with the Confederation Line to Blair Station in mind, and will incorporate connections to transit and pedestrian infrastructure.

Figure 3-7: 2012 Ogilvie Road

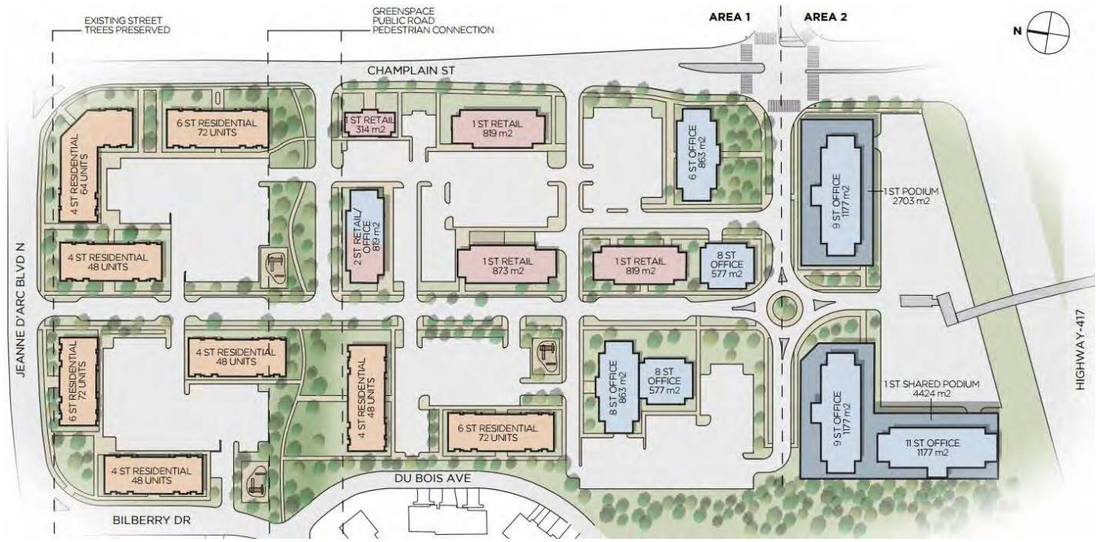


3.3.2 Green's Creek to Tenth Line

From Green's Creek to Jeanne d'Arc there are, at the time of writing, no proposed developments. However from Jeanne d'Arc to Tenth Line there are three sites near the study area at various stages of the development process: 850 Champlain Street, 241 Centrum Boulevard, and 315 Centrum Boulevard.

Minto Communities plans to develop 850 Champlain as per a draft approval of subdivision in place from 2014 (Figure 3-8). Strategically located near the Place d'Orléans transit hub, the concept plan shows approximately 472 residential units in the form of apartment buildings ranging from four to six storeys in height, with a linear park bisecting the 6.5 ha development site. The site will house up to 12 additional buildings of commercial and office space under the long term vision.

Figure 3-8: 850 Champlain Street



Approved in 2014, the development of 241 Centrum by DCR Phoenix (Figure 3-10) will take advantage of an east-west link for the central area via an extended Centrum Boulevard, as identified in the 2013 City of Ottawa Official Plan. The proposed 3.5 ha development will consist of 52 freehold town homes that will be connected to Centrum Blvd and St. Joseph Mainstreet via Eric Czapnik Way.

Neighbouring parcels to 315 Centrum have been redeveloped in recent years, and although no active application exists on the 0.3 ha site, it is fully serviced and ready for development.

Figure 3-9: Development Projects

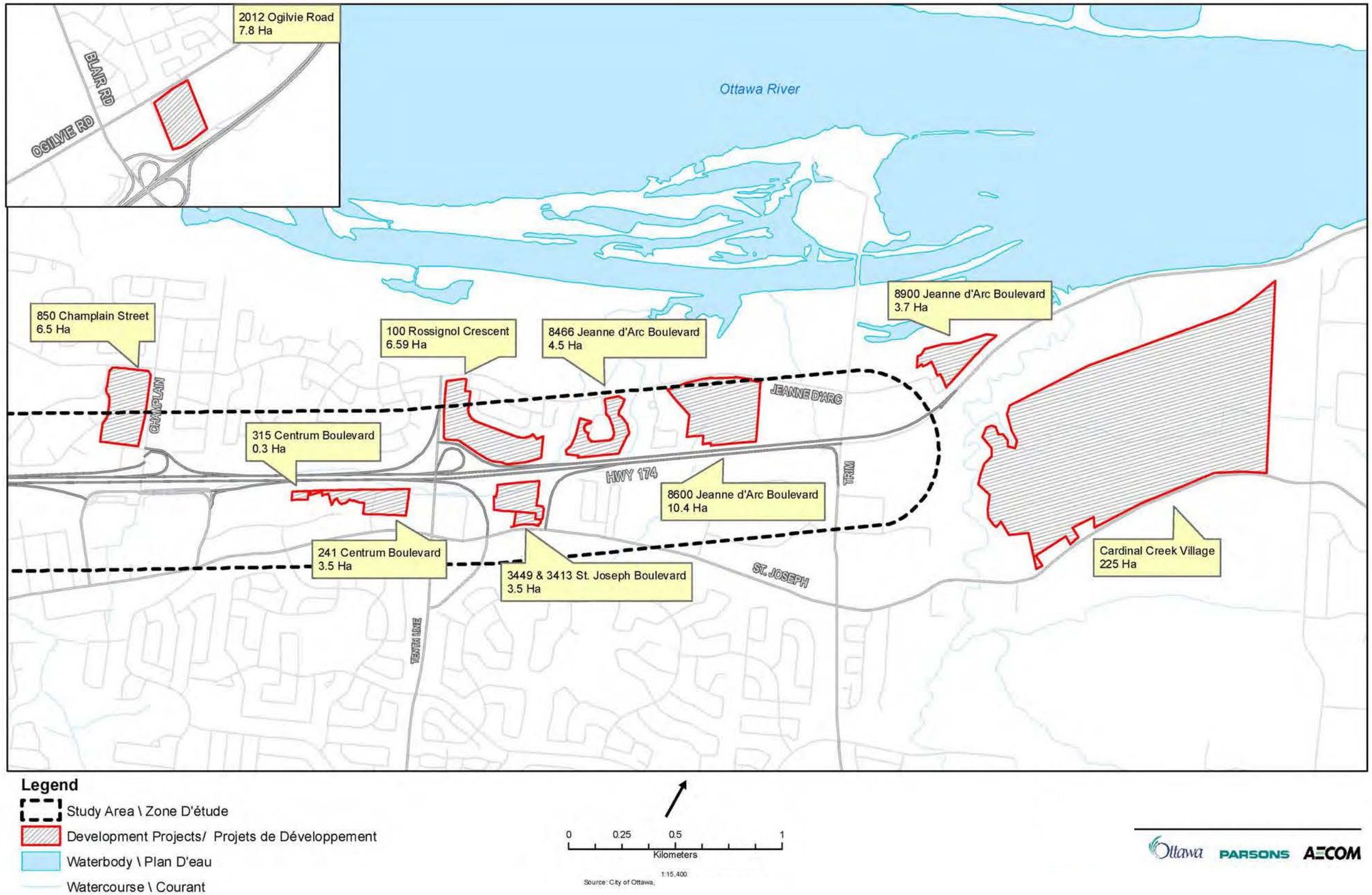


Figure 3-10: 241 Centrum Boulevard

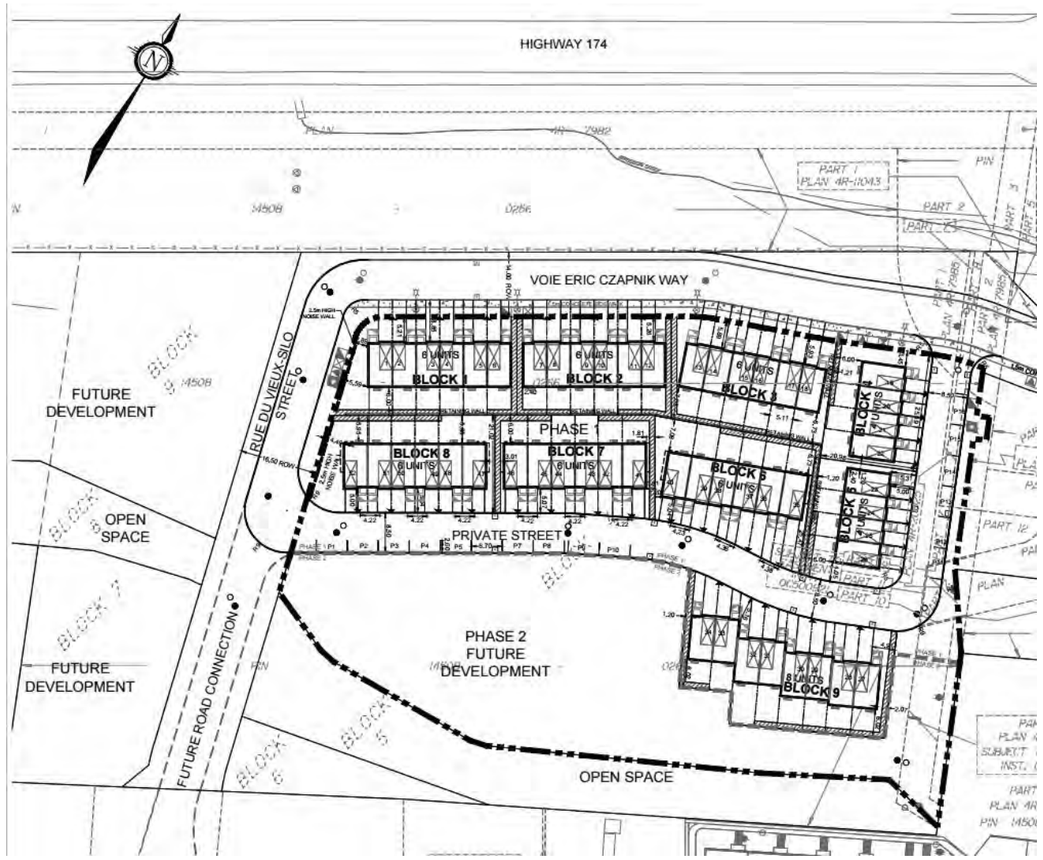
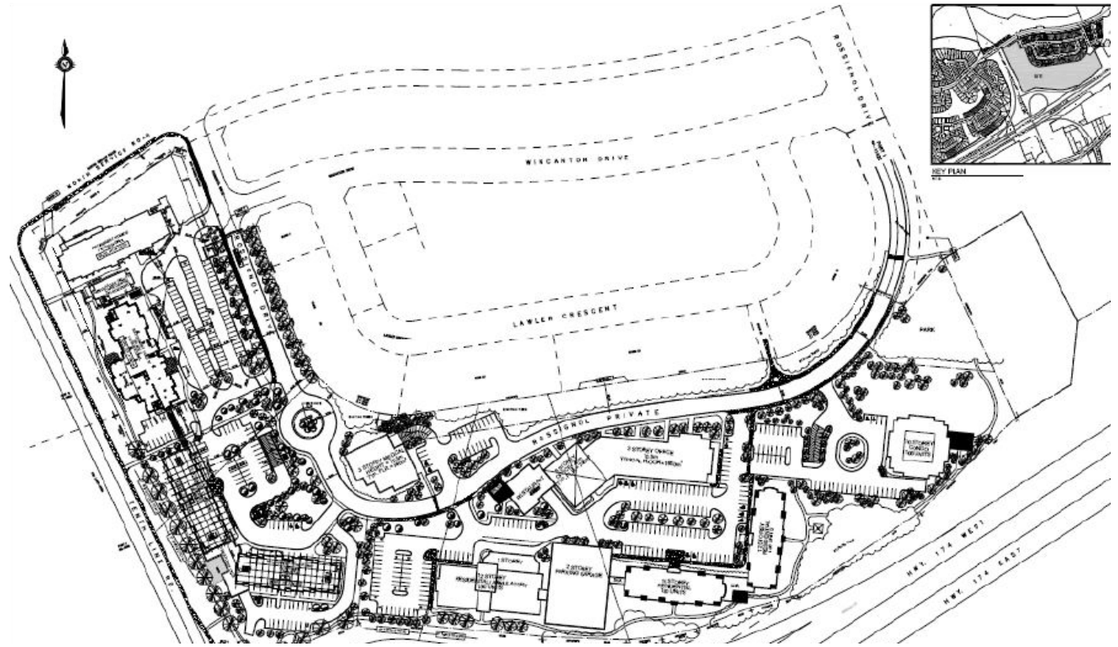


Figure 3-11: 100 Rossignol Crescent



3.3.3 Tenth Line to West of Trim Road

Further east, from Tenth Line to Trim Road, there are five development sites that have been included: 100 Rossignol Crescent, 3449 St. Joseph Boulevard, 3413 St. Joseph Boulevard, 8466 Jeanne d'Arc Boulevard North, and 8600 Jeanne d'Arc Boulevard North. These sites are in differing stages of development, but have potential for substantial medium-high density residential and office uses.

Ashcroft Homes is planning a potentially significant residential and employment development at 100 Rossignol Crescent, a 6.59 ha, densely wooded site bordered by a residential subdivision to the North (Figure 3-11). The northern corner of the site has already had a retirement residence built upon it, while the majority of the site remains vacant. The site plan for the site contains multiple apartment units, office space, commercial establishments, and a medical building. There are four major apartment buildings currently planned to be 10, 12, 12, and 14 storeys respectively. While no formal plan of subdivision is in place, the eventual development of this site is probable.

While no active application exists on 3449 or 3413 St. Joseph Boulevard, the owner Pro/Com Realty Corp procured the necessary minor variance in 2011 to construct up to two, 12 storey office buildings on the combined 3.5 ha site with gross floor areas over 20,000 square feet that would be a significant employment hub (Figure 3-12). Preliminary drawings include consideration for a future transit station east of Tenth Line Road. The owner of the property has indicated that upon approval of the ELRT, the planning process for the office towers will proceed.

There is currently an approved and partially registered plan of subdivision at 8466 Jeanne d'Arc, known as Prestige Circle, being built by Brigil Homes (Figure 3-13). This development will consist of 303 condominium units within nine buildings on a 4.5 ha site, integrated with parkland. Construction of this subdivision is underway.

Brigil Homes plans to develop 3600 Jeanne d'Arc Boulevard North into a high density residential/ office campus, west of La Cité Collégiale. However, this would require a new OP designation through the ongoing appeal of OPA 150. Until this designation is obtained, development on this 10.4 Ha site will not proceed.

Figure 3-12: 3449 & 3413 St. Joseph Boulevard

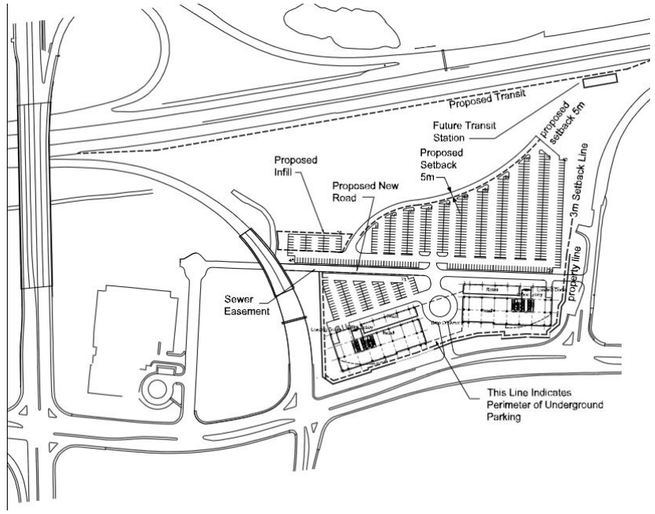
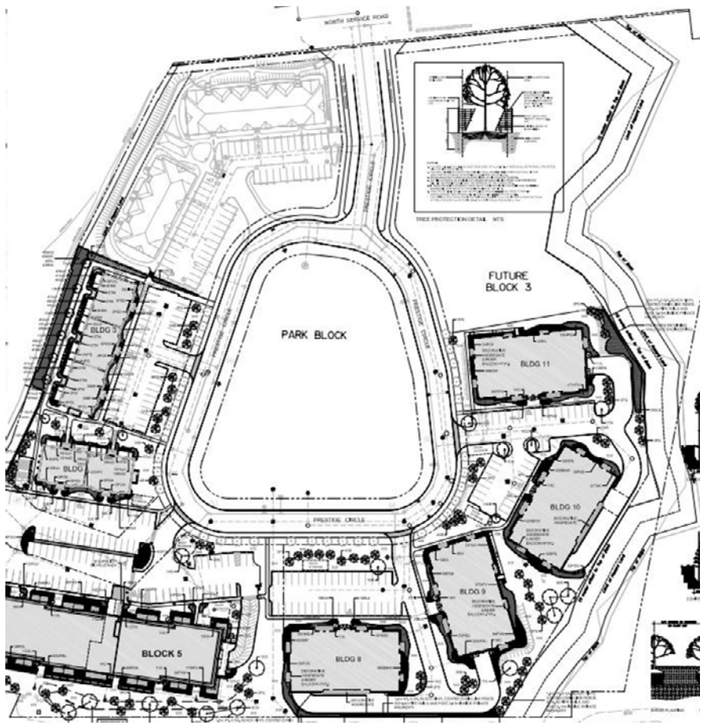


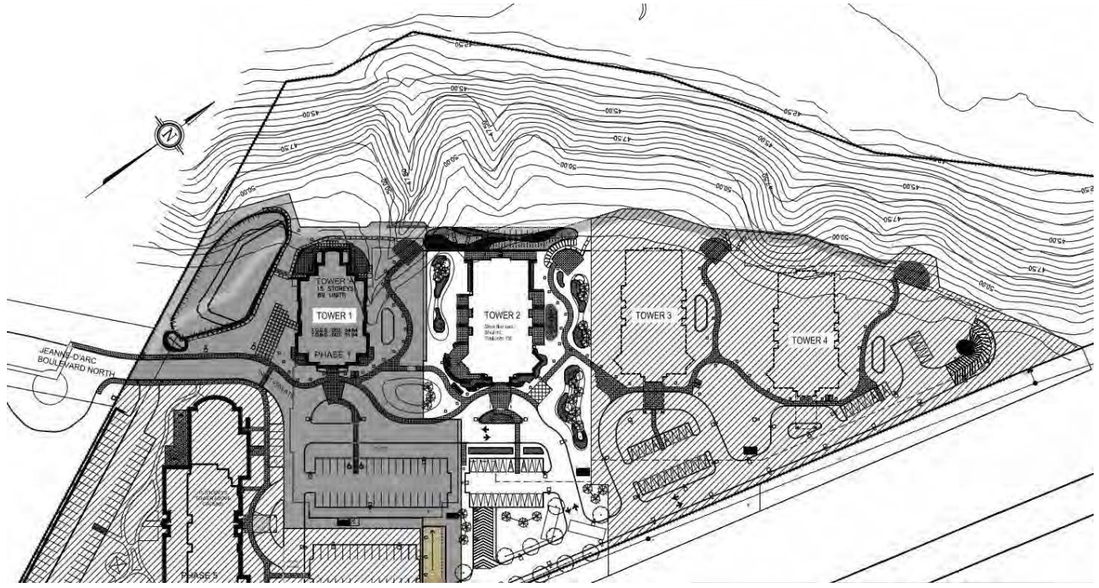
Figure 3-13: 8466 Jeanne d'Arc Boulevard (Prestige Circle)



3.3.4 Trim Road Vicinity

At the eastern limit of the urban boundary, at 8900 Jeanne d'Arc Boulevard North, there is an application from Brigil Homes to continue the development of Petrie Landing (Figure 3-14). There is currently one 15 storey condominium to the west of the site as part of Stage I. It is proposed to construct three additional towers on this 3.7 ha parcel, each measuring 16, 16, and 19 floors respectively, and 465 total units to complete Stage II. There is an active application for this development.

Figure 3-14: 8900 Jeanne d'Arc Boulevard North



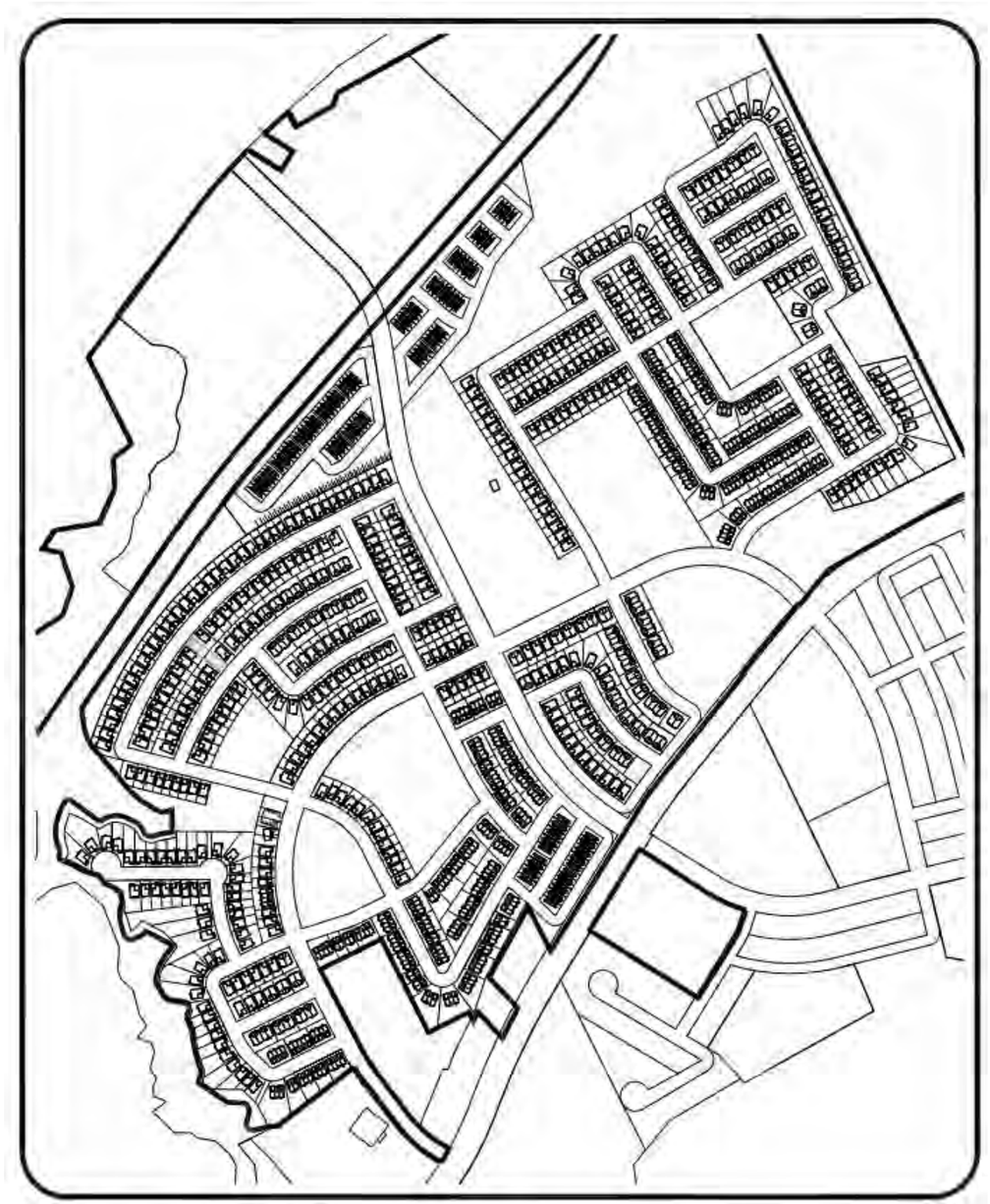
Within the City of Ottawa boundaries just east of the study area, Cardinal Creek Village is the project with the greatest potential effect on traffic growth within the OR174 corridor (Figure 3-15). The project is located just south of OR174, between Cardinal Creek and Frank Kenny Road to the east of Trim Road.

Cardinal Creek Village is a 225 ha development project currently undergoing an integrated planning and environmental assessment process, which will result in a new Secondary Plan and supporting Master Plans for both transportation and municipal services (water, sanitary, sewer). The new community, to be developed by Tamarack Homes, includes approximately 4,800 units, made up of approximately 55% single family homes, 10% apartments and 40% other multiple dwellings. The estimated population of this project is 13,000 residents. A 19 ha commercial site is also proposed at the intersection of OR174 and a new north/south collector road.

An amendment to the City of Ottawa Official Plan was made to include the Cardinal Creek Village within the city's urban area[1]. The project emphasizes its connection to the transit system with several options to link the village to transit service suggested.

[1] *1. Schedule R37 to Amendment No.76*

Figure 3-15: Cardinal Creek Village Concept



3.4 Heritage and Archaeological Resources

Golder Associates Ltd. completed an Archaeological Potential Report for the study area (Appendix A) as part of the OR174-CR 17 EA Study. The City of Ottawa Archaeological Master Plan, and the modified version presented here, only provide a general archaeological potential and a more detailed Stage 1 Archaeological Assessment will be required for specific construction sites within the study corridor once the final area of development has been identified. A detailed settlement history will be completed for properties to be affected once the final construction area has been identified.

Figure 3-16 displays the archaeological potential identified within the study area. Property within 200 m of the primary and secondary waterways is considered by the Ministry of Tourism Culture and Sport (MTCS) to possess archaeological potential.

The following figures further identify transportation routes and structures of historical significance. Not all structures present during the nineteenth century are displayed, but the figure does illustrate general locations documenting historic settlement patterns.

Areas of exclusion of archaeological potential would include anywhere archaeologically significant material cultural residues have been removed or significantly disturbed. Also, any property previously field tested by a licensed archaeologist where the corresponding report has been accepted by the MTCS would be excluded from requiring additional investigations.

3.4.1 Gloucester Township

Primary and secondary waterways within Gloucester Township include the Ottawa River, Greens Creek and Bilberry Creek and their associated tributaries. These waterways are considered to possess archaeological potential.

St. Joseph's Cemetery, located north of St. Joseph Boulevard within Lot 2, Concession 1 has been identified within the study area. This cemetery is well defined and the archaeological potential would be limited to the boundary of the cemetery.

No registered archaeological sites have been identified within the study area of Gloucester Township. However, 1367 St. Joseph Boulevard has been identified as the former location of Butler House and has been designated as a listed property under Part IV of the *Ontario Heritage Act*.

3.4.2 Cumberland Township

Waterways within Cumberland Township that have archaeological potential include the Ottawa River, Taylor Creek, and their associated tributaries. Although five registered archaeological sites were identified within Cumberland Township in the OR174 widening study area, none of these are located within the Eastern LRT corridor.

Additional lands recognized as containing archaeological potential have been identified from previous assessments and are reflected on the archaeological potential map.

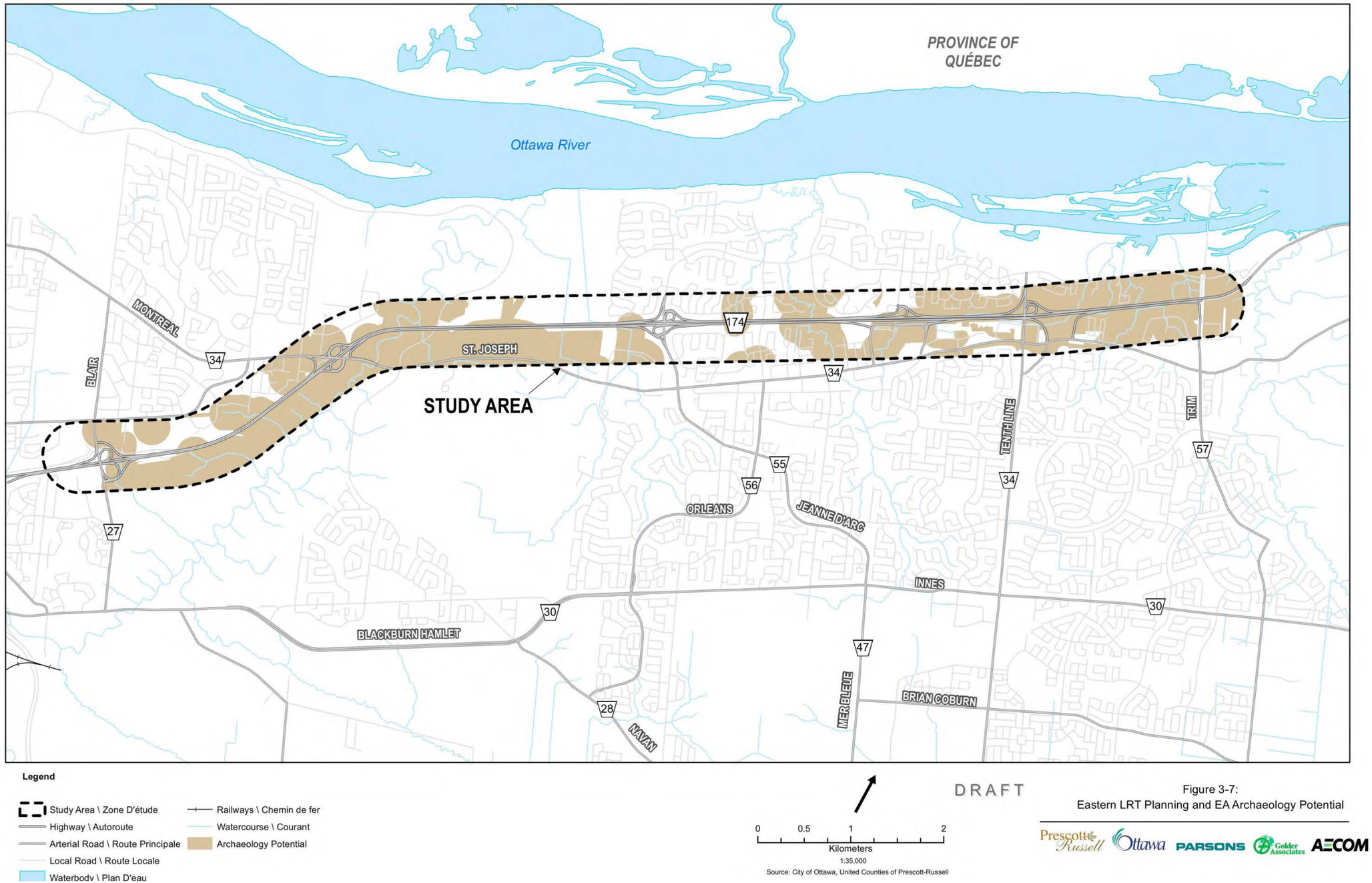


Figure 3-16: Archaeological Potential

3.5 Noise

The (MOECC, Ministry of Transportation (MTO) and the City of Ottawa have noise assessment guidelines for surface transportation and criteria to assess the living environment as it relates to Noise Sensitive Areas (NSAs). In the study area there are a number of NSAs. These include:

- Private homes
- Apartment complexes
- Agricultural properties
- Educational facilities and daycare centres, where there are Outdoor Living Areas (OLAs)
- Hotels/motels where there are OLAs for visitors

Typical noise level examples are outlined on Figure 3-17 below.

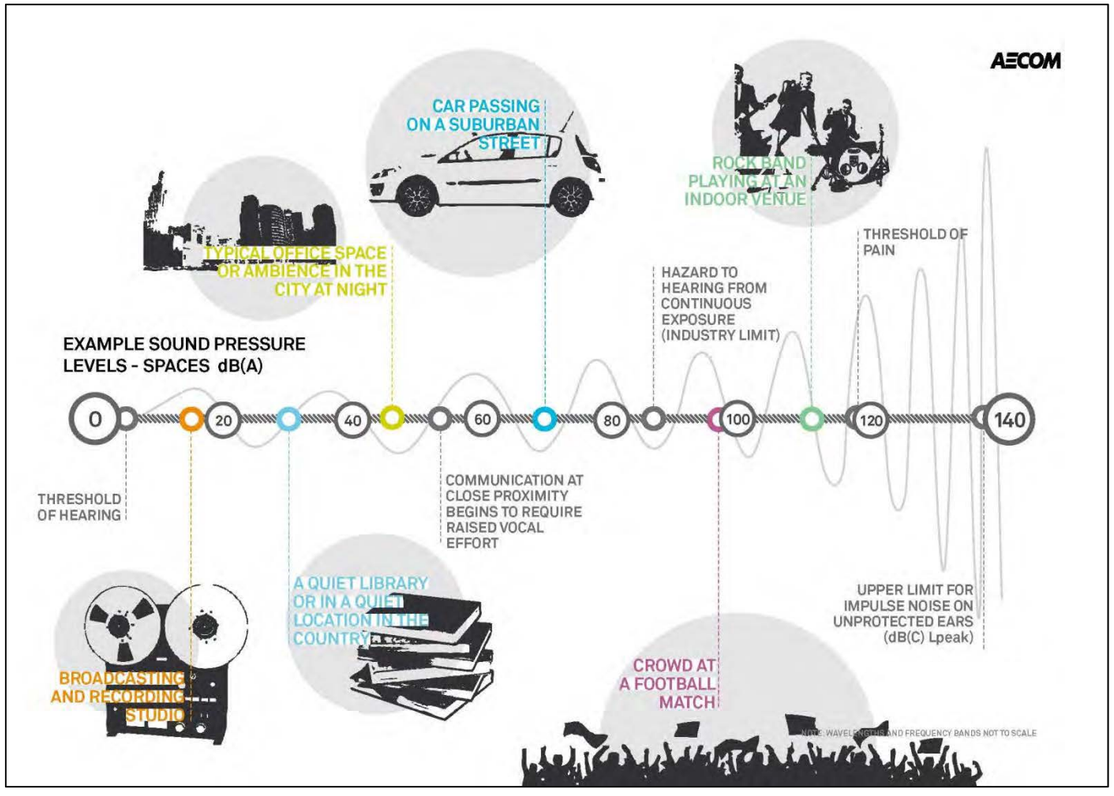


Figure 3-17: Typical Noise Levels

The acceptable outdoor noise level in a noise sensitive area is 55 dBA measured as an equivalent sound level (Leq) criterion, which applies to the day-time period from 07:00 to 23:00 (16 hours). Ottawa municipal noise mitigation guidelines suggest that where the future sound levels are expected to exceed Leq16hr 55 dBA and the increase in the sound levels above the established ambient exceeds 5 dBA, the City of Ottawa will investigate the feasibility of noise control measures within the right-of-way and will introduce appropriate measures such that, where feasible, a minimum attenuation (averaged over the first row of receivers) of 6 dBA can be achieved. Where existing conditions are in excess of 60 dBA, control measures (barriers) are investigated to reduce the Leq to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible.

Noise from road traffic, is the primary source being addressed within the scope of this study. In order to establish the general existing conditions for noise levels, STAMSON modelling predictions have been made at specified distances from major roadways based on an annual average daily traffic (AADT) flow of approximately 70,000 vehicles, smaller roadways with an AADT of approximately 20,000, and existing speeds of 100 km/h. The following table summarises the distance ranges from roadways for various noise levels (Table 3-2).

Table 3-2: Le_{q24hr} Noise Levels

Noise Level Range ($Le_{q,24hr}$)	Major Roadway	Minor Roadway
45 to 50 dB(A)	—	400 m or greater
50 to 55 dB(A)	420 m or greater	400 to 200 m
55 to 60 dB(A)	420 to 210 m	200 to 100 m
60 to 65 dB(A)	210 to 105 m	100 to 49 m
65 to 70 dB(A)	105 to 50 m	49 to 24 m
Greater than 70 dB(A)	Less than 50 m	Less than 24 m

The results of the overall noise level assessment show that without the LRT project, noise levels exceed the City of Ottawa 60 dBA threshold of noise mitigation investigation. This includes most residential sections located along the Highway 174 corridor (Figure 3-11). Existing noise control measures along OR174 include berms and walls along the OR174 right-of-way as depicted in these screenshots from Google Streetview. Retrofit noise walls have also been constructed due to the change in conditions since the residential areas were established. The existing noise barriers were not included in this analysis.

Photo: Noise Control Measures

3.6 Air Quality

Pollutants relevant to roads are: carbon monoxide, nitrogen dioxide, ozone, particulate matter, benzene, 1,3-butadiene, formaldehyde, acetaldehyde and acrolein. Table 3-3 presents the Provincial Ambient Air Quality Criteria (AAQC) and Canada-Wide Standards (CWS) as found in the *Environmental Guide for Air Quality Impacts and Greenhouse Gas Emissions*.

Table 3-3: Air Quality Criteria for Pollutant Relevant to Roads

Pollutant	Period	AAQC	CWS
Carbon monoxide (CO)	1 hour	30 ppm or 36200 µg/m^3	
	8 hours	13 ppm or 15700 µg/m^3	
Nitrogen dioxide (NO_2)	1 hour	200 ppb or 400 µg/m^3	
	24 hours	100 ppb or 200 µg/m^3	
PM10	24 hours	50 µg/m^3 (interim criterion)	
PM2.5	24 hours		30 µg/m^3 (98th percentile over 3 years)
Ozone	1 hour	80 ppb or 165 µg/m^3	
	8 hours		65 ppb or 127 µg/m^3 (4th highest over 3 years)
Benzene	24 hours	10 µg/m^3	
1,3-butadiene	24 hours	2.3 µg/m^3	
Formaldehyde	24 hours	65 µg/m^3	
Acetaldehyde	24 hours	500 µg/m^3	
Acrolein	24 hours	0.04 µg/m^3	
	1 hour	4.5 µg/m^3	

The MOECC has a network of air quality stations measuring air concentration of ozone (O_3), fine particulate matters (PM2.5), nitric oxide (NO), nitrogen dioxide (NO_2), nitrogen oxides (NO_X), carbon monoxide (CO) and sulphur dioxide (SO_2). Two air quality stations are in the Ottawa area: Ottawa Downtown and Ottawa Central.

- Measurements for the years 2008, 2009, and 2010 at the air quality stations in Ottawa indicate the concentration in ozone exceeded the criteria of 80 ppb a few times in 2008 and 2009. In 2010, the maximum concentration reached almost 94% of the criteria for the station in Ottawa downtown and 80% in Ottawa central
- Over the 2008 to 2010 period, the PM2.5 concentration exceeded the 30 µg/m3 on one occasion in 2010
- Measurements for the years 2008, 2009, and 2010 show the air concentration for NO_2 was always below the criterion, never exceeding 35% of the hourly air concentration criterion and 34% of the daily criterion
- Air concentrations measured for SO_2 and CO were always below the criteria in downtown Ottawa and in central Ottawa from 2008 to 2010, never exceeding 30% of the criteria

The National Capital Air Quality Mapping Pilot Project (www.ottawa.ca) is a unique air quality mapping project that combined air quality data from a satellite, with ground level air quality monitoring from the national network as well as mobile air quality labs to create maps of air pollution concentrations at 1 km resolution on an hourly basis. The project measured air quality for the Cities of Ottawa and Gatineau between July 1, 2007 and July 31, 2009. Six major pollutants were measured –NO_2, NO, NO_X, CO, O_3 and PM2.5.

The project indicated that air pollutants in the NCR were below the CWS 95 per cent of the time. Levels of air pollutants were also below the more-stringent World Health Organization standards 86 per cent of the time. Some other keys findings of the pilot project include:

- Major roadways and intersections do experience localized air quality readings that exceed standards under certain conditions – for example, on calm days with little wind and during the morning rush hour
- Due to prevailing winds, the eastern part of the region shows slightly higher concentrations of most air pollutants (about one per cent higher)
- Incidents with elevated levels of particulate matter are more frequent in downtown Ottawa, due to the high concentration and volume of fuel-combusting automobiles in the downtown core

Figure 3-18 to Figure 3-19 represent the monitoring results for December 20 2007 at 8:00 am.

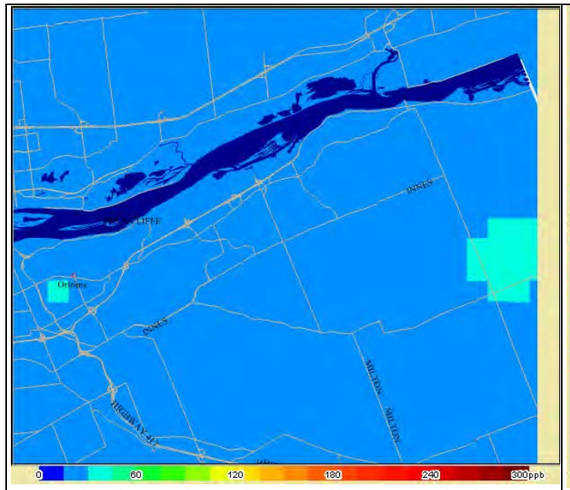


Figure 3-18: Nitrous Oxide (NO_X) Concentrations

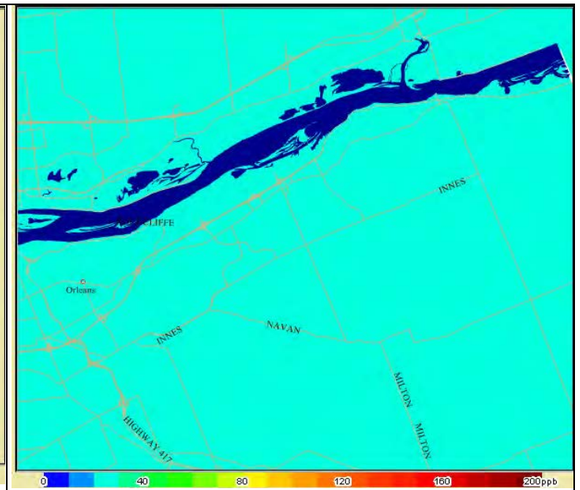


Figure 3-19: Nitrogen Dioxide (NO_2) Concentrations

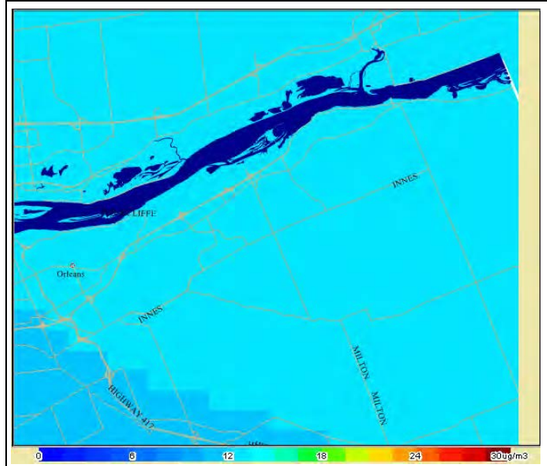


Figure 3-20: Ozone (O_3) Concentrations

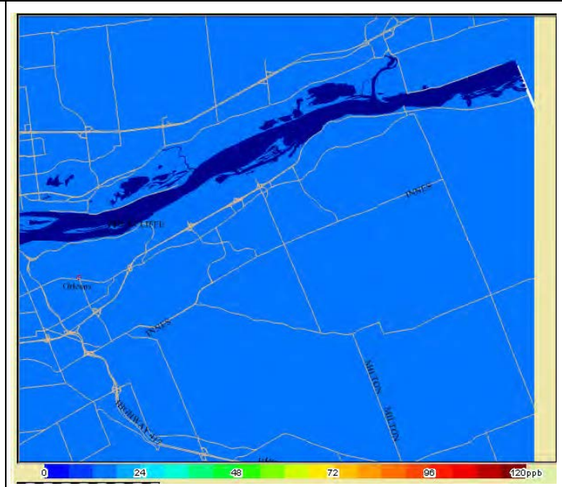


Figure 3-21: Particulate Matter (PM2.5) Concentrations

The Air Quality Index (AQI) is an indicator of air quality, based on air pollutants that have adverse effects on human health and the environment. The pollutants are ozone, fine particulate matter, nitrogen dioxide, carbon monoxide, sulphur dioxide and total reduced sulphur compounds.

Several state-of-the-art air monitoring stations, operated by the Ministry of Environment and Climate Change across the province, form the Air Quality Index (AQI) network. In 2014 Downtown Ottawa registered only one day with air quality levels in the poor category. This level may have adverse effects for sensitive members of human and animal populations, and may cause significant damage to vegetation and property. The remainder of the measurements were primarily in the good to very good range (http://www.airqualityontario.com/).

3.7 Views and Vistas

3.7.1 Information Collection Methodology

The collection of existing conditions data for views and vistas was undertaken using a combination of desktop and on-site review. Initially the site was reviewed using Google© 2012 Maps and City of Ottawa aerial photos. This virtual review allowed for an in-depth view of the corridor and allowed the identification of key points along the route.

Following the review, the study team landscape architect conducted an on-site review of the corridor. The visual assessment paid particular attention to visual conditions and vistas. A photo inventory was compiled of the corridor and adjacent areas to attain an appreciation for the existing conditions (Appendix B). Where physical constraints (i.e., 'no stopping' zones, and unsafe high speed zones) prevented the gathering of photos, images from Google© 2012 Street View were used.

3.7.2 Land Use and Density

The length of the corridor transitions through various levels of development ranging from higher density urban land use in the west at Blair Road to undeveloped Greenbelt to medium density suburban land use in Orléans. For the most part, positive views and vistas are present along the corridor. The number and character of the views are influenced by the degree of development.

3.7.3 Natural and Man-Made Features

Along the corridor there is little in the way of significant architecture or other man-made features that would be identified as focal points. However, the existing hydro transmission line and associated towers located along the south side of the route visually detracts from the positive views that are present.

The natural environment offers a wide range of significant features within, adjacent to, and at a distance that impact the experience of the user along the corridor. There are several natural watercourses that drain the lands along the south shore of the Ottawa River. Significant growths of existing vegetation are associated with the crossings. The Greenbelt offers views of the Green's Creek Core Natural Area as well as agricultural fields. Elsewhere trees line the right-of-way.

From the Trim Road intersection to just west of the Jeanne D'Arc Boulevard interchange, OR174 traverses a relatively flat section that lies between the Ottawa River to the north and an escarpment to the south. Along this section, the majority of existing views accessible from the roadway are restricted to the confines of the road right of way by existing vegetation buffers, berming, rock cut and the built environment, which flank the corridor. There are however, opportunities where the flanks open up to reveal distant views of natural elements that define the natural history of the area and add to the overall experience of the user. At various locations along the north side such openings expose distant views of the Gatineau Hills. At locations along the south side of the corridor are generous views of the escarpment that meanders through Orléans.

Further west, OR174 crosses the eastern end of the National Capital Greenbelt, a large contiguous natural corridor that encompasses the inner urban area of the City. The OR174 route through the Greenbelt is identified as a Capital Arrival and Scenic Entry corridor in Canada's Capital Greenbelt Master Plan Review, prepared for the NCC (Nov. 2013). In the Greenbelt, the motorist is treated to a broad and spectacular view of the Green's Creek Valley. The Green's Creek Valley/Greenbelt/OR174 crossing is the most significant node along the proposed ELRT route. The valley is diverse and picturesque adding a significant experience to the motorist's journey. Just east of Green's Creek the Sir George-Etienne Cartier Parkway (one of several federal parkways in the National Capital Region) crosses over OR174. Motorists heading east from Blair Road have significant views of the Greenbelt due to the location of the highway flanking the natural corridor and Green's Creek Valley.

The NCC Greenbelt Master Plan Review calls for improved visual identity at entrances to the Greenbelt. This project provides an opportunity to incorporate this identify to convey the significance of the Greenbelt to the user, resident and visitor alike.

3.7.4 Visual Barriers

Along the corridor are numerous instances where man-made and natural visual barriers exist as separations between the roadway and adjacent land uses. Between the split and Trim Road elements such as berms, plantings, existing topography, and sound attenuation barriers have been incorporated to add privacy for and to mitigate negative impacts of the road on adjacent residential areas. These barriers have served a dual purpose in some areas by screening unattractive ground plane features such as parking lots and building service zones.

While these are valuable features, they are not effective in all cases. There are a number of locations where the berms are not high enough, and/or plant material and walls are absent leaving the neighbouring residential areas exposed and negatively impacted by the road corridor. In the areas where the screening features are effectively incorporated, they add an aesthetic quality.

Photo 3-1: Existing Berming Shefford Park Industrial Area

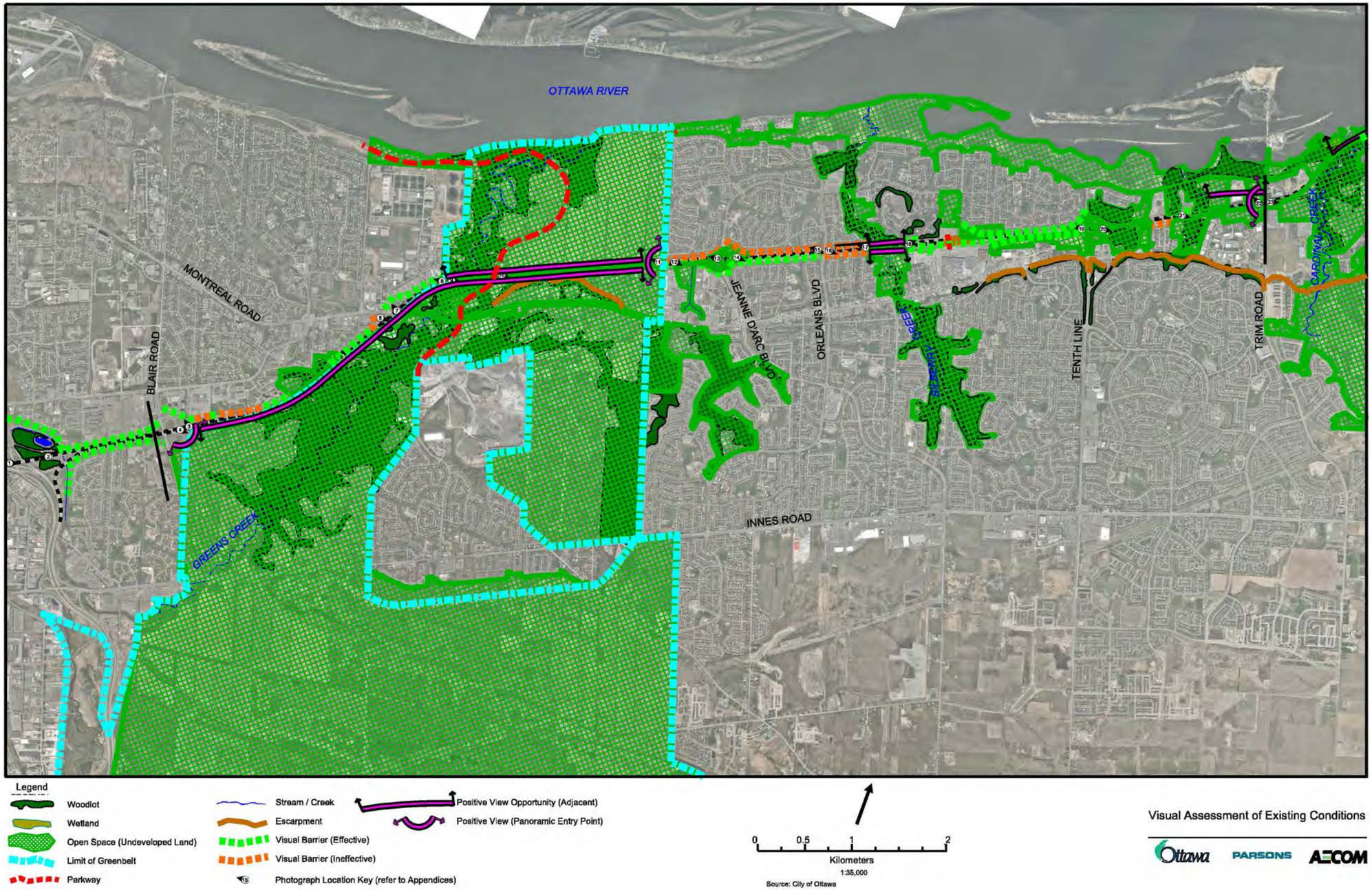
3.7.5 Opportunities and Constraints

Due to the controlled-access nature of the OR174 in the study area, there are no formal opportunities for users of the route to pull off the road to rest or pause to sample the scenery.

The City of Ottawa's Official Plan (OP) identifies this corridor as a major recreational pathway and scenic-entry route. The introduction of a separated multi-use pathway corridor would offer a safe environment for cyclists and pedestrians wishing to experience the area.

Visually, there are a few issues that presently impact both the roadway and the surrounding areas. The hydro corridor that parallels the road and the ineffective visual barriers are issues that could be mitigated through proper design (Figure 3-22).

Figure 3-22: Visual Assessment - Views and Vistas



4. Transportation

This section of the report contains existing condition information regarding road, transit, and pedestrian/cycling networks within the study area. Information was obtained from existing digital mapping, the City's Transportation Master Plan (TMP) schedules, transportation studies, land use reports and other available information related to and impacting the study area.

4.1 Road Network Overview

The transportation system serving the study corridor and surrounding areas includes a city freeway, a primary artery, and arterial and collectors roads. Roads are classified according to their function as outlined in Table 4-1.

Table 4-1: City of Ottawa Road Classifications

Classification	Primary Function	Secondary Function
City Freeway	Serve "through" travel between points not accessed directly from the road itself	None — direct access to adjacent lands is prohibited
Arterial Road	Serve travel through the city in conjunction with other roads.	Provide direct access to adjacent lands
Major Collector Road	Serve travel between collector and arterial roads	
Collector Road	Serve neighbourhood travel between local and major collector or arterial roads	
Local Road	Provide direct access to adjacent lands	Serve neighbourhood travel to and from collector or arterial roads

Sources: City of Ottawa Transportation Master Plan (2013)

A screenline is an imaginary or real boundary across which travel demand and supply issues may be evaluated. Typically physical barriers (rail lines/rivers/greenbelts) are used as screenlines since they tend to have limited numbers of physical crossing opportunities. As a result, people who travel also limit the number of times they cross through these screenlines during peak periods, providing transportation planners with a more realistic view of the demand for travel in an area. The existing screenlines within the study area include: Greens Creek, Bilberry Creek, and Frank Kenny screenlines, with the latter located just to the east of the study area. A map of the study area transportation network and the location of the key screenlines to be reviewed as part of subsequent analyses are presented in Figure 4-1.

4.1.1 Ottawa Road 174

Ottawa Road (OR) 174 extends west-east from Ontario Highway 417 to Canaan Road. OR174 is a city freeway from Highway 417 to 700 m east of Trim Road. In this section of freeway, the posted speed limit is 100 km/h. OR174 is a six lane divided freeway from Highway 417 to the Place d'Orléans interchange with three eastbound lanes and three westbound lanes. From Highway 417 to Blair Road all six lanes are available for general use. From Blair Road to Place d'Orléans, each direction has two lanes available for general use and one lane dedicated to transit use. From Place d'Orléans to Trim Road, OR174 is a four lane divided freeway with two lanes available in each direction.

Between Highway 417 and Trim Road, vehicles can access the OR174 at one signalized intersection (Trim Road) and at six interchanges: Highway 417 (MTO); Blair Road; Montreal Road; Jeanne D'Arc Boulevard; Place d'Orléans; and Tenth Line Road. OR174 is a two lane undivided arterial road from 700 metres east of Trim Road to the City of Ottawa limits.

4.1.2 Existing Arterial Road Network

Blair Road is a north-south arterial road from Montreal Road to Innes Road. North of Montreal Road, Blair Road continues as a collector road. Blair Road has a four-lane divided cross-section between Ogilvie Road and OR 174 and a four lane undivided cross-section south of OR 174. In this area, it has a posted speed limit of 70 km/h.

Montreal Road is an east-west arterial road. It extends from the Vanier Parkway in the west (where it continues as Rideau Street) to the OR174 in the east (where it continues as St. Joseph Boulevard). In the study area, Montreal Road has a four lane divided cross section with a posted speed limit of 60km/h.

St. Joseph Boulevard is an east-west arterial road. It is the continuation of Montreal Road to the east of the OR174. St. Joseph Boulevard extends from OR174 to Trim Road where it continues as Old Montreal Road. It has a four lane cross section from OR174 until 1 km west of Trim Road where it transitions into a two lane cross section. The posted speed limit is 60 km/h.

Jeanne d'Arc Boulevard is a curvilinear north-south road connecting Innes Road at Mer Bleue Road to OR 174. North of OR174, Jeanne d'Arc Boulevard North is an east-west major collector road that extends from OR174 to Trim Road. Jeanne d'Arc Boulevard south of OR174, has a four-lane divided cross section (four-lane undivided between the OR174 and St. Joseph Boulevard). The posted speed limit is 60 km/h.

Orléans Boulevard is an arterial road south of St. Joseph Boulevard; however, within the study area it is primarily a collector road.

Place d'Orléans Drive is an arterial that forms a loop around the Place d'Orléans Shopping Centre connecting St. Joseph Boulevard and Champlain Street. Place d'Orléans Drive has a four-lane divided cross section (undivided along the east side of the loop/shopping centre) and a posted speed limit of 60 km/h. **Champlain Street** is a north-south major collector that connects Place d'Orléans Shopping Centre to OR 174 and then continues northerly. Champlain Street has a four-lane divided cross section between Place d'Orléans Shopping Centre and the OR174 WB on/off ramps where it transitions to a two-lane undivided cross section.

Tenth Line Road is a north-south arterial. It extends from south of Navan Road to Jeanne d'Arc Boulevard North. It has a four-lane divided cross section from Jeanne d'Arc Boulevard N. to just south of Brian Coburn Boulevard, where it transitions to a two-lane undivided cross section. The posted speed limit is 60 km/h.

Trim Road is a north-south arterial road from OR 174 to the Village of Navan in the south. North of OR 174 Trim Road is a collector providing access to Petrie Island. Trim Road has a two lane undivided cross section north of OR174 with a posted speed limit of 50 km/h. Trim Road is under construction south of OR174 and is being widened to four-lanes and realigned to Innes Road. It has a posted speed limit of 70 km/h.

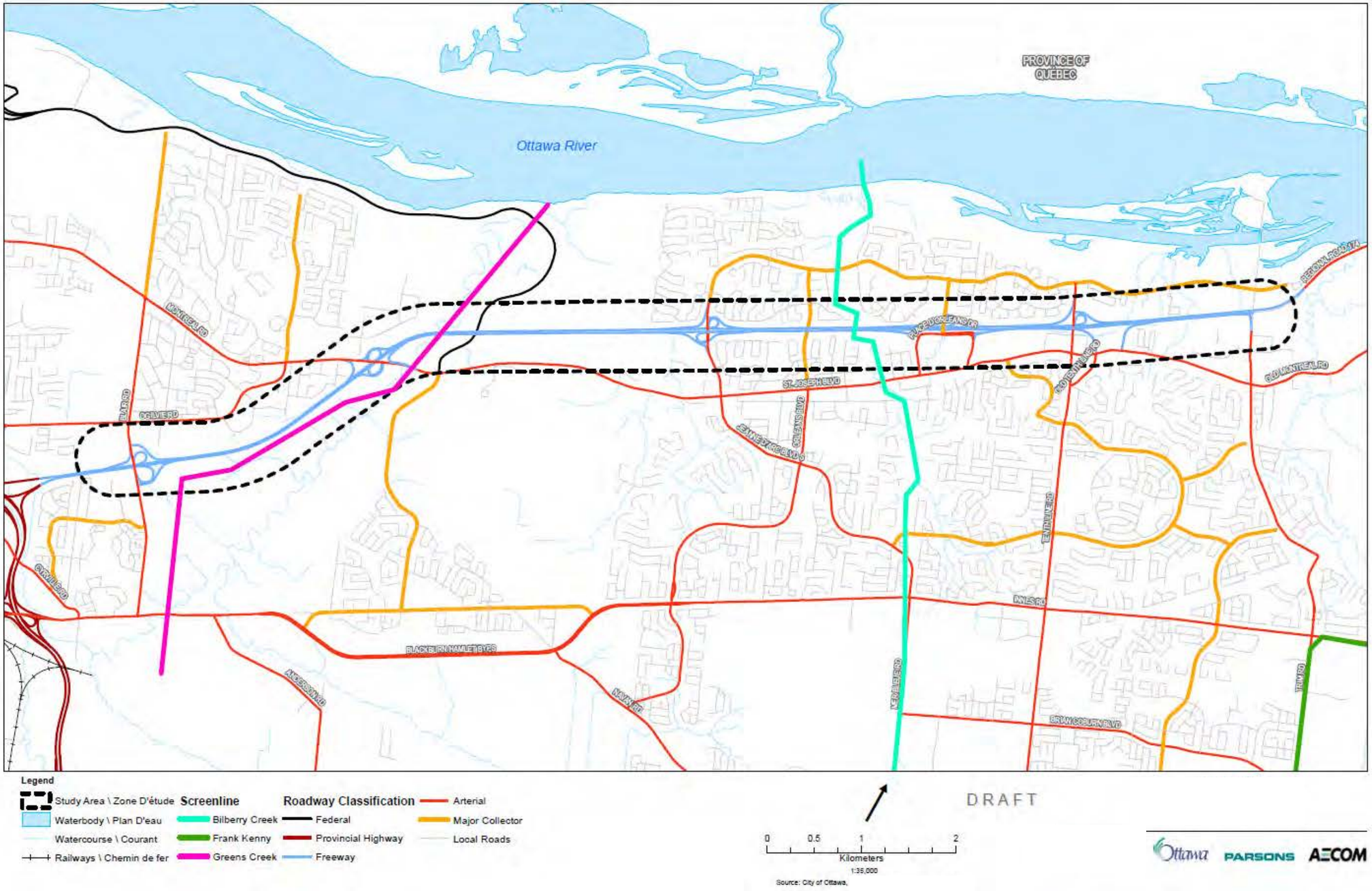


Figure 4-1: Study Area Transportation Network and Screenlines

4.1.3 Truck Routes

The City of Ottawa truck routes are shown in Figure 4-2. The City of Ottawa truck routes information was last updated in August 2014. OR174 forms part of both the Urban Truck Route and Rural Truck Route. The percentage of heavy vehicles on the OR174 corridor ranges between 2 and 5% based on daily traffic volumes. Seasonal load restrictions are in place on some roads in the study area.

4.1.4 Planned Road Improvements

OR174 Widening
According to the 2013 City of Ottawa TMP, the widening of the OR174 Corridor, from four lanes to six lanes between Highway 417 and Trim Road, is identified as a planned road project. The planned widening is needed to address local capacity, operational and safety issues.

The widening west of Blair Road has already been completed. In the eastbound direction, the on-ramp from Highway 417 was extended to join the off-ramp to Blair Road to provide additional space and time for drivers to complete the required lane changes through this stretch of the road. Similarly, in the westbound direction, the on-ramp from Blair Road was extended to join the off-ramp to Highway 417. The resulting cross section is six travel lanes, offering slightly improved operations (although the capacity implications are not significant).

The planned widening of OR174 between Blair Road and Trim Road is identified as a Network Concept in the 2013 TMP, with a widening of the OR174 corridor from two to four lanes between Trim Road and the city boundary also identified as a Network Concept.

Trim Road Widening / Frank Kenny
Construction of the widening of Trim Road to four lanes and its realignment south of Portobello to intersect with a realigned Frank Kenney Road at Innes Road began in 2013. This work is expected to be complete in 2015 and will extend from the North Service Road southerly to Brian Coburn Boulevard.

Intersection improvements form part of this project with the introduction of roundabouts for traffic control at Dairy Drive, St. Joseph Boulevard and at Innes Road. At the signalized intersection with OR 174, in addition to four through lanes on Trim Road, there will be double northbound left turn lanes and a southbound right turn lane. The design also calls for on-street cycling lanes and asphalt multi-use pathways behind the boulevard on both sides of Trim Road. As a Phase 2 of this project, widening of other area roads including St. Joseph Boulevard, Old Montreal Road and Frank Kenny Road will follow.

Highway 417 Widening
In 2007, a Transportation Environmental Study Report for 26 km of Highway 417 through Ottawa was provided for public review and subsequently received environmental clearance. The recommended plan included four lanes in each direction from the OR 174 interchange westerly to Metcalfe Street and three lanes in each direction from the split easterly to the new interchange at Hunt Club Road. In addition, the recommended plan modified the connection between OR 174, Highway 417 and St. Laurent Boulevard to improve flow in this area. Two lanes on OR 174 would continue onto Highway 417 while the third lane on OR 174 would exit to St. Laurent Boulevard and Highway 417 eastbound ramp. The existing ramp from westbound Highway 417 to St. Laurent Boulevard would be closed.

4.2 Observed Traffic Volumes

The existing peak hour traffic volumes on OR174 between Hwy 417 and Trim Road are shown in Figure 4-3.

In the peak direction, AM peak hour volumes westbound range between 2,000 veh/h east of Tenth Line Road and gradually increase to over 4,000 veh/h approaching the Split. PM peak hour volumes eastbound range between approximately 4,000 veh/h at the Split and gradually dissipate to less than 2,000 veh/h east of Tenth Line Road.

4.3 Operational Performance

A volume to capacity (v/c) ratio represents the capability of a road to accommodate the traffic demand. As the v/c ratio approaches 1.0, traffic flow is unstable and there is an increased possibility of delays and queuing. Once the v/c ratio exceeds 1.0, excessive delays and queues are expected.

The screenlines and capacities that were used to assess existing conditions are illustrated in Figure 4-4. The proportion of all motorized trips served by transit during peak traffic conditions is described as the modal split for transit. The existing modal split across the screenlines is also shown in Figure 4-4.

Existing link volume to capacity (v/c) ratios were determined for OR174, Montreal Road - St. Joseph Boulevard, Innes Road, Trim Road, and the Sir George Etienne Cartier Parkway. Directional capacities consistent with the City of Ottawa's TMP were assumed.

The directional capacities were expressed in passenger car units (pcus). Since buses and large trucks take up more space than cars, source traffic data were converted into passenger car equivalents by applying a factor of 2.0 to the heavy truck and bus component of the volume. The resulting v/c ratios for individual roadway links are shown in Figure 4-5 and Figure 4-6. It is noted that there are v/c ratio gaps along ***OR174***. These gaps generally occur near interchanges (complexities of merging and diverging of traffic).

4.3.1 AM Inbound

OR174 has a v/c ratio greater than 1.0 between the City limit and Trim Road. The v/c ratio improves at Trim Road where the number of inbound lanes (towards central Ottawa) increases from one to two. The v/c ratio approaches 1.0 between the Jeanne D'Arc interchange and Montreal Road interchange.

Other inbound road links with v/c ratios close to or exceeding 1.0 in the AM peak include the Sir George Étienne Cartier Parkway, as well as segments of Innes Road and St. Joseph Boulevard through the Greenbelt.

4.3.2 PM Outbound

OR174 has a v/c ratio greater than 1.0 between the Montreal Road interchange and the Jeanne D'Arc interchange. The v/c ratio improves to the east of Jeanne D'Arc. However, capacity is again exceeded on portions of the corridor to the east of Trim Road.

Other outbound road links with v/c ratios close to or exceeding 1.0 in the PM peak include the Sir George Étienne Cartier Parkway and Innes Road (west of of Tenth Line), as well as the segment of St. Joseph Boulevard through the Greenbelt.

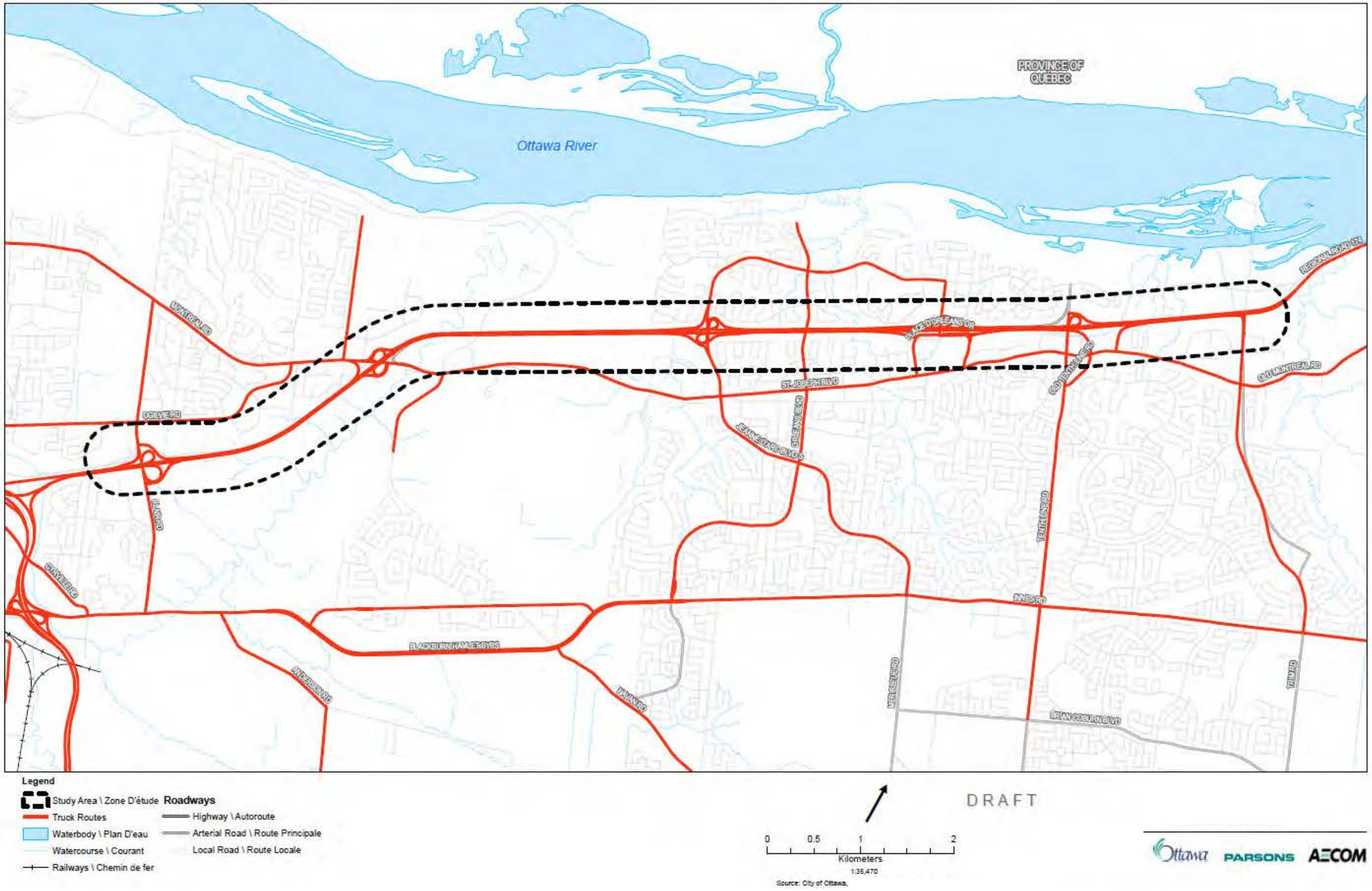


Figure 4-2: City of Ottawa Existing Truck Routes

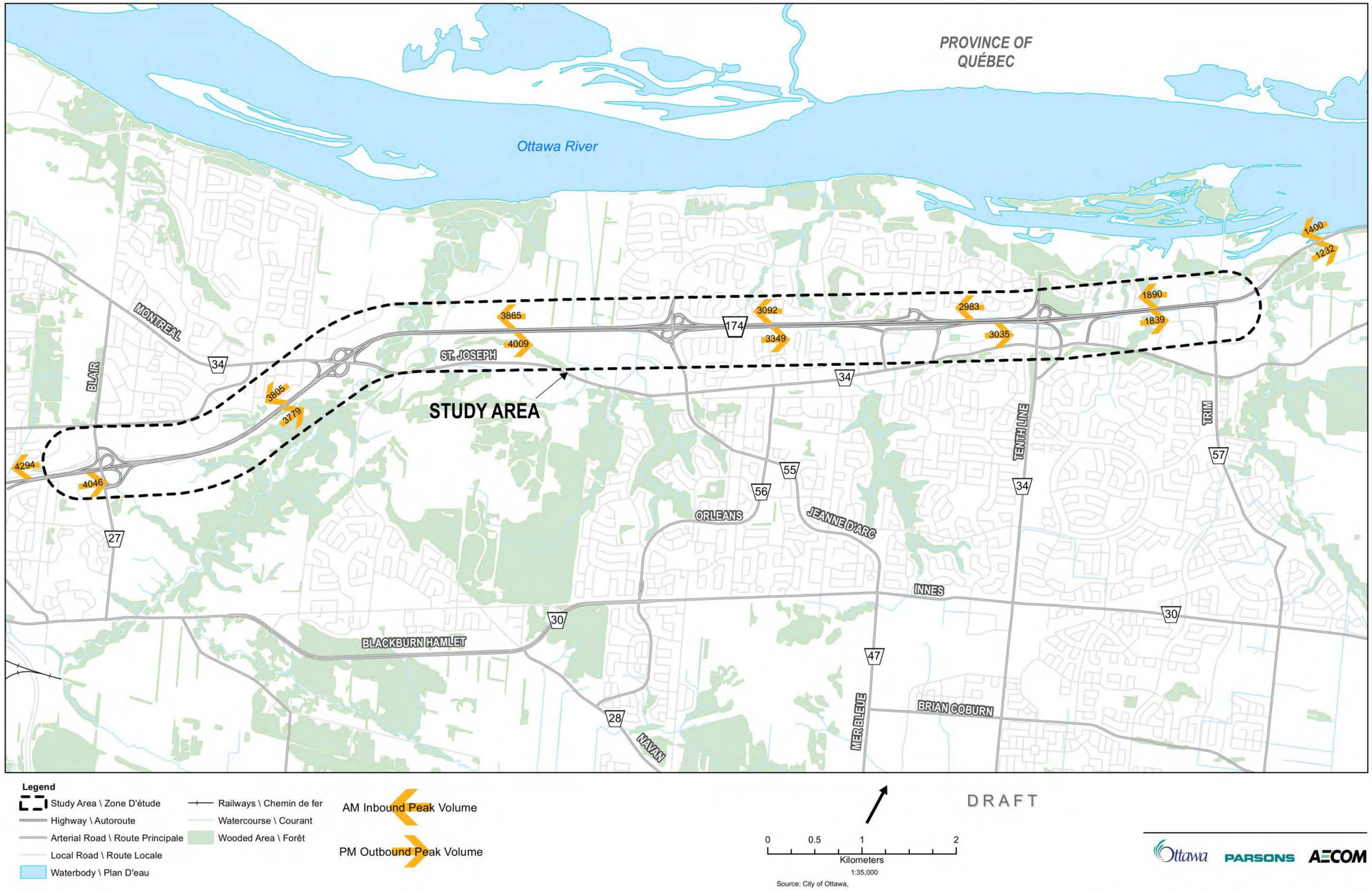


Figure 4-3: OR174 Traffic Volumes

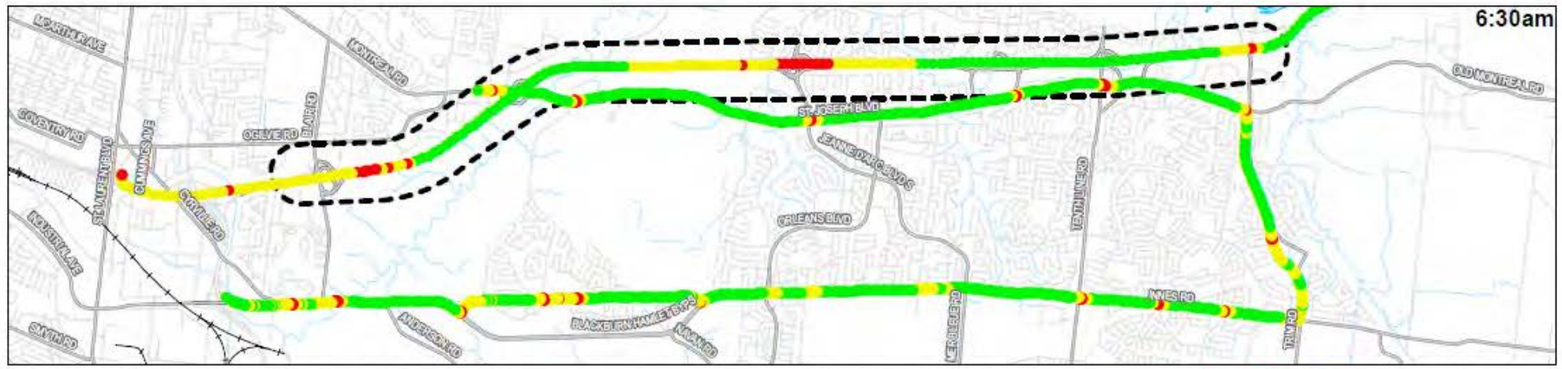


Figure 4-4: 2012 AM Inbound Screenlines, Assumed Capacities, and Modal Split

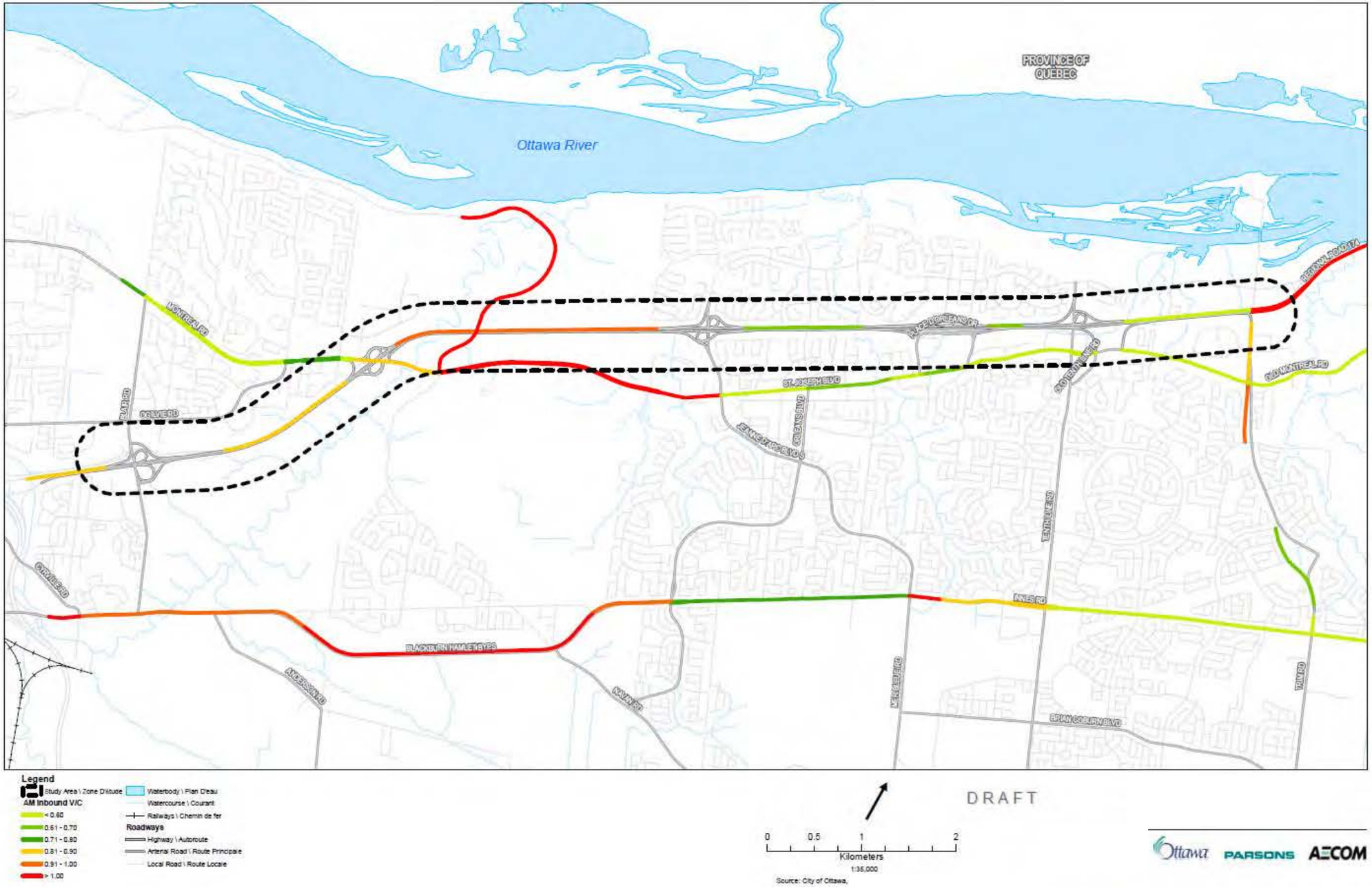


Figure 4-5: Volume to Capacity – AM Inbound

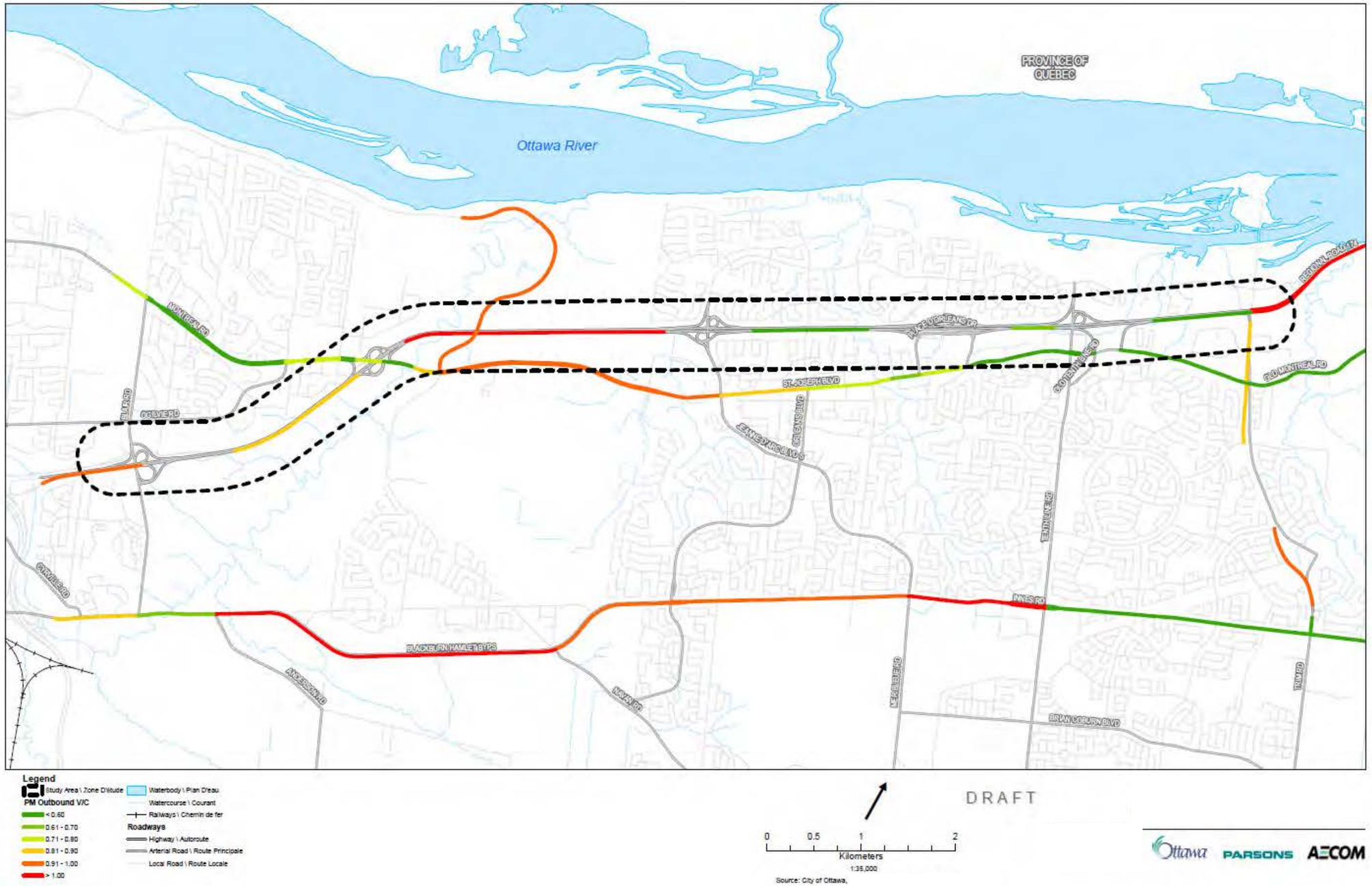


Figure 4-6: Volume to Capacity – PM Outbound

4.4 Observed Travel Times

Speed and travel time data was provided by the City of Ottawa, and was also gathered by the study team for the OR174 Corridor to reflect AM inbound and PM outbound conditions. Three trips in each period were selected to provide a general indication of the peak period speed and travel times conditions within the OR174 Corridor (Split to Trim) for general purpose travel. The team travelled at the prevailing speed of traffic.

For the AM inbound trips, route start times of 6:30 am, 7:15 am, and 8:00 am were selected. For the PM outbound trips, route start times of 3:30 pm, 4:00 pm, and 4:30 pm were selected.

From the data presented in Table 4 5, average speeds during the AM inbound and PM outbound peak periods are noted to be 15 km/h to 50 km/h lower than the posted speed limits.

Table 4-2: Speed and Travel Times

		OR174	
East Limit		Trim Road	
West Limit		Highway 417	
Distance (km)		13.7	
Posted Speed (km/h)		100	
Peak Period		AM	PM
Speed (km/h)	*Average**	64	76
	*Maximum**	>100	99
Travel Times	*6:30 am / 3:30 pm*	17m 52s	15m 03s
	7:15 am / 4:00 pm	16m 32s	15m 12s
	8:00 am / 4:30 pm	22m 31s	17m 52s

4.4.1 AM Inbound

In the freeway section of OR174 the average speed is 64 km/h with travel times between 16 minutes and 23 minutes. If traffic is flowing at the posted speed limit, it should take approximately 9 minutes to travel between Trim Road and Highway 417. The segment between Place d'Orléans and Jeanne D'Arc Boulevard has speeds lower than 60 km/h for most of the morning peak period. The segment between Montreal Road and Highway 417 has speeds lower than 60 km/h throughout the morning peak period.

4.4.2 PM Outbound

OR174 has an average speed of 76 km/h and travel times between 15 minutes and 18 minutes. It should take approximately 9 minutes to travel between Trim Road and Hwy 417, if traffic is flowing at the posted speed limit. The segment between the Highway 417 and Montreal Road experiences significant reductions in speed throughout the afternoon peak period. Speeds are generally exceed 80 km/h to the east of Montreal Road.

4.5 TRANS Simulated Performance

According to the TRANS regional model, the Greens Creek and Bilberry Creek screenlines are currently operating with volume to capacity (v/c) ratios in the inbound direction 1.08 and 0.77, based on the average AM peak period hourly demand.

In the future, assuming a do nothing scenario, the projected v/c ratios according to the TRANS model are 1.22 and 0.94. With the additional roadway capacity offered by the widening of the OR174 from 4 to 6 lanes west of Trim Road, the Greens Creek, Bilberry Creek screenlines are projected to be operating at v/c of 1.03 and 0.66, respectively, based on the average AM peak period hourly demand.

4.6 Transit Networks

4.6.1 Overview

The promotion of travel by transit, and the provision of the required infrastructure is a fundamental objective of all Official Plans of the City of Ottawa (and Regional Municipality of Ottawa-Carleton) since the early 1970s. A reflection of the success of the long-standing objective is the continuing and steady increase in annual ridership that has been achieved and which now totals approximately 94 million trips. This level of transit use translates into an annual figure of approximately 120 transit trips per capita for the City and has resulted in Ottawa having one of the highest per capita levels of ridership of any City its size in North America.

OC Transpo operates an integrated network of rapid, express and local transit routes that provide good public transit access and mobility within the urban area of the City of Ottawa (Figure 4-7). Additional peak period service is provided to destinations within the rural area of the City of Ottawa.

4.6.2 Rapid Transit Routes

The East Transitway runs parallel to Highway 417/OR174 as a dedicated bus-only roadway from Blair Road to downtown Ottawa. East of Blair Station, buses run in dedicated transit-only lanes within the OR174 corridor to Place d'Orléans Station, continuing on to the Trim Park and Ride Lot in mixed traffic. Rapid transit stations are provided at Blair Road, Montreal Road, Jeanne d'Arc Boulevard, Place d'Orléans and Trim Road.

Additional rapid transit services are provided to the south of the Study Area within the Innes Road corridor, with buses running in mixed traffic between Blair Station and the Millennium Park and Ride lot. Both main rapid transit routes (94 and 95) provide frequent all-day service.

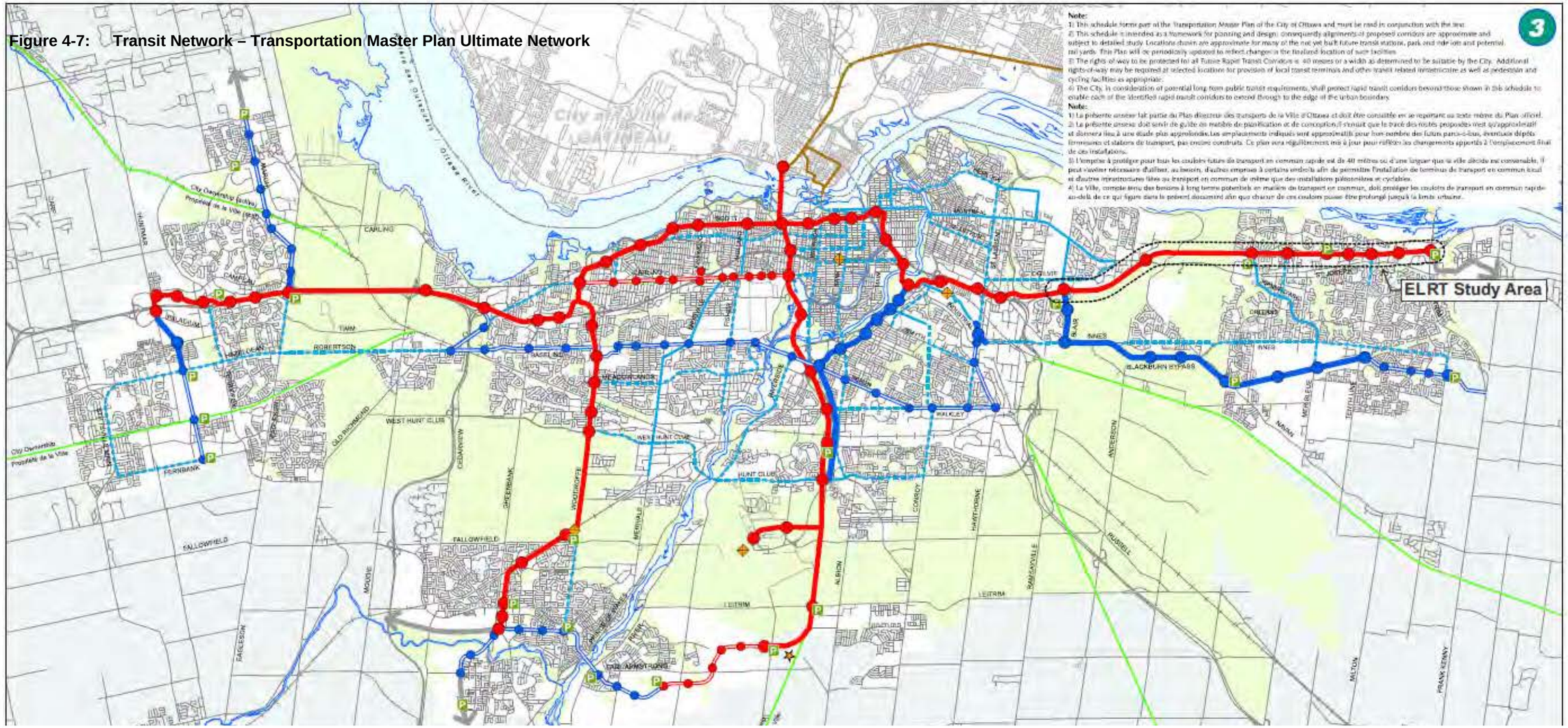
4.6.3 Express Transit Routes

OC Transpo operates a significant number of express bus routes within the OR174 widening study area. In general, these routes circulate as local routes through specific neighbourhoods before operating as express services via the Transitway, providing a "single seat" service between communities within the Orléans sector of the study area and downtown Ottawa. Express buses operate during the weekday peak periods only, inbound to downtown in the morning and outbound to Orléans in the afternoon. An additional fare is required to board express services.

4.6.4 Local Transit Routes

Local transit service within the study area is oriented to the Place d'Orléans Station, which serves a large regional shopping centre and provides connections to the rapid transit network. Local routes provide relatively frequent service during weekdays, with less frequent (or no service) during the evening and weekend periods.

Figure 4-7: Transit Network – Transportation Master Plan Ultimate Network



4.6.5 Transit Ridership

Based on analysis of recent (September, 2012) transit data, OC Transpo services in the OR174 corridor carry approximately 22,200 people per direction per day and 5,700 people per hour in the peak direction (PPHPD) during the weekday morning peak hour) along the East Transitway at Blair Station. West of Place d'Orléans Station, ridership is approximately 12 000 people per direction per day (4000 PPHPD during the weekday morning peak hour). West of Trim Road, ridership is 1500 people per direction per day (575 PPHPD during the weekday morning peak hour).

Within the Innes Road corridor, ridership is approximately 4100 people per direction per day (900 PPHPD during the morning peak hour).

4.6.6 Park and Ride

OC Transpo currently operates six park and ride facilities within the study area. These facilities provide more convenient access to transit for those who may not live in proximity to existing transit routes. Based on a license plate trace survey undertaken by OC Transpo staff, the majority of park and ride users reside within the City of Ottawa, with few people from outside the boundaries of the city using these facilities. The following is a summary of existing park and ride lots and activity within the study area.

- Blair (Telesat) consists of 20 permit parking spaces. This lot is less than 50% utilised on weekdays.
- Jeanne d'Arc consists of 60 permit parking spaces. This lot is approximately 60% utilised on weekdays.
- Place d'Orléans consists of 568 parking spaces made up of a combination of free and permit parking. This lot is close to 100% utilised on weekdays.
- Trim consists of 977 parking spaces (recently expanded from 688 spaces), made up of a combination of free and permit parking. This lot is approximately 80% utilised on weekdays.
- Millennium consists of 151 free parking spaces. This lot is approximately 10% utilised on weekdays.
- Cumberland consists of 70 free parking spaces. The current utilisation of this lot is unknown but is considered to be well under capacity.

4.6.7 Planned Transit Improvements

In terms of short-term improvements, OC Transpo is in the process of deploying new high capacity double decker buses on direct-to-downtown express routes. As new buses are added to the fleet, schedules for the peak periods will be readjusted to reduce the number of trips due to the higher capacity of these vehicles. As double decker buses replace articulated buses on express routes, the displaced articulated buses will be reassigned to other routes to replace existing standard (12 m) buses. OC Transpo will continue to make seasonal adjustments based on ridership levels to match transit service to demand.

With respect to longer-term improvements, the City of Ottawa's Transportation Master Plan (TMP) identifies a network of bus and rail-based rapid transit lines which are required to support growth out to the current 2031 planning horizon. A cornerstone of the current TMP is the conversion of the main east-west Transitway spine within the inner urban area from a bus rapid transit (BRT) system to a light rail transit (LRT) system. This conversion is based primarily on the need to significantly expand rapid transit capacity through downtown Ottawa. Expected to commence service in 2018, the first stage of Ottawa's LRT network (the Confederation LIne) will run west from Blair Station to Tunney's Pasture Station. As part of this conversion, all OC Transpo services currently originating in Orléans and travelling to downtown will terminate at Blair Station, with passengers transferring to LRT to continue their journeys. As described above, extension of the Confederation Line east of Blair Station is included in the 2031 Ultimate Network Plan.

To the south of the study area, the Cumberland Transitway is identified as a primary BRT facility, providing rapid transit parallel to the Innes Road corridor between Millennium Park and Ride and Blair Station. This facility will be constructed in stages, with the first portion (between Blair Station and Chapel Hill/ Navan Park and Ride) to open between 2020-2025 and the remainder of the corridor between 2025-2031.

4.6.8 Clarence-Rockland Transit

Clarence Rockland Transpo (CRT) operates two bus routes (No. 530 and 535) which connect the City of Clarence-Rockland with downtown Ottawa, with some services continuing on to Gatineau. These routes are commuter-oriented express services, operating inbound to Ottawa/Gatineau in the morning and outbound to Clarence-Rockland in the afternoon. Both routes serve existing Transitway stations along their routes, enabling connections with the OC Transpo network. Only Route 530 serves the study area, using OR174 and the Transitway to travel between Clarence-Rockland and Ottawa.

Currently, 11 daily trips are provided on Route 530, with an average daily ridership of 355 people using the service (per direction).There are no service changes or new transit infrastructure being considered by CRT. Once the East LRT project is completed, CRT services will need to be altered to either terminate at Blair Station or continue on to downtown Ottawa via an alternate route (e.g. Highway 417) as the Transitway will no longer be available to buses.

4.7 Pedestrian Network

The Ottawa Pedestrian Plan (OPP 2013) aims to make walking year-round a viable, comfortable and realistic means of travel and an integral part of the transportation system in Ottawa. To achieve its vision, it provides guidelines for improvements, including the completion of connections along and across arterials and the provision of connectivity to key community destinations and transit facilities. The OPP 2013 sets targets for increased levels of pedestrian activity in 2031, notably an increase in the city-wide walking mode share during the morning peak period, from 9.5% in 2011 to 10.0% in 2031, and similar or higher targets for internal walking trips within various sub- areas of Ottawa.

Table 4-3: Pedestrian Modal Share Targets (OPP 2013)

Exhibit E.1 Modal Share and Person-Trip Volumes: 2011 Observations and 2031 Targets (Morning Peak Period)					
Travel mode	Modal share		Person-trips		Growth
	2011	2031	2011	2031	
Walking	9.5%	10.0%	43,200	60,100	39%

Exhibit E.2 Walking Modal Shares for Internal Trips: 2011Observations and 2031 Targets						
	Inner Area	Inner Suburbs	Orléans	Riverside South/ Leitrim	Barhaven	Kanata/ Stittsville
2011	51%	14%	19%	18%	23%	22%
2031	52%	16%	20%	21%	24%	23%

Walkability around OR174 is higher in areas with urban development (Gloucester Centre and Orléans), with a walkability gap in the Greenbelt and in the immediate vicinity of OR174 where it forms a barrier to pedestrian movement. No pedestrians can access OR174 between Hwy 417 and Trim Road except along adjacent multi-use pathways.

4.7.1 Planned Pedestrian Infrastructure

No proposed sidewalks or affordable multi-use pathways structures between the Split and Trim Road were identified in the Proposed Pedestrian Network Projects.

4.8 Cycling Network

The City of Ottawa's Cycling Plan(OCP 2013) sets out a vision to make the capital a premiere example of sustainable transportation through a visible and connected cycling network. Currently, there are no bike facilities along OR174 within the Ottawa City limits. However, several paths do cross OR174:

- *Beacon Hill:* one City-Owned Pathway crossing west of the Blair interchange, a shared use lane crosses at Blair and a bicycle lane crosses at the Montreal Road interchange
- *Greenbelt:* NCC-Owned Capital Pathway crosses OR174
- *Orléans*: shared use lane crosses OR174 at Orléans Boulevard (on the overpass), while a few City-owned pathways are located in the vicinity of OR174 on both sides but do not cross it

When considering all person-trips (during a typical fall work-day morning peak period), the city-wide cycling mode share target for 2031 is 8% for trips originating within the Greenbelt and 5% city-wide.

Table 4-4: Cycling Modal Share (OCP 2013)

Exhibit 3.2 – Actual (2011) and Target (2031) Cycling Mode Shares for Internal Trips by Area (morning peak period)

Area	2011	2031
Inner Area	8%	12%
Inner Suburbs	3%	6%
Orléans	2%	3%
Riverside South/Leitrim	0%	3%
South Nepean	2%	4%
Kanata/Stittsville	1%	4%

4.8.1 Planned Cycling Infrastructure

There is new infrastructure identified in the OCP in the vicinity of / connecting to the study area:

- Multi-use pathway between Shefford Road Pathway - Montreal Road to the Ottawa River Pathway (Phase 1);
- Multi-use pathway along City Park Drive with access to Blair Station (Phase 2);
- Multi-use pathway along Tenth Line Road from St. Josephs Boulevard to Innes Road (Phase 3);
- Segregated bike facility Montreal Road/Ogilvie Road from Blair to Highway 417 (Phase 3); and
- Bike lanes along Blair Road from Ogilvie to Meadowbrook across Highway 417 (Phase 3).

4.9 Rail Network

There are no active railway facilities that pass through the study area.

5. Infrastructure and Utilities

5.1 Infrastructure

5.1.1 Water Services

Major watermains supply large population sectors within the study area. The following watermains are either considered backbone pipes or large diameter watermains:

- 1220 mm diameter watermain on the south side of Highway 417/OR174 from St-Laurent Boulevard to St-Joseph Boulevard
- 610 mm to 406 mm diameter watermain crossing OR174 west of Blair Road
- 406 mm diameter watermain crossing OR174 from the south end of Shefford Road at East Acres Road to the 1220 mm diameter watermain on the south side of OR174
- 406 mm diameter watermain crossing OR174 east of Orléans Blvd.
- 406 mm diameter watermain crossing OR174 on the east side of Place d'Orléans Drive (west leg, i.e. near the eastbound ramp terminal intersection) and crossing under the park and ride lot north of OR174 and west of Champlain Street
- 406 mm diameter watermain crossing OR174 in easement about 350m east of Trim Road

The City of Ottawa is proposing a new feedermain along the OR174. The feedermain begins on Youville Drive located south of OR174 and crosses to the north side of OR174 approximately 500 m west of Jeanne D'Arc Blvd. The feedermain continues westward on the north side of OR174, where it will exit the OR174 and follow the westbound off ramp to Montreal Road. It will then head west on Montreal Road. The feedermain varies in diameter from 610 mm to 762 mm.

Another feedermain is proposed to be installed approximately 490 m from OR174/Montreal Road. The feedermain will cross the OR174 entire ROW and head toward Shefford Road. It will also run parallel to the existing 406 mm diameter watermain noted above – 610 mm diameter.

5.1.2 Sanitary Sewer System

There are two major sanitary sewer constraints within the OR174 corridor from Trim Road westerly to the Highway 417 / OR174 interchange: the South Ottawa Collector and the Green's Creek Collector. These two collector sewers flow northward to the R.O. Pickard Environmental Centre (wastewater treatment plant) and are described as follows:

- Crossing OR174 on a 45 degree angle, 565 m from Montreal Road then running along the eastbound lanes of OR174 (this collector is within the OR174 corridor for 713 m) – 3000 mm diameter (South Ottawa Collector)
- Crossing OR174 on a 45 degree angle 684 m from Montreal Road then running along the eastbound lanes of OR174 (this sanitary sewer, parallel to the South Ottawa Collector, is within the OR174 corridor for a total length of 823 m) – 1650 mm diameter (Green's Creek Collector)

Additionally, the following sanitary sewers are all major collectors, 450 mm diameter or larger:

- Crossing OR174, 200 m west of Trim Road – 825 mm diameter
- Crossing OR174, 60 m west of Tenth Line Road – 200 mm diameter
- Crossing OR174, 118 m west of Tenth Line Road – 750 mm diameter
- Crossing OR174, 524 m west of Tenth Line Road – 525 mm diameter
- Crossing OR174, 272 m east of Champlain Street – 450 mm diameter
- Flowing parallel to Orléans Blvd. east side. Crosses Orléans Blvd structure east to west underneath the eastbound lane then crosses the OR174, 25 m west of Orléans Boulevard. – 750 mm to 900 mm diameter
- Located south of OR174, 31 m west of Orléans Boulevard structure, connected to the 900 mm diameter previously noted – 600 mm diameter
- Crossing OR174, 626 m west of Jeanne D'Arc – 900 mm diameter
- Crossing OR174 1268 m west of Montreal Road and connecting to the Green's Creek Collector,– 525 mm diameter
- Crossing OR174, 354 m west of Blair Road – 1200 mm diameter

5.1.3 Storm Sewer System

The storm sewer systems along the OR174 corridor include sewers, catchbasins, leads, trunk sewers, collector, maintenance holes/ chambers, catch basins and stormwater management facilities (SWMFs). There are a number of large diameter storm sewers crossing OR174. Storm sewers 600 mm in diameter or larger are identified in Table 5-1.

Table 5-1: Storm Sewer Crossings of OR174

Subwatershed	Diameter (mm)	Length (m)	Material	Year Installed	Function
Green's Creek d/s Reach	Unknown	100	Reinforced Concrete	1983	Outfall
Bilberry Creek	3600	126	Corrugated Steel	1975, 2012	Bilberry West Collector
	1800	52	Concrete	1975,1980	Trunk
	900, 1050, 1350	395	Concrete	Unknown	Highway Drainage
Taylor Creek	1650	160	Concrete	1989	Trunk

5.1.4 Water Crossings

Figure 5-1 shows the location of most of the existing bridges and culverts within the study area. It is important to note that these represent only the existing water crossings and do not include the roadway overpasses and underpasses located on the OR174 between Highway 417 and Trim Road. These watercourse crossing structures were previously examined in 1993 by IBI Group in a report entitled "Highway 417/17 Preliminary Design Report".

Details of the culverts and stormwater management facilities (SWMF), and the bridges/culverts for each subwatershed within the study area are summarized on Tables 5-2 and 5-3 respectively.

Table 5-2: Existing SWMF along OR174

Subwatershed	Type	SWMF
Cyrville Drain	Wet Pond	Cyrville Artificial Wetlands
	Dry Pond	Gloucester City Centre
Taylor Creek	Wet Pond	Taylor Creek
	Dry Pond	Orléans Police Station
	Wet Pond	OR174 and CHS Land (?)

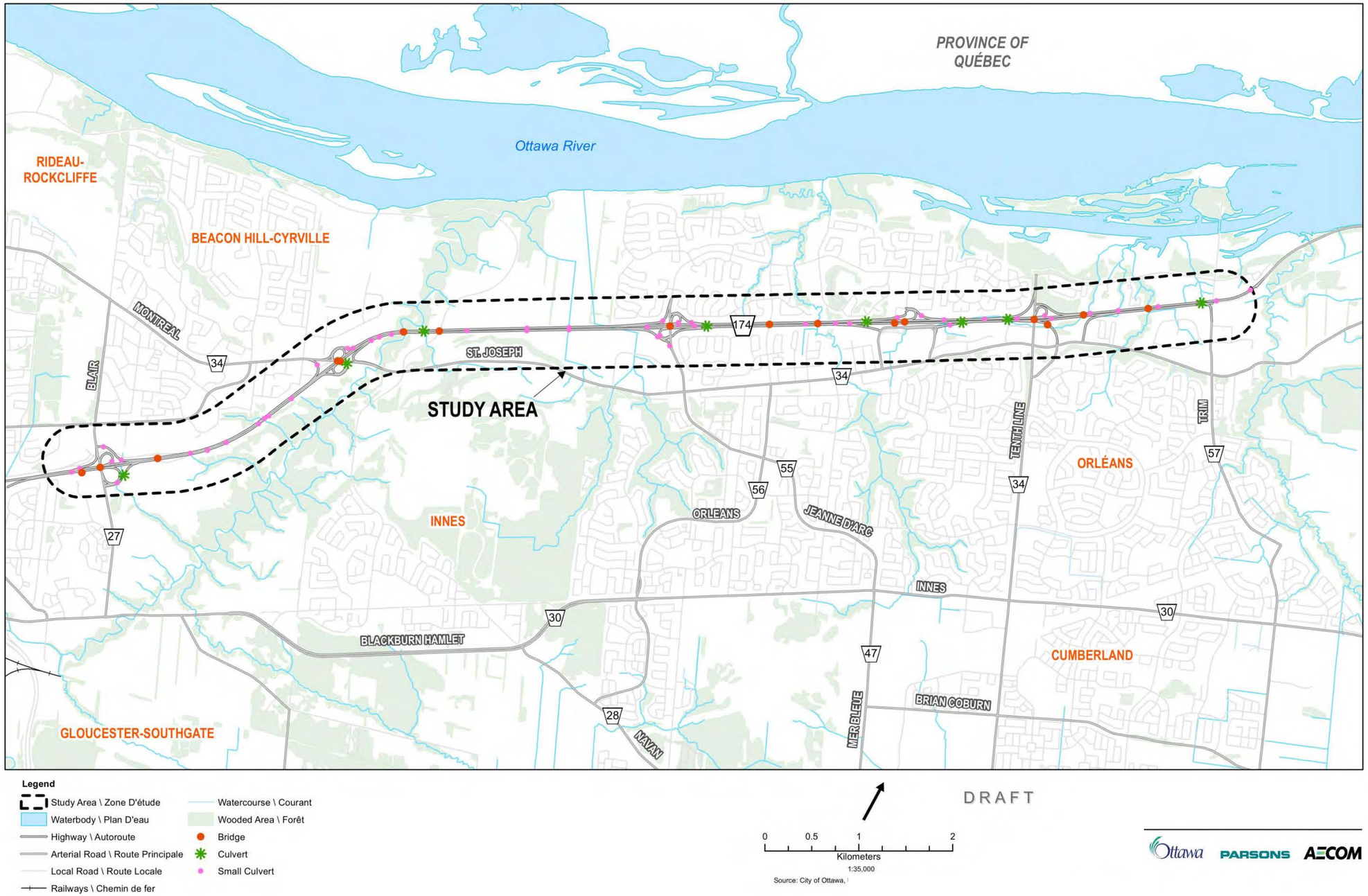


Figure 5-1: Existing Bridges and Culverts

Table 5-3: Existing Culverts Crossing under OR174

Subwatershed	Span (m)	Length (m)	Material	Year Installed	Notes
Cyrville Drain	6.3	18	Concrete Reinforced Frame	1987	The bridge-culvert crosses under the Transitway and is maintained by OC Transpo, while the two culverts associated with Highway 417 are maintained by MTO.
	1.55	19	Corrugated Steel	Unknown	
	1.67	45	Corrugated Steel	Unknown	
Green's Creek d/s reach	32.7	67	Corrugated Steel	1958	The bridge-culvert was installed in 1958, and is well past its life expectancy of 35 years.
	1.15	42	Corrugated Steel	1980	
	1.65	81	Concrete	2007	
Ottawa East of Core 2	-	-	-	-	
Voyager Creek	-	-	-	-	
Bilberry Creek	3.4	100	Concrete Reinforced Box	1960	The bridge-culvert was extended at the south end in 2009.
	1.22	65	Corrugated Steel	1980	
	1.22	54	Corrugated Steel	1940	Culvert is well beyond its life expectancy of 35 years.
	1.22	58	Concrete Reinforced Frame	1980	
Taylor Creek	4.5	138	Concrete Reinforced Box	1994	
	3.5	110	Concrete Reinforced Box	1994	
	3	79	Corrugated Steel	1993	
	1.63	32	Concrete Reinforced Box	1970	
	1.55	66	Corrugated Steel	1950	Culvert is past the life expectancy of 35 years
	2.4	73	Corrugated Steel	1970	Culvert is past the life expectancy of 35 years

Once alternative LRT alignments are selected for evaluation, associated impacts on any other existing bridges and culverts that may require widening or replacement, will be assessed. New infrastructure will also be required.

5.2 Utilities

5.2.1 Hydro

There is a 115 kV single circuit transmission line along the OR174, which starts to follow the OR174 approximately 750 m west of the Blair Road overpass where it crosses OR174 (north to south). From that point on to 340 m west of the Blair road overpass, the transmission line is on a double circuit latticed tower with one strung circuit. West of this point, the transmission line is generally composed of wood frames (2 poles) for alignment and small angle structures and wood guyed frames (3 poles) for strain structures. The usual right-of-way to allow live-line maintenance is 30m (Figure 5-2).

Starting east of Blair Road, the transmission line runs on the south side of the OR174 for 1.9 km where the line forks east towards the intersection of St-Joseph Boulevard and Bearbrook Road. East of this intersection, it heads northeastward to rejoin the OR174 corridor behind Orléans Fruit Farm located at 1399 St-Joseph Blvd. The transmission line then follows the south side of OR174 all the way to Trim Road.

At Jeanne D'Arc Boulevard, two wood frames structures are replaced by guyed, single pole structures with a vertical configuration. Starting at 650 m west of Champlain Street and for a distance of 1,300 m, the wood frames are replaced by singles poles with delta configurations.

A second transmission line crosses OR174 perpendicularly approximately 180 m west of the Blair Road overpass.

Several substations and transformer stations are located in the vicinity of the OR174 right-of-way:

- Hydro One station – off City Park Drive, north side of OR174 ROW, 975 m west of Blair Road
- Hydro One station – off Telesat Court, south side of OR174 ROW, 200 m west of Blair Road
- Hydro One station – off Youville Drive, south side of OR174 ROW, 440 m west of Jeanne-d'Arc Boulevard

5.2.2 Gas

Gas service in the study area is supplied by Enbridge. The OR174 is crossed by gas mains in various locations. The following list of gas mains are all 100 mm diameter or larger:

- 500 mm diameter gas main located approximately 1.0 kilometer west of Jeanne D'Arc Boulevard (Niagara Gas Transmission Line). The Niagara Gas Transmission line is the major constraint relative to gas service. This gas main crosses OR174 and then runs eastward along the OR174 westbound lane for approximately 350 m before heading north
- 200 mm diameter gas main crossing the OR174, the eastbound off ramp and the westbound on ramp approximately 42 m east of Blair Road
- 150 mm diameter gas line crossing the OR174 and goes around the Montreal Road on and off ramp on the east side of the Montreal Road interchange
- 200 mm diameter gas main crossing the OR174 approximately 37 m west of Orléans Blvd.
- 200 mm diameter gas main crossing the OR174 at the intersection of Place d'Orléans Drive and the eastbound on ramp. On the north side of OR174, the gas main then follows the westbound off ramp up to Champlain Street

5.2.3 Cable

Within the study area, Rogers does not have any sub-stations. Fibre optic cable is present on Trim Road.

5.2.4 Other Utilities

Network layouts have not been provided from Bell Canada, Bell Aliant, Hydro Ottawa and Videotron. If layouts are provided, this information will be added.

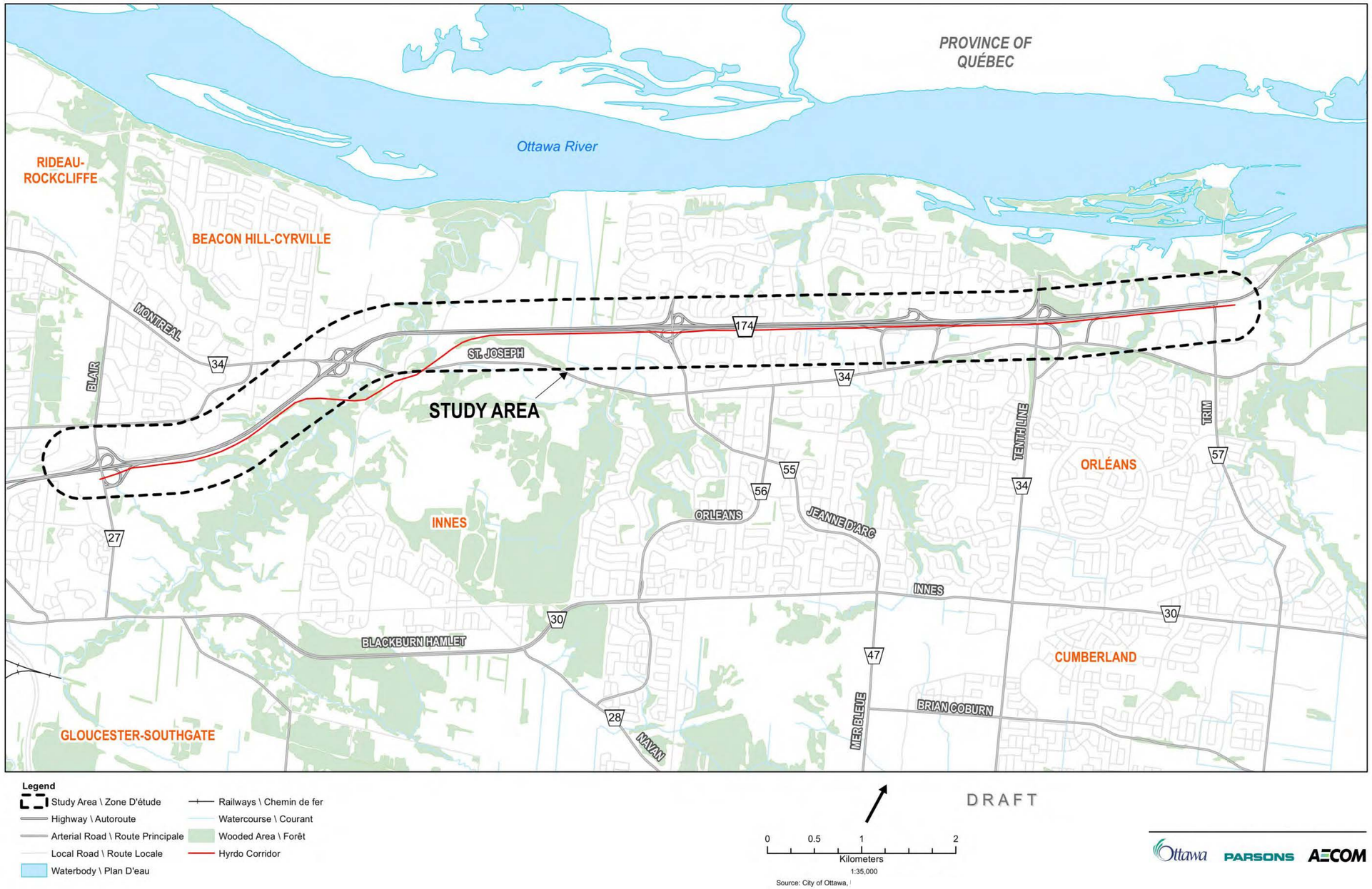


Figure 5-2: Hydro One Corridors

6. Economic Environment

In establishing existing conditions associated with businesses along the primary OR174 corridor, secondary data sources were used where practical and then the information was updated with data from field investigations.

Secondary source information was collected and reviewed using aerial mapping, street views of the route (using Google Earth) and recording businesses either adjacent to the road or at access and egress points. Further desktop research was conducted to gather descriptive information on these features using company websites, business directories. To confirm and update secondary source data, staff drove the study area and identified businesses along and close to the road and documented general land uses to establish an overall impression of economic mobility and to gain a sense of the primary uses of the road.

6.1 Overview

OR174 in the study area passes through Gloucester and the community of Orléans. From the interchange with Highway 417 to Trim Road, OR174 is a controlled access, divided highway passing through commercial areas (e.g., retail and offices), green space and residential areas. There are interchanges on OR174 at Blair Road, Montreal Road, Jeanne d'Arc Boulevard, Place d'Orléans Drive/Champlain Street, Tenth Line Road and a signalized at-grade intersection at Trim Road providing access to businesses.

6.2 Community Profiles

Gloucester (formerly the City of Gloucester) is an established area in Ottawa, and the City of Goucester was one of the 11 former municipalities that merged to make the new City of Ottawa in 2001. The area in the vicinity of OR174 is predominantly residential and also features a number of retail outlets, such as the Gloucester Centre with approximately 40 stores, office buildings including TD Bank and Sun Life Financial as well as various government buildings.

Prior to amalgamation in 2001, Orléans was split between two municipalities with the portion east of Champlain Street being in Cumberland Township and the western portion being within Gloucester.

The OR174 corridor is between 1 and 1.5 km south of the Ottawa River, dividing the Orléans community. Orléans is predominantly residential with business/retail and institutional areas. The Place d'Orléans Shopping Centre located immediately adjacent to OR174 offers over 160 stores. Areas of growth along the corridor include the Town Centre, vicinity of Tenth Line Road and Trim Road. Other business areas are located along major arterials.

6.3 Business Establishments

The study team undertook a field survey of existing businesses located immediately adjacent to the road or accessed from interchanges. Within the built-up areas, much of the business activity is based in malls, commercial parks and strip plazas located close to the major roads.

Table 6-1 summarises the general types of businesses found in the survey area. The numbers for retail counts multi-unit malls as one business. Offices/Professional services counts buildings containing multiple different offices as one business.

Table 6-1: Summary of Business Types

Business Type	Count	%
Food, Fuel and Accommodations *Including hotels, motels, gas stations, restaurants and fast food outlets*	17	19
Retail *Shops and malls*	25	28
Offices/Professional Services *Large company offices or single service offices e.g., lawyers, accountants etc. Also including banks and financial services*	38	43
Other *Any business not encompassed above, including recreation and entertainment facilities*	8	9
Total	**88**	

Business customers likely rely on OR174 for access however, most of the businesses are destinations for their customers, rather businesses that rely on passing traffic. The types of businesses that rely on passing traffic include fast food and fuel retailers. Figure 6-1 illustrates the type and number of businesses in Gloucester and Orléans.

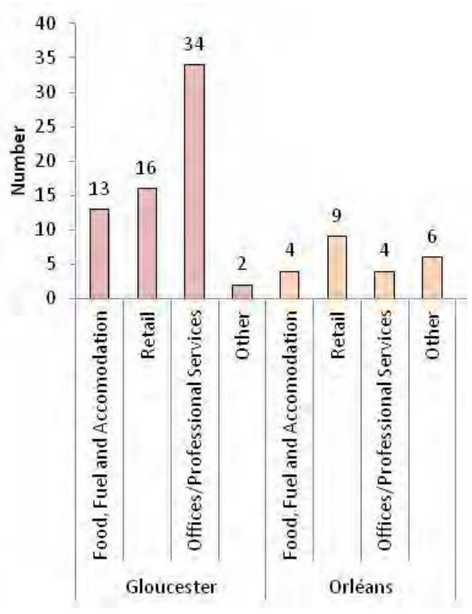
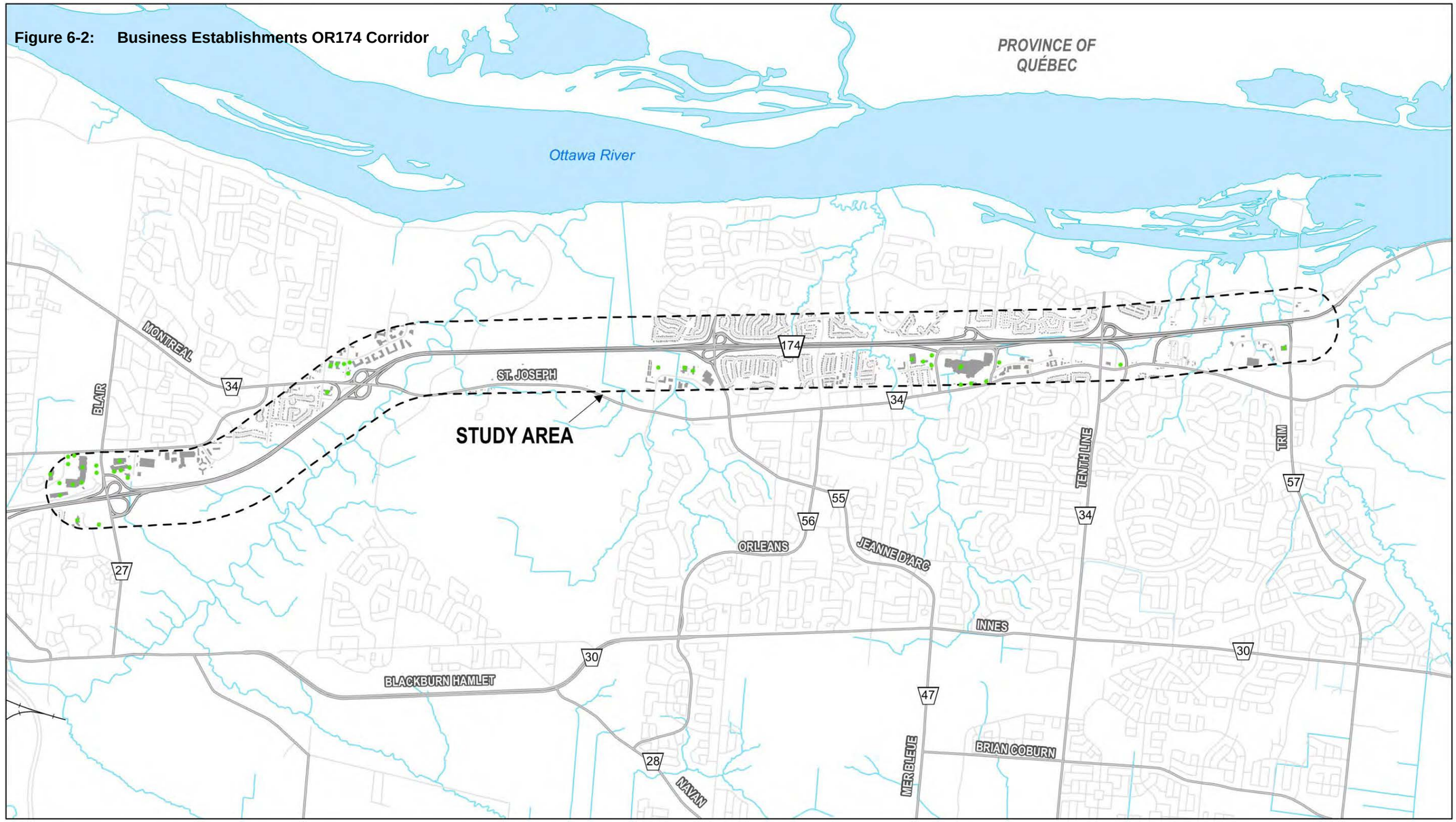


Figure 6-1: Number of Business Types In Gloucester and Orléans

Businesses are mapped in Figure 6-2.

Figure 6-2: Business Establishments OR174 Corridor



Legend

- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Railways \ Chemin de fer
- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale
- Watercourse \ Courant
- Businesses
- Buildings

DRAFT

0 0.5 1 2
Kilometers
1:35,000

Source: City of Ottawa,

7. Natural Environment

To determine those natural heritage features that may be indirectly or directly affected, a comprehensive background review was conducted (Appendix C). Existing reports, including the existing conditions report for the OR174-CR 17 Class EA Study were used and agencies were contacted as part of the review. Field investigations were completed to provide an understanding of site-specific conditions. Information will be updated as required during subsequent study phases.

7.1 Aquatic Environment

The study area is located within the Ottawa River Watershed. There are four (4) subswatersheds that have crossings located within the study area: Taylor Creek, Bilberry Creek, Green's Creek and Voyager Creek. (Cyrville Drain subwatershed is to the west of Blair Road and has no crossings of OR 174 in the Study Area.) For each subwatershed in the study area, fish records were summarized by reviewing available background information and secondary-source reports. Additional information was also provided by the Ministry of Natural Resources and Forestry (MNRF), the Rideau Valley Conservation Authority (RVCA), and Fisheries and Oceans Canada (DFO). Together, this information provides a high-level understanding of the known features at the watershed level. However, further detailed information and studies are required at the watercourse level to accurately characterize fish and fish habitat within the Study Area.

The federal *Fisheries Act* defines fish habitat as:

> *"Spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes".*

Field investigations were also conducted to supplement information collected during the background information review. During the field investigations, thirteen (13) existing watercourse crossings were observed and twenty-six (26) assessments (one upstream and one downstream) of each crossing were made. Seven assessments were for permanent watercourses, nine were intermittent, four were ephemeral and six were unknown as the watercourse was buried or could not be located. A sensitivity classification of the watercourses was also performed. This involved assessing the ability of the aquatic ecosystem to recover from changes in environmental conditions. Three (3) locations were assessed as "High" sensitivity fish habitat, two (2) were assessed as "Moderate" and twenty-one (21) were assessed as "Low" habitat sensitivity (Figure 7-1).

A total of thirty-three (33) fish species were identified in the subwatersheds within the study area. The majority of native fish species identified were classified as either S4 (Common and apparently secure in Ontario; usually with more than 100 occurrences in the province) or S5 (Very common and demonstrably secure in Ontario). This indicates that the species found are primarily common, and are fairly tolerant to environmental or anthropogenic stresses. Of the 33 species identified, thirteen (13) species are warmwater, eighteen (18) species are coolwater, and two (2) species are coldwater. Coldwater species are generally more sensitive to anthropogenic influences, and their habitat can consequently be considered as more sensitive than the habitat of some warmwater habitat generalist species. Trout-perch and Burbot were the only coldwater species identified. Trout-perch was found within Green's Creek, whereas Burbot was found in both Green's and Bilberry Creeks. This may indicate the presence of groundwater upwelling in these areas; however, no groundwater indicators were observed during site investigations.

The following SAR were identified as species that could be potentially present in the study area: the Channel Darter (*Percina copelandi*), American Eel (*Anguilla rostrata*), Lake Surgeon (*Acipenser fulvescens*), Silver Lamprey (*Ichthyomyzon unicuspis*), River Redhorse (Moxostoma carinatum), Brindle Shiner (Notropis bifrenatus) and Northern Brook Lamprey (Ichtyomyzon fossor). However, suitable habitat was only identified for the American Eel within Green's and Taylor Creeks, with no suitable habitat identified for the remaining species. The timing window for the watercourses within the study area, when no in-water works are permitted, is expected to be between March 15th and June 30th.

Once the location of the proposed Eastern LRT has been determined, Fisheries Act "Self-assessments" may be required if in-water work is required.

7.2 Terrestrial Environment

7.2.1 Ecozones and Ecoregions

In the present Ecological Land Classification System used in Ontario, *Ecozone* and *Ecoregions* represent the two highest levels of classification. As per the Ministry of Natural Resources publication "The Ecosystems of Ontario, Part 1: Ecozones and Ecoregions" published in 2009, the subject lands for the Eastern LRT EA fall within the Mixedwood Plains Ecozone and are further divided into the Lake Simcoe-Rideau Ecoregion 6E (Figure 7-1).

The Mixedwood Plains Ecozone: The Mixedwood Plains Ecozone is located on limestone and dolostone formations south of the Precambrian Shield. In Ontario, this ecozone is bounded to the south and west by Lakes Huron, Erie, and Ontario, and the St. Lawrence River and extends into southern regions of Quebec along the St. Lawrence lowlands. It is characterized as a relatively moist ecozone, receiving between 720 mm and 1,000 mm annually, with one of the mildest climates in Canada, represented by cool winters and somewhat warm summers (Crins, W, *et al*., 2009).

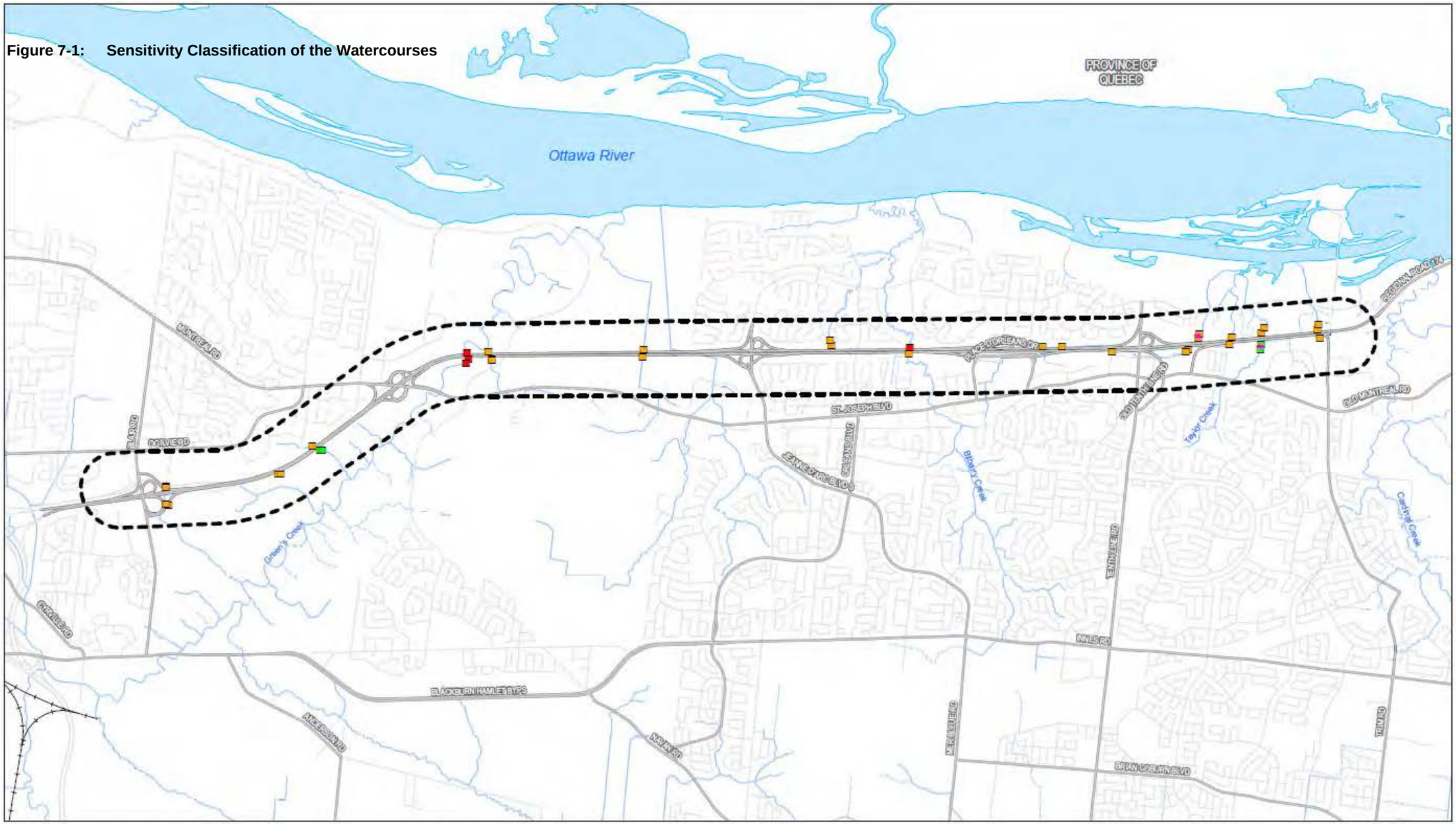
Ecoregion 6E – Lake Simcoe-Rideau: The Lake Simcoe-Rideau Ecoregion encompasses 6.4% (6,312,000 ha) of Ontario. It is bordered by Lake Huron in the west and the Ottawa River in the east. The ecoregion includes most of the Lake Ontario shore and the Ontario portion of the St. Lawrence River Valley, as well as Manitoulin, Cockburn, and St. Joseph's Islands in Lake Huron. Land cover within the ecoregion is dominated by cropland, pasture, abandoned fields, forest and water. Vegetation within the Lake Simcoe-Rideau ecoregion is described as diverse, divided into hardwood forests, floodplain forests, and peatlands with dominant species being sugar maple, beech, white ash, eastern hemlock, green ash, silver maple, red maple, eastern white cedar, yellow birch, balsam fir, and black ash (Crins, W, *et al*, 2009).

7.2.2 Ecological Land Classification

Vegetation communities along the proposed route of the Eastern LRT were delineated into Ecological Land Classification (ELC) Units via roadside investigations. Where possible, vegetation units were classified to vegetation type; however, in areas were insufficient data was available, vegetation units were classified to Ecosite. ELC distinguishes existing vegetation communities based on a combination of stand structure and composition. This includes the collection of a floral species list recording dominant plant species within each vegetation layer followed by the delineation of vegetation communities into ELC units.

A total of 166 ELC polygons were delineated along the Eastern LRT Route falling within 16 different Ecosite classifications. A total of 194 hectares (ha) of vegetation is found within the study area boundary. Of this, 66 ha or 34%, are classified as upland forest communities, 106 ha or 55% are classified as cultural communities, and 22 ha or 11% are classified as wetland communities. Details regarding the composition of each vegetation community can be found in Appendix C.

Figure 7-1: Sensitivity Classification of the Watercourses



7.2.3 Animal Movement Corridors

Animal Movement Corridors are elongated areas used by wildlife to move from one habitat to another. They are important to ensure genetic diversity in populations, to allow seasonal migration of animals (e.g. deer moving from summer to winter range) and to allow animals to move throughout their home range from feeding areas to cover areas. Animal movement corridors function at different scales and are often related to the size and home range of the animal.

Identifying the most important corridors that provide connectivity across the landscape is challenging because of a lack of specific information on animal movements. There is also some uncertainty about the optimum width and mortality risks of corridors. Furthermore, a corridor may be beneficial for some species but detrimental to others. Corridors often consist of naturally vegetated areas that run through more open or developed landscapes. However, sparsely vegetated areas can also function as corridors. For example, many species move freely through agricultural land to reach natural areas. Despite the difficulty of identifying exact movement corridors for all species, these landscape features are important to the long-term viability of certain wildlife populations (MNR 2012).

Considering that the Eastern LRT will be along an existing road system, the potential for the project to affect movement corridors is considered minimal; however, the potential effects of the project within the study area were still assessed, especially along watercourse crossing areas (Figure 7-4).

7.3 Designated Natural Heritage Features

A review of background information identified several key natural heritage features within the study area. The background information consulted includes the Natural Heritage Information Centre database (NHIC, 2014), data received from the City of Ottawa, as well as location-specific information provided by the MNRF for the Eastern LRT corridor. Detailed descriptions are provided for those features with a provincial designation as they will provide the highest level of constraint for the project (Figure 7-4).

7.3.1 Significant Wetlands

Provincially significant wetlands (PSWs) are wetlands that scores a high number of points based on the MNRF's Wetland Evaluation system. The system has four components: biological, hydrological, social, and special features. Wetlands are evaluated based on these components and assigned points based on the features they possess. An unevaluated wetland is a wetland that has not yet been assessed following the MNRF's Wetland Evaluation system, but has been identified through aerial photographic interpretation as having wetland components.

No provincially significant wetlands were identified within the study area boundary. The Petrie Island Provincially Significant Wetland is located along the northern boundary of the Eastern LRT study area in the vicinity of Trim Road. None of its communities are present within the study area. A portion of seven (7) unevaluated wetland patches were identified in the study area. During the Ecological Land Classification (ELC) surveys, the composition of these unevaluated wetlands was investigated. It is important to note that it is difficult to differentiate a wetland versus an upland forest community based on roadside investigations without conducting soil analysis or detailed vegetation surveys. A full list of the corresponding ELC units for these unevaluated wetlands can be found in Appendix C.

7.3.2 Significant Woodlands

A significant woodland is an "area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history."

In total, there are portions of approximately eighteen (18) significant woodlands identified by the City of Ottawa within the study area boundary. These significant woodlands are described below as observed through roadside field investigations. Not all of the identified patches have associated ELC data as they could not be seen through roadside investigations. A full list of the ELC units for these corresponding significant woodlands can be found in Appendix C.

7.3.3 Areas of Natural and Scientific Interest (ANSIs)

Areas of Natural and Scientific Interest (ANSIs) are areas of land and water containing unique natural landscapes or features. These features have been scientifically identified as having life or earth science values related to protection, scientific study or education.

Francon Quarry Provincially Significant Earth Science ANSI: This area is a provincially significant earth science site, where dawsonite-rich carbonatite sills have a rather unique mineralogy that are not found anywhere else in the region.

Green's Creek Provincially Significant Earth Science ANSI: Green's Creek ANSI contains Late Wisconsinan, Champlain Sea marine clays and clays of a later freshwater phase. These clays contain calcareous clay nodules which reveal the fossilized remains of plants and animals (crustaceans, insects, bones, fish, twigs, leaves, seeds).

Green's Creek Provincially Significant Conservation Area ANSI: The area described here constitutes the core of the Greens Creek Conservation Area, an area that also includes a variety of developed lands of minimal natural significance. The forested area consists of a complex of deciduous and mixed woodland, with young to sub-mature sugar maple, trembling aspen, eastern hemlock, white spruce and white pine on drier slopes. White pine and white cedar are common on the steep, eroding slopes, with deciduous thicket swamps and marshy meadows dominating the banks of the meandering stream. Towards the mouth of Greens Creek relatively extensive and well-developed mature, late successional deciduous swamp forests of silver and red maple are dominant.

Blackburn Hamlet Forest Regionally Significant ANSI: This regionally significant forest is dominated by species such as sugar maple, American beech and eastern hemlock, with a diverse ground layer containing a relatively large number of regionally uncommon species that are more typical of dry, sandy hardwoods on the Canadian Shield of western Quebec. It is situated on a highland area of deep sand which drains through small rivulets north and westward to Greens Creek. The forest is surrounded by industrial and residential/institutional development, but still remains essentially in a natural condition. Sand-based forest sites are vulnerable to urban development and are rarely found in a natural or near-natural state within the site district.

Petrie Island Wetland Provincially Significant Life Science ANSI: This ANSI is dominated by silver maple - black ash - white elm swamps, with basswood, green ash and hackberry (*Celtis occidentalis*) being dominant on higher slopes. The Hackberry development here is one of the best groves of this regionally significant species in the site district (cf. Duck Islands). These swamp forests support a variety of regionally significant species including wild-cucumber (*Sicyos angulatus*), moonseed, Canada onion (Allium canadense), dodder (*Cuscuta gronovii*), and Virginia cut-grass (*Leersia virginica*). The associated eutrophic marsh areas are diverse consisting of cattail, great bulrush (*Scirpus lacustris*), flowering rush (*Butomus umbellatus*), woodreed (*Spartina pectinata*) and arrowhead (*Sagittaria latifolia*). Frogbit (*Hydrocharis morsus-ranae*) and Carp are non-native elements which are increasing in abundance in the marshes, to the detriment of native flora and fauna.

Figure 7-2: Animal Movement Corridors

Figure 7-3: Natural Heritage Features

7.4 Wildlife

Mammals that are characteristic of the region include White-tailed Deer, Northern Raccoon, Striped Skunk and Groundhog. Water birds and shorebirds that can be associated with wetland habitats within the region include Wood Duck, Great Blue Heron and Wilson's snipe. Birds that can be associated with open upland habitat include Field Sparrow, Grasshopper Sparrow and Eastern Meadow Lark. Upland forests support species such as the Hairy Woodpecker, Wood Thrush, Scarlet Tanager and Rose-breasted Grosbeak. Reptiles and amphibians found in this ecoregion include American Bullfrog, Northern Leopard Frog, Spring Peeper, Red-spotted Newt, Snapping Turtle, Eastern Gartersnake and Common Watersnake. (William *et al.* 2009).

Additional information on the species that occupy the study area was obtained through the documentation of incidental wildlife observations during the site visits carried out in 2014. In addition to incidental wildlife observations, surveyors documented and conducted a preliminary evaluation of significant wildlife habitat, as defined in MNRF's Significant Wildlife Habitat Technical Guide.

7.4.1 Significant Wildlife Habitat

Potential Significant Wildlife Habitat (SWH) was assessed through the application of various criteria found within the Significant Wildlife Habitat Ecoregion Criteria Schedule for Ecoregion 6E. This guidance document details specific criteria to assist in identifying each type of significant wildlife habitat listed in the guide. This review was completed through a combination of roadside investigations and aerial photography interpretation. Significant wildlife habitat is divided into the following four sections: seasonal concentrations of animals, rare vegetation communities or specialized habitats for wildlife, habitats of species of conservation concern; and wildlife movement corridors as illustrated in Figure 7-4.

Table 7-1 lists the types of SWH, whether they are present in the study area and whether any additional work is required during detail design. One confirmed Significant Wildlife Habitat area was found along the Eastern LRT Route. Significant Wildlife Habitat for Special Concern and Rare Wildlife Species (Milksnake) was confirmed within the vegetation communities found along Green's Creek. The following SWH are potentially located along the Eastern LRT route:

- Waterfowl Stopover and Staging Areas (Terrestrial)
- Waterfowl Stopover and Staging Areas (Aquatic)
- Shorebird Migratory Stopover Area
- Raptor Wintering Area
- Bat Maternity Colonies
- Turtle Wintering Areas
- Reptile Hibernaculum
- Colonially-Nesting Bird Breeding Habitat (trees/shrubs)
- Colonially-Nesting Bird Breeding Habitat (Ground)
- Deer Yarding Areas
- Deer Wintering Congregation Areas
- Bald Eagle and Osprey Nesting, Foraging and Perching Habitat
- Turtle Nesting Areas
- Amphibian Breeding Habitat (Woodland)
- Amphibian Breeding Habitat (Wetlands)
- Marsh Breeding Bird Habitat
- Terrestrial Crayfish
- Special Concern and Rare Wildlife Species
- Amphibian Movement Corridors

  Deer Movement Corridors

The identified potential SWH should be further studied once the area of disturbance has been determined.

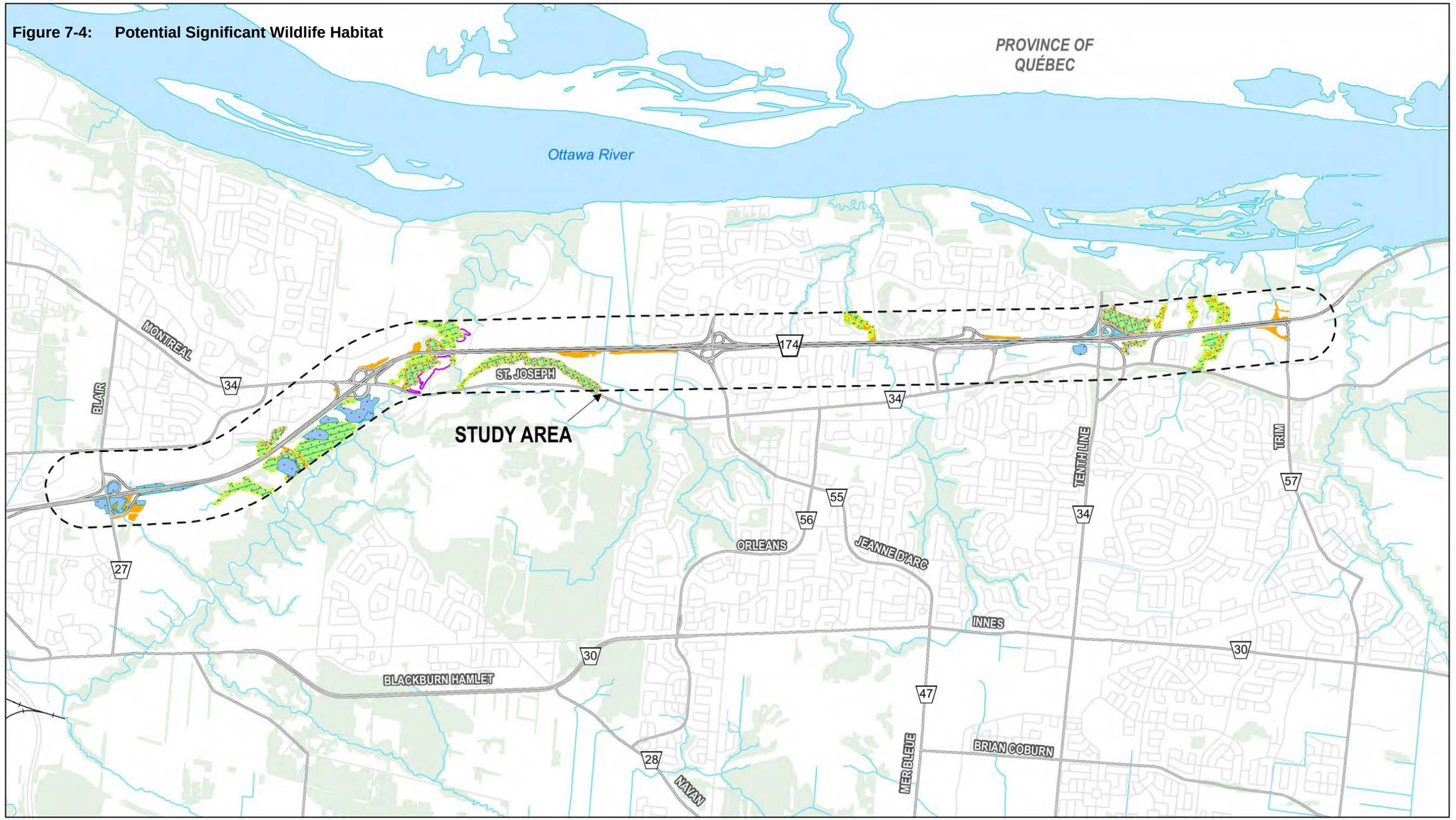
7.5 Species at Risk

Information on species at risk in the study area was obtained from several data sources including: the MNRF Species at Risk website, additional correspondence with the MNRF, DFO SAR mapping, the Atlas of Breeding Birds of Ontario, and the City of Ottawa. Based on background information compiled, a total of 53 SAR were determined to potentially occur within the study area. Field surveys completed in 2013 and 2014 provided input to the assessment of whether species at risk and/or SAR habitat is present in the study area.

The 53 potential species were then screened for available preferred habitat within the study area through the confirmation of existing conditions completed during field investigations. Using the aquatic and terrestrial characterization of the study area, it was determined that 45 species have suitable habitat present in the study area. Of these species, sixteen (16) are listed as Endangered, twelve (12) are listed as Threatened and seventeen (17) are listed as Special Concern. The final list of potential species is based on habitat found along the entire route. Once the location of the LRT route has been selected, the list of potential species should be revisited to reassess habitat conditions and provide recommendations. The following list describes species potentially present in the Eastern LRT study area:

- American chestnut (*Castanea dentata*)
- American Eel (*Anguilla rostrata*)
- American Ginseng (*Panax quinquefolius*)
- Butternut (*Juglans cinerea*)
- Eastern Prairie Fringed-Orchid (*Platanthera leucophaea*)
- Golden Eagle (*Aquila chrysaetos*)
- Henslow's Sparrow (*Ammodramus henslowii*)
- Hickorynut (*Obovaria olivaria*)
- Little Brown Myotis (*Myotis lucifugus*)
- Loggerhead Shrike (*Lanius ludovicianus*)
- Mountain Lion (*Puma concolor*)
- Northern Myotis (*Myotis septentrionalis*)
- Rapids Clubtail (*Gomphus quadricolor*)
- Rusty-patched Bumble Bee (*Bombus affinis*)
- Spotted Turtle (*Clemmys guttata*)
- Wood Turtle (*Glyptemys insculpta*)
- Barn Swallow (*Hirundo rustica*)
- Blanding's Turtle (*Emydoidea blandingii*)
- Bobolink (*Dolichonyx oryzivorus*)
- Cerulean Warbler (*Dendroica cerulean*)
- Channel Darter (*Percina copelandi*)
- Chimney Swift (*Chaetura pelagica*)
- Eastern Meadowlark (*Sturnella magna*)
- Eastern Musk Turtle (*Sternotherus odoratus*)
- Eastern Whip-poor-will (*Caprimulgus vociferous*)
- Flooded Jellyskin (*Leptogium rivulare*)
- Grey Fox (*Urocyon cinereoargenteus*)
- Least Bittern (*Ixobrychus exilis*)
- Bald Eagle (*Haliaeetus leucocephalus*)
- Black Tern (*Chlidonias niger*)
- Bridle Shiner (*Notropis bifrenatus*)
- Canada Warbler (*Wilsonia canadensis*)
- Common Nighthawk (*Chordeiles minor*)
- Eastern Ribbonsnake (*Thamnophis sauritus*)
- Golden-winged Warbler (*Vermivora chrysoptera*)
- Milksnake (*Lampropeltis triangulum*)
- Monarch (*Danaus plexippus*)
- Northern Brook Lamprey (*Ichthyomyzon fossor*)
- Olive-sided Flycatcher (*Contopus cooperi*)
- Peregrine Falcon (*Falco peregrinus*)
- Red-headed Woodpecker (*Melanerpes erythrocephalus*)
- Short-eared Owl (*Asio flammeus*)
- Snapping Turtle (*Chelydra serpentina*)
- West Virginia White (*Pieris virginiensis*)
- Yellow Rail (*Coturnicops noveboracensis*)

Figure 7-4: Potential Significant Wildlife Habitat



Legend

- Study Area \ Zone D'étude
- Railways \ Chemin de fer
- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale
- Watercourse \ Courant
- Wooded Area \ Forêt
- Waterbody \ Plan D'eau
- Raptor Wintering Area
- Waterfowl Stopover and Staging Areas (Terrestrial)
- Nesting Bird Breeding Habitat (Bank_and_Cliff)
- Bat Maternity Colonies
- Reptile Hibernaculum
- Migratory Butterfly Stopover Areas
- Landbird Migratory Stopover Areas
- Deer Yarding Areas
- Shorebird Migratory Stopover Area
- Waterfowl Stopover and Staging Areas (Aquatic)
- Deer Winter Congregation Areas

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Source: City of Ottawa,

Table 7-1: Significant Wildlife Habitat Screening of the Eastern LRT Corridor

Significant Wildlife Habitat	Candidate Habitat	Recommendations
Seasonal Concentration Areas of Animals		
Waterfowl Stopover and Staging Areas (Terrestrial)	Candidate habitat may be present agricultural lands east of Sir George Etienne Cartier Parkway.	Field Investigations were not completed during the spring melt, therefore should the location of the LRT Route run along the north side east of the Sir George Etienne Cartier Parkway **spring surveys/ Stopover/Migratory Surveys** should be conducted.
Waterfowl Stopover and Staging Areas (Aquatic)	Candidate habitat may be present along vegetation communities along Green's Creek.	Where vegetation removal is to occur within Candidate habitat **Stopover/Migratory Surveys** should be conducted in the area of Green's Creek.
Shorebird Migratory Stopover Area	Candidate habitat may be present along vegetation communities along Green's Creek.	Where vegetation removal is to occur within Candidate habitat in the area of Green's Creek **Stopover/Migratory Surveys** should be conducted.
Raptor Wintering Area	Candidate habitat may be present along vegetation communities along Green's Creek.	Where vegetation removal is to occur within Candidate habitat **Raptor Point counts** should be conducted to confirm SWH.
Bat Hibernacula	No suitable habitat.	No further studies required.
Bat Maternity Colonies	Candidate habitat may be present within FOD, FOM, FOC, SWD, SWM, and SWC vegetation communities.	Should tree removal occur within candidate habitat **snag density calculations** will need to take place in order to determine suitability at each location.
Bat Migratory Stopover Area	Unknown – Criteria to determine significance are still being determined.	Contact local agencies to ensure no known migration routes occur within the study area.
Turtle Wintering Areas	Candidate habitat may be present within vegetation communities associated with Green's Creek, Taylor Creek and Bilberry Creek.	Where in water works are to occur within Candidate habitat**, Basking turtle surveys** should be conducted on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May).
Reptile Hibernaculum	Candidate habitat may be present along Green's Creek. A confirmed Milksnake was observed in this location.	Should vegetation removal or construction occur within Candidate habitat **hibernacula surveys** should be undertaken. As inventories were completed using roadside investigations where construction is to occur, the areas immediately within the construction disturbance area should be cleared for the presence of hibernacula.
Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)	No suitable habitat present.	No further studies required.
Colonially-Nesting Bird Breeding Habitat (Trees and Shrubs)	Candidate habitat may be present within the identified Swamp communities along Green's Creek.	Should vegetation removal occur within Candidate habitat **point count surveys during the nesting season (April to August)** should be conducted.
Colonially-Nesting Bird Breeding Habitat (Ground)	Candidate habitat for Brewers Blackbird may be present within the areas along Green's Creek.	Should vegetation clearing occur within Candidate habitat **point count surveys** should be conducted in **May – June**.
Migratory Butterfly Stopover Areas	No suitable habitat is present.	No further studies required.
Landbird Migratory Stopover Areas	No suitable habitat is present.	No further studies required.
Deer Yarding Areas	Candidate habitat may be present within vegetation communities along Green's Creek.	Contact the MNRF for information regarding this area. MNRF are responsible for the classification of Deer Yards.
Deer Winter Congregation Areas	Candidate habitat may be present within the areas along Green's Creek. This woodland is over 100 hectares in size.	Should vegetation removal occur within Candidate habitat surveys to confirm deer movement may need to be considered through consultation with the MNRF.
Rare Vegetation Communities or Specialized Habitat for Wildlife		
Cliffs and Talus Slopes	No Cliffs and Talus Slope communities were observed.	No further studies required.
Sand Barren	No Sand Barren vegetation communities were observed during field investigations.	No further studies required.
Alvar	No Alvar vegetation communities were observed during field investigations.	No further studies required.
Old Growth Forest	No Old Growth Forest communities were observed during field investigations.	No further studies required.
Savannah	No Savannah vegetation communities were observed during field investigations.	No further studies required.
Tallgrass Prairie	No Tallgrass prairie vegetation communities were observed during field investigations.	No further studies required.
Other Rare Vegetation Communities	No other rare vegetation communities were observed during field investigations.	No further studies required.
Specialized Habitat for Wildlife		
Waterfowl Nesting Area	No suitable habitat is present.	No further studies required.
Bald Eagle and Osprey Nesting Foraging and Perching Habitat	Candidate habitat may be present within the study area given its proximity to the Ottawa River. Species can be found nesting several kilometers away from the river.	Should tree removal occur within Candidate habitat, **bird observational studies** should be conducted to determine nest site use, perching sites and foraging areas (mid-March to mid-August).
Woodland Raptor Nesting Habitat	No suitable habitat is present.	No further studies required
Turtle Nesting Areas	Candidate habitat may present in vegetation communities along Green's Creek, Taylor Creek and Bilberry Creek.	Should vegetation removal or in-water works occur within Candidate habitat **turtle nesting surveys** should be conducted during nesting season (late spring to early summer).
Seeps and Springs	No suitable habitat is present. Study area is too close to the Ottawa River.	No further studies required.
Amphibian Breeding Habitat (Woodland)	Candidate habitat may be present within the vegetation communities found along Green's Creek, Taylor Creek and Bilberry Creek.	Should vegetation removal occur within candidate habitat **Amphibian surveys** following marsh monitoring protocol should be completed.
Amphibian Breeding Habitat (Wetlands)	Candidate habitat may be present within the vegetation communities found along Green's Creek, Taylor Creek and Bilberry Creek.	Should vegetation removal occur within candidate habitat **Amphibian surveys** following marsh monitoring protocol should be completed.
Habitats for Species of Conservation Concern (Not Including END, THR)		
Marsh Breeding Bird Habitat	Candidate habitat may be present within the wetlands communities associated with Green's Creek, Taylor Creek and Bilberry Creek.	Should vegetation removal occur within Candidate habitat **breeding bird surveys** should occur during nesting season (May/June).
Woodland Area-Sensitive Bird Breeding Habitat	No suitable habitat is present.	No further studies required.
Open Country Bird Breeding Habitat	No suitable habitat is present.	No further studies required.
Shrub/Early Successional Bird Breeding Habitat	No suitable habitat is present.	No further studies required.
Terrestrial Crayfish	Candidate habitat may be present within wetland communities in the study area. Field investigations were confined to watercourses and roadside investigations. Wetland communities were not search for the presence of chimneys or crayfish.	Should vegetation removal occur within candidate habitat **surveys should be completed to identify the presence or absence of crayfish or chimneys** during the breeding season (April to late June and in late summer-early August).
Special Concern and Rare Wildlife Species	Confirmed – A Milksnake was observed along the edge of the road near Green's Creek.	Milksnake is a species of Special Concern. Construction mitigation is recommended to avoid disruption of this species.
Animal Movement Corridors		
Amphibian Movement Corridors	Candidate habitat may exist along Green's Creek, Taylor Creek and Bilberry Creek. This can be determined once the significance of Amphibian Breeding Habitat Wetland is determined.	TBD
Deer Movement Corridors	Candidate habitat to be confirmed once Deer Wintering Habitat has been confirmed.	TBD

8. Physical Environment

8.1 Geotechnical Conditions

The available soil, bedrock and groundwater information was collected and collated to provide information on the subsurface conditions within the study area. Information was collected by Houle Chevrier Engineering who referred to the following sources: Geological Survey of Canada, Ontario Geological Survey, Historical Land Use Inventory, Intera Report, City of Ottawa Aquifer Vulnerability Report and available borehole and geotechnical reports. The *Geotechnical Inventory* report prepared by Houle Chevrier Engineering Ltd. is attached as Appendix D.

8.1.1 Bedrock Geology

Along Ottawa Road 174 between Blair Station and Trim Road, the bedrock type varies from interbedded limestone and dolostone (Gull River formation), limestone (Bobcaygeon formation), dolostone (Oxford formation), and interbedded limestone and shale (Lindsay formation) (Figure 8-1). Several inactive east-west aligned faults are mapped within the study area.

Drift thickness maps indicate that the bedrock surface is located between 3 and 100 m below the ground surface (Figure 8-2). Furthermore, bedrock outcrops exist within the study area at the Champlain Street overpass and the pedestrian bridge at Place D'Orléans Station.

8.1.2 Surficial Geology

Deposits of silty clay and silt of marine origin (commonly referred to as Leda Clay) are mapped in the study area. It is expected that the upper part of the silty clay is weathered to a very stiff to stiff, grey brown crust. Below the weathered zone, the silty clay generally is grey and red-grey in colour. The grey and red-grey silty clay typically has a high moisture content, is compressible, and relatively weak. The silty clay and silt deposits are both highly sensitive to disturbance and frost susceptible.

Alluvial deposits exist in localized areas within the study area (i.e., near the OR174 crossing of Billberry Creek and along the banks of the Ottawa River between Tenth Line Road and Trim Road). These deposits could vary greatly in composition from sand and gravel, to clay and silt.

Shallow glacial till deposits are mapped within the study area in the transition areas between shallow Paleozoic bedrock and deposits of silt and clay of marine origin. Furthermore, it is expected that the silty clay deposits are underlain by glacial till.

The glacial till can be described as a sandy silt or silty sand with variable amounts of clay, gravel, cobbles and boulder size material. Figure 8-3 identifies the surficial geology for the study area.

8.1.3 Groundwater Levels

The groundwater depth is expected to be variable and likely reflects the local topography. In low lying areas, such as along the Ottawa River, the groundwater is expected to be at or near the ground surface. In areas of higher topographic relief, the groundwater level could be up to about 3 metres below ground surface.

The groundwater levels are expected to be higher during wet periods of the year, such as the early spring, or following periods of heavy precipitation and are also likely influenced by surface water levels in the rivers, streams and creeks.

8.2 Slopes and Ravines

The study area consists of a mixture of low lying and terraced lands with ground level typically increasing south of the Ottawa River. Existing slopes are present along the banks of the Ottawa River and along area creeks. These water courses, such as Greens Creek, Billberry Creek, and many of their tributaries, outlet into the Ottawa River. OR174 typically crosses the creeks with high embankments.

The formation of the natural slopes within the study area can be attributed to erosion by flowing water. As silt and clay particles are eroded, the rivers, creeks, and streams become wider and deeper, and slopes develop along the banks. Eventually, erosion processes lead to shallow slope failures along the banks followed by deeper failures of the subsequent steeper/higher valley slopes. Deepening of the valley continues until a material that is relatively resistant to erosion is reached such as glacial till or bedrock. Ongoing erosion/slope failures of the silt and clay deposits continues to occur as mature rivers, creeks, and streams meander.

Available geology maps indicate the presence of areas with historical landslides within the study area. These locations are in general agreement with the location of unstable slopes identified in the hazard mapping, and are provided on Figure 8-4. Table 8-1 provides a description of the unstable slopes identified within the study area for the ELRT.

Table 8-1: Description of Potential Areas of Slope Instability on OR174 in the Study Area

Area	Embankment Side Slopes	Watercourse	Slope Geometry		Preliminary Slope Stability Assessment[3]
			Approximate Height (metres)	Overall Inclination from Horizontal (Degrees)	
1	Both[1]	Unknown Creek	10 to 12	30	Unstable
2	Both[1]	Greens Creek	5 to 7	20	Adequately Stable
3	North Side	Billbery Creek	6 to 8	20 to 25	Marginally Stable to Adequately Stable
4	North Side	None	3 to 5	10 to 15	Adequately Stable
5	Both[1]	Stormwater Management Facility	8 to 10	25	Marginally Stable
6	North Side	Unknown Creek	6 to 8	20 to 25	Marginally Stable to Adequately Stable
7	Both[1]	Unknown Creek	10 to 15	20 to 25	Unstable

Notes:

1. *Embankment side slopes on both sides indicates an elevated roadway platform. Likely a fill section of the roadway was constructed to cross a ravine or watercourse.*
2. *Slope geometry obtained from contour information available from the City of Ottawa topographic mapping.*
3. *A preliminary assessment of the stability of the existing slopes, in their current configuration, is based on slope geometry from topographic mapping in conjunction with existing slope stability charts (assuming the slopes are composed entirely of fully saturated silty clay). It should be noted that this information is intended for preliminary design and discussion purposes only.*

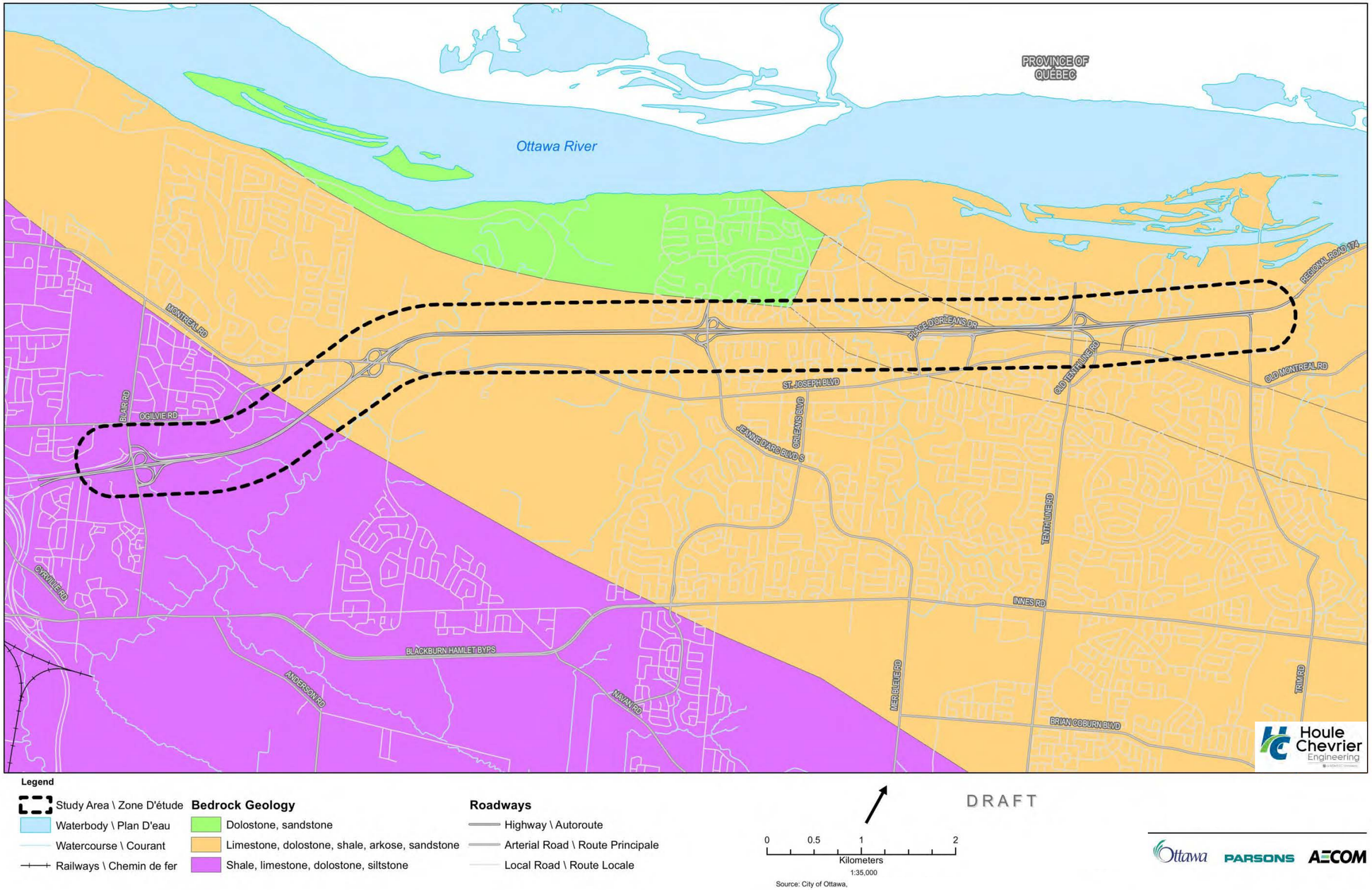


Figure 8-1: Bedrock Geology

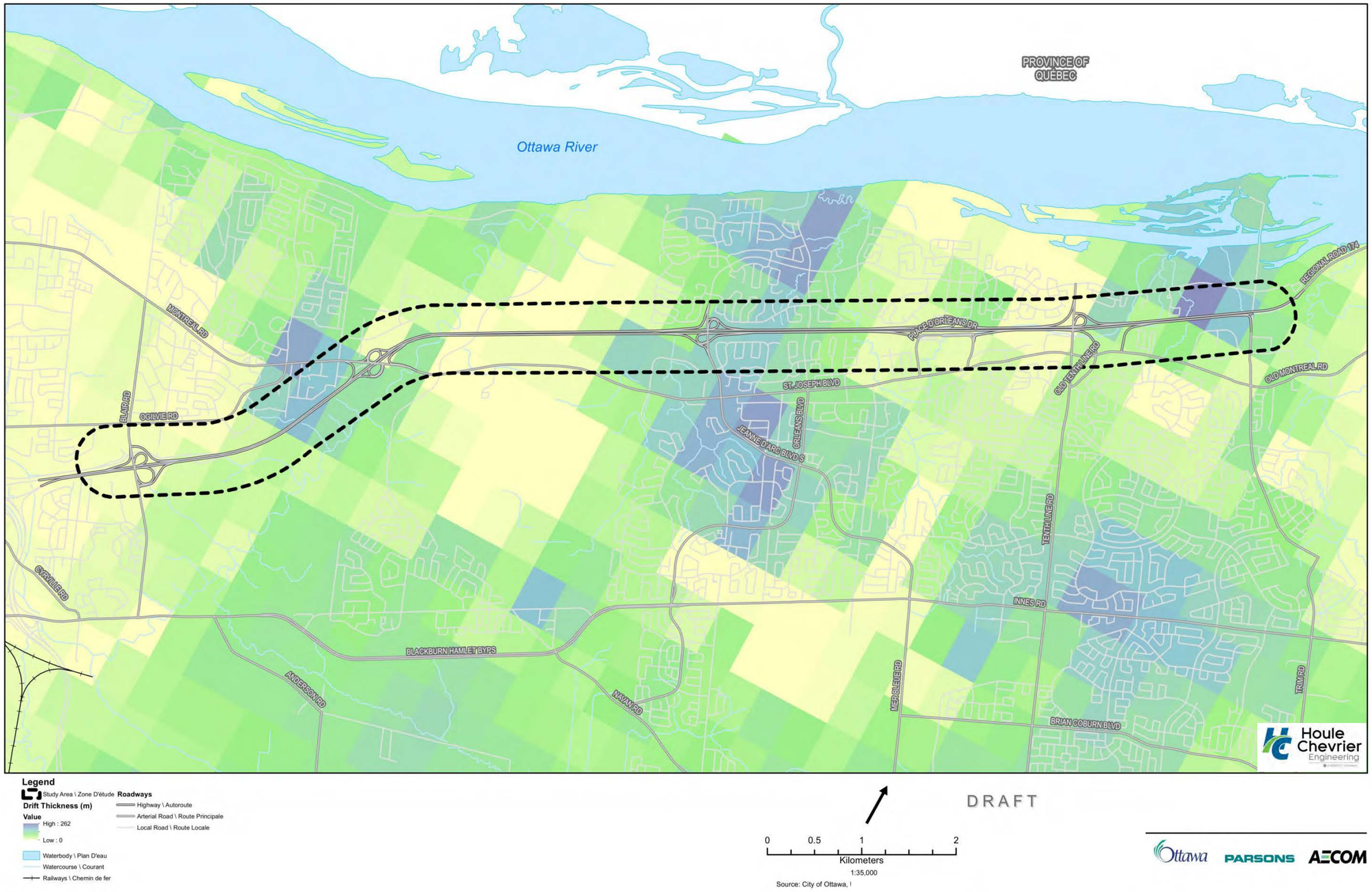
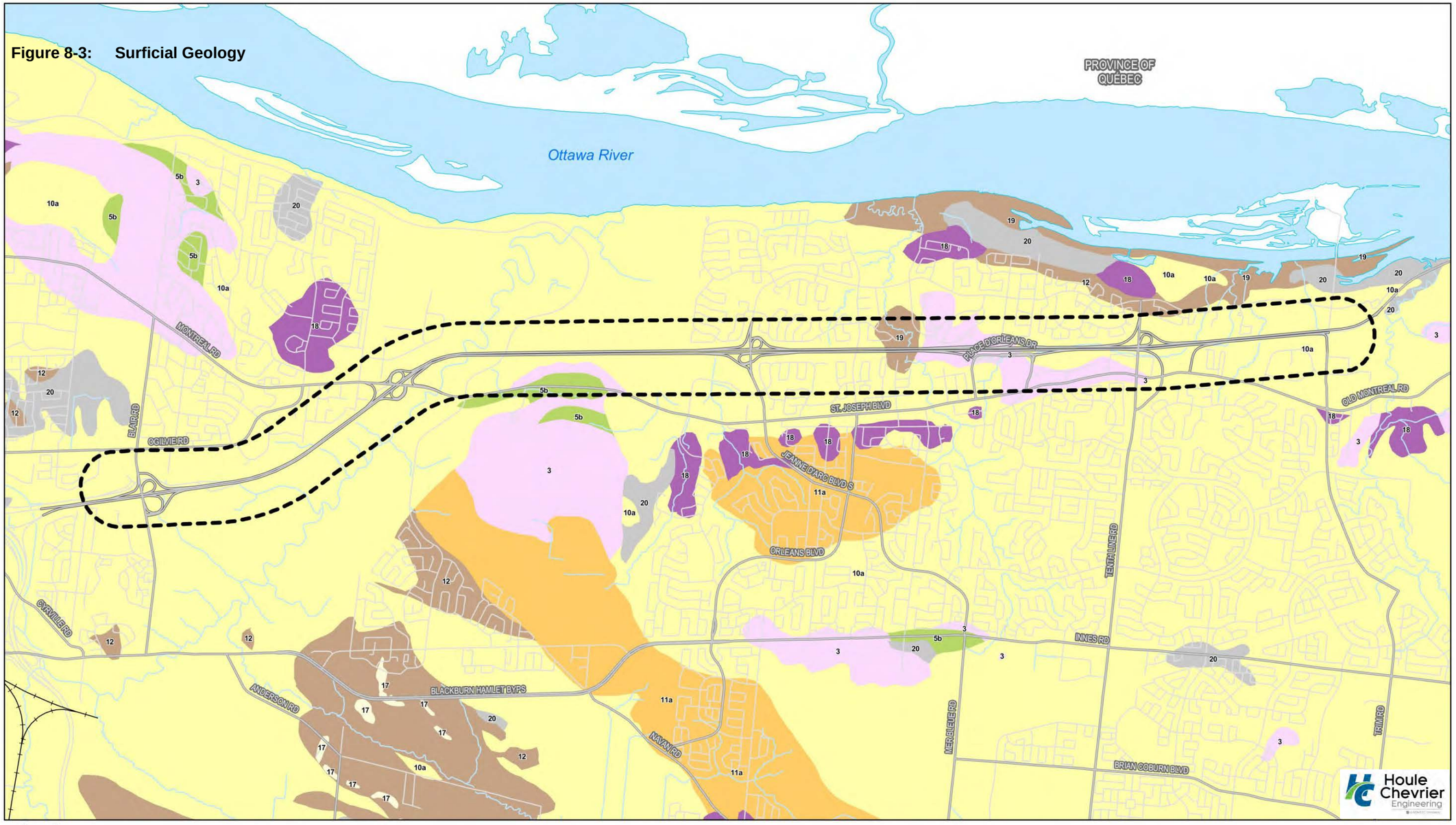


Figure 8-2: Overburden Thickness

Figure 8-3: Surficial Geology



Legend

- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Watercourse \ Courant
- Railways \ Chemin de fer

Roadways

- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale

Surficial Geology

- 20: Organic Deposits: peat, muck, marl
- 19: Modern alluvial deposits: clay, silt, sand, gravel, may contain organic remains
- 18: Colluvial deposits: boulders, scree, talus, undifferentiated landslide materials
- 17: Eolian deposits: fine to very fine sand and silt
- 12: Older alluvial deposits: clay, silt, sand, gravel, may contain organic remains
- 11a:Coarse-textured glacio-marine (Detaic)deposits: sand, gravel, minor silt and clay
- 10a: Fine-textured glaciomarine deposits of silt and clay
- 5b: Stone-poor, sandy silt to silty sand till
- 3: Paleozoic bedrock

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Kilometers
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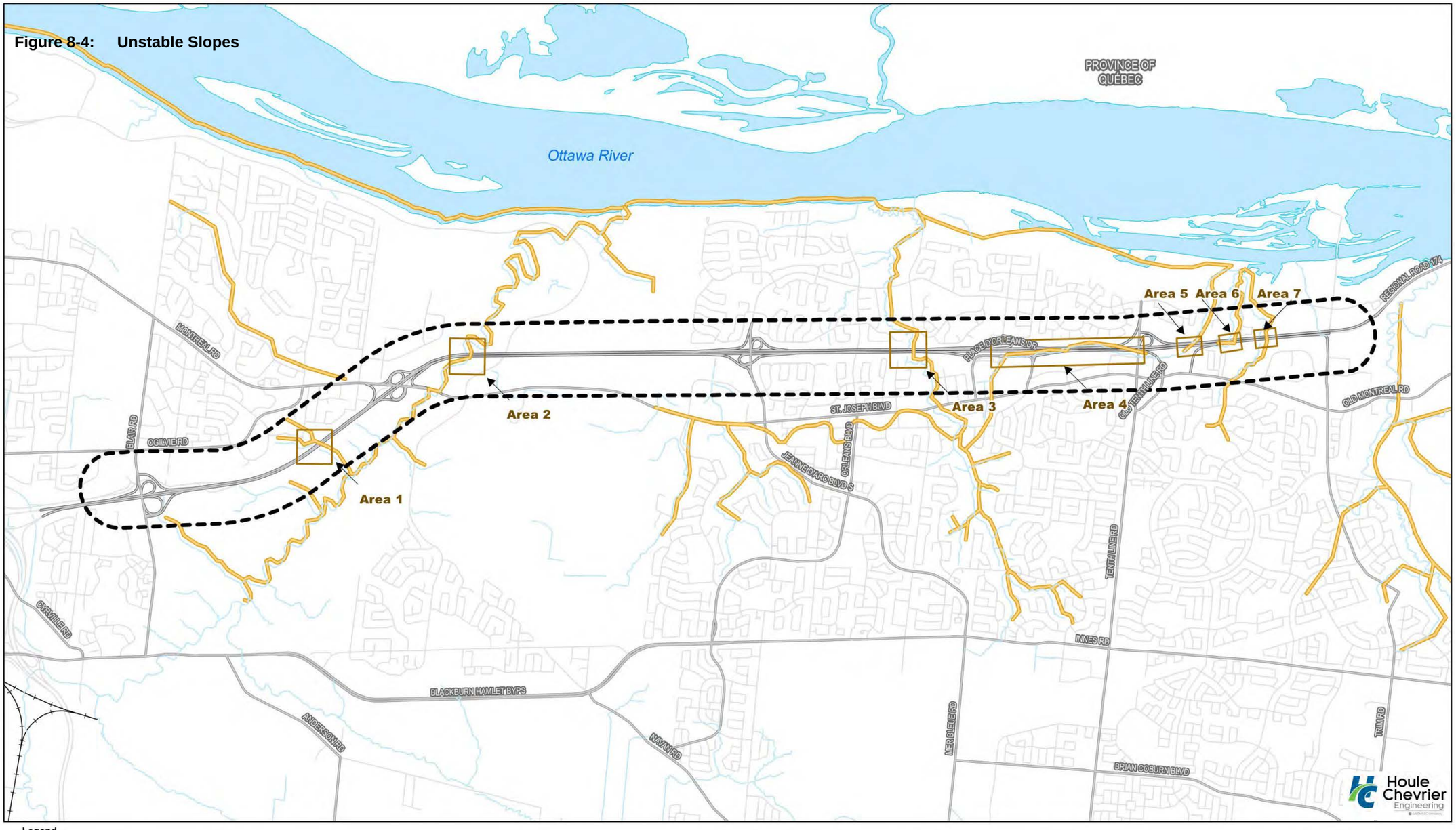
Source: City of Ottawa,

Ottawa PARSONS AECOM

Figure 8-4: Unstable Slopes



Legend

- Study Area \ Zone D'étude
- Unstable Slopes \ Pentes instables
- Major Slope Areas \ Zone de pente importante
- Waterbody \ Plan D'eau
- Watercourse \ Courant
- Railways \ Chemin de fer

Roadways

- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale

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Kilometers
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Source: City of Ottawa,

Ottawa PARSONS AECOM

8.2.1 Slope Setback Requirements

The Ontario Ministry of Natural Resources (MNR) policy and the City of Ottawa requirements, report that a safe setback is required for development adjacent to unstable slopes. This safe setback limit is referred to as the *Erosion Hazard Limit* and consists of the following three components, as outlined in the MNR Technical Guide "Understanding Natural Hazards" (2001):

- *Stable Slope Allowance*: portion of the setback that ensures safety in the event of slumping or slope failure
- *Toe Erosion Allowance*: portion of the setback that ensures safety of the top of the slope in the event that the river or stream erodes or weakens the banks
- *Erosion Access Allowance*: portion of the setback needed to ensure that there is a large enough safety zone for people and vehicles to enter and exit an area during an emergency, such as a slope failure or flood. Typically it is also included where construction vehicle access is required to repair a failed slope

Hazard lands refer to the area between the safe setback distance and the crest of the slope. Development within hazard lands is restricted. In accordance with MNR and City of Ottawa requirements, hazard lands should not be developed with permanent structures, roadway areas, or any other valuable infrastructure

8.3 Groundwater Wells, Aquifer Vulnerability and Septic Systems

A search of the MOE Water Well Records was conducted. Figure 8-5 identifies the locations of water wells within the study area. There are concentrations of water wells along Ottawa Road 174 in the eastern extent of the study area.

The intrinsic vulnerability of an aquifer is based on the assessment of the spatial distribution of physical and hydrologic attributes such as soils, the unsaturated zone media, aquifer properties, and the recharge rate. The specific vulnerability of an aquifer is based on the assessment of the risk of the system becoming exposed to contamination.

There is potential that the existing wells may be impacted during construction due to an encroachment onto land containing the well or to a lesser extent from nearby construction activities, such as bedrock removal.

The intrinsic vulnerability of an aquifer is based on physical and hydrologic attributes such as soils, the unsaturated zone media, aquifer properties, and the recharge rate. The specific vulnerability of an aquifer is based on the assessment of the risk of the system becoming exposed to contamination. According to the report, large scale, long term potential sources of contamination may be associated with agricultural activities and road salting, while smaller scale point source contamination may be associated with waste disposal sites, industrial activity, and private septic systems. Road salting may introduce sodium and chloride contamination into the aquifer, which could impact on water supply wells.

The results show low to medium vulnerability zones on OR174 between Old Montreal Road and Jeanne d'Arc Boulevard.

Some residential properties within the study area are currently serviced by septic systems. Figure 8-5 provides a reasonable initial overview of the locations of septic systems, although other septic system locations may exist in urbanized areas that are serviced by municipal water. There is the potential that the existing septic systems may be impacted, either immediately due to an encroachment onto land containing septic systems, or over a longer term due to a change in land property and drainage characteristics.

8.4 Potential Contaminated Land

8.4.1 Historical Land Use Inventory

The City of Ottawa Historical Land Use Inventory (HLUI) indicates the presence of a number of gasoline service stations, automobile repair shops, dry-cleaning facilities, and other industries in proximity to the study area that could potentially contribute to environmental contamination. Most of the sites identified in Table 8-2 are removed from the OR174 corridor and are not a significant concern.

Table 8-2: Significant Land Uses Within and In Proximity to the Study Area as Identified in the HLUI

Location	Facility Type	Approximate Years of Operation Under One or More Company Names
Cyrville Road	Gasoline Service Stations	1970, 1980
	Motor Vehicle Repair Shops	1953, 1959, 1979, 1979 to 2005, 1980, 1998
	Industrial Chemicals Industries	1998, 2001
Labrie Avenue	Motor Vehicle Repair Shop s	1980
Star Top Road	Gasoline Service Stations	1998 to 2005
Cadboro Road	Motor Vehicle Repair Shop	2001, 2005
Cadboro Road	Motor Vehicle, Wholesale	201, 2005
Ogilvie Road	Petroleum Products, Wholesale	1994
	Gasoline Service Stations	1998, 2001 to 2005, 1998, 2001, 2005, 1970
	Motor Vehicles, Wholesale	1972 to 2001
	Motor Vehicle Repair Shop	1980 to 1998
	Laundries and Cleaners	1970 to 1980, 2001
City Park Drive	Motor Vehicle Repair Shop	1998
Meadowbrook Road	Laundries and Cleaners	1998, 2001
	Gasoline Service Station	2005
Green's Creek, south of OR174	Other Chemical Products Industry (Factory blew up in August 1901)	1885-1901
Montreal Road	Laundries and Cleaners	1994 to 2001, 2001
	Motor Vehicle Repair Shop	1977 to 2005, 1980, 1998
	Gasoline Service Station	1980, 2005, 1970 to 1980, 2001, 2005
Ogilvie Road	Laundries and Cleaners	1994, 1998 to 2001
Canotek Road	Motor Vehicle Repair Shop	2001 to 2005, 1998 (4), 1998, 2001, 2001 to 2005, 1998 to 2001
Polytek Street	Gasoline Service Station	1998
Rainbow Street	Chemical Manufacturer, Auto Body Supplies, Chrome Cleaner	1970-1980
Jeanne D'Arc Boulevard	Gasoline Service Station	1979 to 2005
Youville Drive	Motor Vehicle Repair Shop	1976, 2001, 2005,
	Gasoline Service Station	2005
Orléans Industrial Park	Motor Vehicle Repair Shop	1974
Orléans Boulevard	Laundries and Cleaners	2001
Champlain Street	Laundries and Cleaners	1994 to 2001
Cousineau Street	Motor Vehicle Repair Shop	2001, 2005
St. Joseph Boulevard	Gasoline Service Station	2005 (6), 1998, 2001, 2005 (2), 1980 to 2005,1996 to 2001, 1996 to 2005
	Other Motor Vehicle Service	2001 to 2005, 2006
	Motor Vehicle Repair Shop	2001(3), 2005(4), 2001 to 2005,
	Laundries and Cleaners	1996, 2000, 2001 (3), 2003
Taylor Creek Park	Gasoline Service Station	1996, 2001
Trim Road	Gasoline Service Station	2005
	Motor Vehicle, Wholesale	1999
N.E. Corner of Trim & OR174	Motor Vehicle, Wholesale	1999
Old Montreal Road	Gasoline Service Station	2005

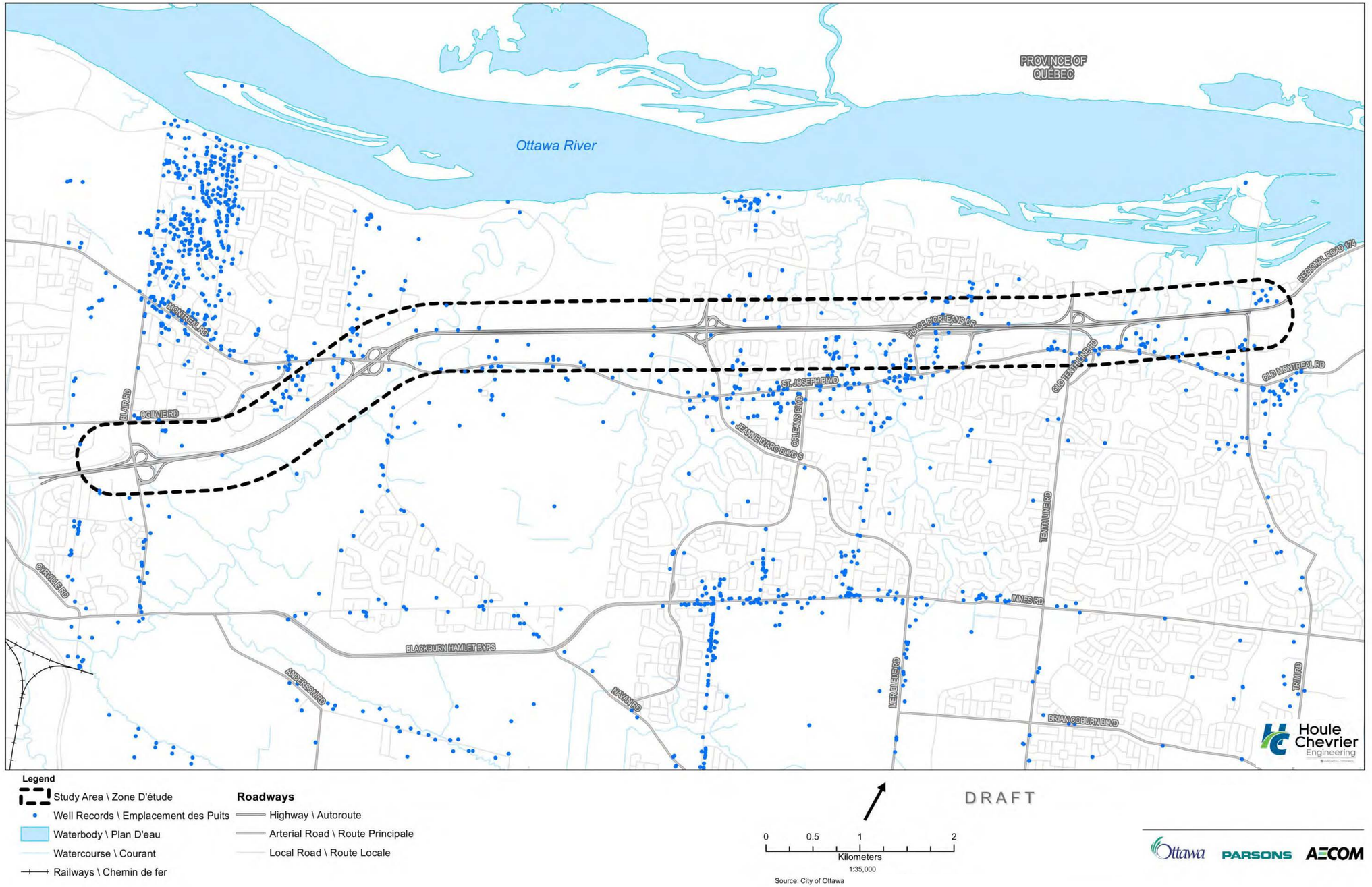

Figure 8-5: Locations of Water Wells

8.4.2 Historical and Active Landfills

Two landfills within the study area, designated as Cu-13 and Cu-22, are described in the report titled "Old Landfill Management Strategy, Phase I, Identification of Sites, City of Ottawa, Ontario" (2004), prepared by Golder Associates Ltd.

Landfill Cu-22 is located on the south side of OR174 between 10th Line Road and Trim Road, and is a potential environmental concern. Widening within the landfill could encounter landfill waste, which would require disposal at another landfill. Furthermore, groundwater downgradient of the existing landfill could be contaminated. Groundwater pumped from temporary excavations during the construction may require offsite disposal and/or treatment.

A report titled "Mapping and Assessment of Former Industrial Sites, City of Ottawa", dated July 1988 prepared by Intera Technologies Ltd. was reviewed for the purposes of this report. The report provides an inventory and assessment of former industrial sites in the City of Ottawa from 1850 to 1984 that would have likely produced or handled hazardous waste and materials.

The report does not identify any landfill or former industrial sites near the study area that would present a significant environmental risk

8.5 Geomorphology

Geology and topography are the key controls of channel form and function. These characteristics influence the rate of channel migration and evolution, the rate of incision, the volume of sediment delivered to the watercourse, channel dimensions and characteristics of bed morphology. Human modifications to the landscape alter the influence of natural physical characteristics within a watershed.

8.5.1 Methodology

Previous studies of watercourses in the vicinity of the ELRT study area have been reviewed. The following contain information useful to define existing conditions of the watercourses:

- Bilberry Creek Geomorphic Assessment, City of Ottawa (Geomorphic Solutions, 2007)
- Conceptual Study for the Realignment of Brisebois Creek from Place d'Orléans Dr. to Tenth Line Road (R. V. Anderson Associates Limited, 2007)
- Phases 1 & 2 Class EA report Taylor Creek Erosion Control (Stantec Consulting Limited, 2007)
- Memo: Taylor Creek Erosion Control Hydraulic Modelling - DRAFT (Stantec Consulting Limited, 2007)
- Cardinal Creek Geomorphic Assessment, City of Ottawa (Geomorphic Solutions, 2007)
- Bilberry Creek Storm Water Management and Erosion Control Study (Cumming Cockburn Ltd. and Golder Associates, 1987)
- Supplementary Report to the Master Drainage Plan and Environmental Study Report, City of Cumberland East Urban Community Expansion Area (Cumming Cockburn Limited, 2001)
- City Stream Watch Annual Reports (Rideau Valley Conservation Area, 2007, 2008, 2009, 2010)
- Beckett's Creek Summary Report (Rideau Valley Conservation Area, 2011)
- Historic aerial photographs (1926, 1945, 1950, 1959, 1960, 1973, and 1991)
- Green's Creek Watershed Integrated Fluvial Geomorphological and Hydrological Study (JTB Environmental Systems Inc., and J.F. Sabourin & Associates, Inc., 2009)
- Green's Creek Watershed Fluvial Risk Mapping (JTB Environmental Systems Inc., 2011)
- Characterization of Ottawa's Watersheds: An Environmental Foundation Document with Supporting Information Base. (City of Ottawa, March 2011)

Information for several watercourses through the study area, was limited or non-existent, including Voyager Creek, Taylor Creek and Cyrville Drain. The acquisition of additional background materials may provide further insight into geomorphic channel conditions that could define constraints for construction of the Eastern LRT.

8.5.2 Watersheds

Lands within the study area drain north toward the Ottawa River major watershed. The study area passes through six subwatersheds, all of which are under the jurisdiction of the Rideau Valley Conservation Authority (Figure 8-6 and Table 8-3).

The study area also includes portions of the Rideau Downstream, Ottawa East of Core 2 (within RVCA jurisdiction), but due to the lack of surface water features within the subwatershed, it will not be discussed in this report. Environmental features of each subwatershed are defined in Table 8-4.

Table 8-3: Minor Watersheds and Subwatersheds

Major Watershed	Minor Watershed	Subwatershed
Ottawa River	Greens Creek	Cyrville Drain
		Greens Creek
	Ottawa East	Voyager/West Bilberry Creek
		East Bilberry Creek
		Taylor Creek
		Cardinal Creek (just east of study area)

8.5.3 Historical Assessment

Review of aerial photography illustrates changes in land-use and land cover that directly affect controlling (e.g., precipitation and runoff) and modifying (e.g., vegetation) influences of channel form. By identifying the nature of change that has occurred within the watershed and general study area, future channel responses can often be predicted, in conjunction with an understanding of site geology and physiography. The historical assessment for this study was based on a review of aerial photographs spanning the period from 1926 to 1991. Available background reports and satellite imagery were also reviewed to gain further insight into historic conditions and/or changes in the study area.

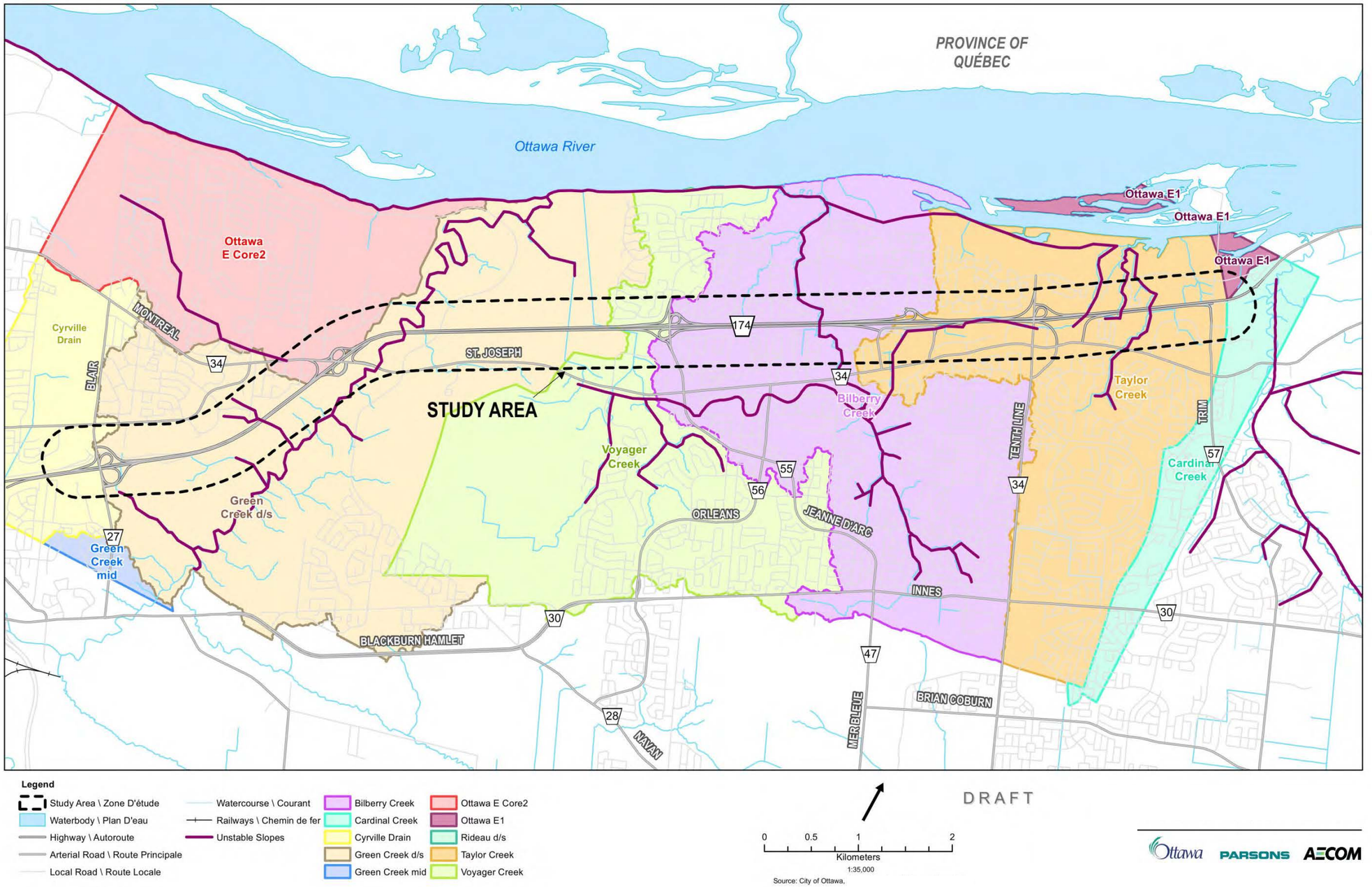

Figure 8-6: Geomorphology

Table 8-4: Geomorphology of the Watershed

Subwatershed	Drainage Area (km^2)	Study Area (km^2)	Physiographic Unit	Key findings for Study Area	Upstream Land Use	Current Land Use Along Watercourse	Channel Planform	Valley Setting	Stream Orders
Cyrville Drain	7.20	2.97	Till Plains (Drumlinized)	n/a	Urban	Urban	Altered	Unconfined	2
Green's Creek	14.12	6.71	Clay Plains	Channel is in adjustment or in transition Channel is sensitive to land use change Erosion concerns present	25% Agricultural 25% Forest 25% Urban 25% Aggregate	30% Agricultural 40% Urban 25% Forest 5% Golf Course	Natural	Partially Confined	3
Voyager Creek/ West Bilberry Creek	9.97	1.22	Clay Plains	Some urban impacts	100% Urban	50% Agricultural 45% Urban 5% Golf Course	Straightened	Partially Confined	4
East Bilberry Creek	11.71	3.80	Clay Plains	In Transition; Impacted by Urbanization Bedrock exposure Bank erosion and scour Exposed foundation of pedestrian bridges	95% Urban 5% Agricultural	100% Urban	Altered - min. 50% Straightened	Partially Confined	3
Taylor Creek	9.72	5.50	Clay Plains	Minor to severe erosion (scour, slump), meander bend erosion Historic channel modification	100% Urban	75% Urban 25% Agricultural	Natural	Partially Confined	2

Land use

Prior to 1945, land use was predominantly agricultural. Buildings and vegetation were sparse. Urban development began around 1950, likely in conjunction with construction of the highway and accelerated after 1973. At present, the study area is densely urbanized except through the National Capital Greenbelt.

Changes to the drainage network often occur in conjunction with land use alterations. These drainage network changes may include loss of surficial drainage channels (e.g., swales replaced by tile drains in agricultural fields, or small watercourses replaced by a storm drainage network), which alters the hydrologic characteristics of flows within the channel. When flows are altered (e.g., increase in peak flows, duration of flows in the creek), then the channel responds. Further, when a loss in channel length occurs, an increase in stream energy occurs, with implications to in-stream processes and channel stability.

Many watercourse reaches were realigned and straightened prior to 1926 to accommodate agricultural activities. Urbanization in the study area resulted in further realignments, diversions, piping, loss of headwater channels and an overall reduction in channel length. Although the natural silt/clay substrate has provided some resistance to change, these watercourses show signs of impacts from urbanization, (Geomorphic Solutions, 2007). In general, watercourse reaches in subwatersheds containing urbanized areas show more evidence of alteration than those impacted only by agricultural activities. Details for specific subwatersheds are presented in Table 8-5**.**

Table 8-5: Overview of Historical Subwatershed Changes

Subwatershed	Primary Land use	Historic Channel Changes		Historic Loss of Channel Length
		Study Area	Upstream	
Cyrville Drain	Urban	Realignment and channelization suspected	Likely channelization around residential area	Assumed loss due to modifications
Green's Creek	Conservation Area / Urban / Golf Course	Tributaries north of highway piped	Modification in urbanized areas, e.g., concrete wall lining bank at Innes Road	Limited channel loss suspected in urbanized areas
Voyager Creek	Urban / Agricultural	Straightened and channelized, piped reaches	Possible modification in urban area	Limited loss of headwater channels suspected
East Bilberry Creek	Urban	Bank Armouring	Substantial channel straightening, bank armouring, and diverted / piped tributaries; one major tributary diverted	Substantial loss of headwater channels due to urbanization upstream of study area
Taylor Creek	Urban	Brisebois Creek Straightened, channelized; Taylor Creek Armoured	Taylor Creek channelized and concrete-lined; piped	Assumed due to modifications

8.5.4 Watercourse Considerations and Constraints

When crossings are placed over a watercourse without due consideration of the processes that are occurring within the watercourse, then risks to the crossing structure and/or channel form and function may occur. Such risks could lead to the need for regular or emergency maintenance of the bridge or culvert and/or could adversely affect channel stability and both fish passage potential and aquatic habitat. Common impacts associated with watercourse crossings and specific considerations and constraints within the general study area are described below.

Risk to Crossings

Crossings placed over a watercourse may be at risk of failure due to channel processes occurring along the channel, both in proximity to the crossing location, and also along the drainage network. The extent of the risk will depend on the crossing type (e.g., bridge vs. culvert), the type and extent of engineering countermeasures in proximity to the crossing,

and the nature of channel processes that are occurring which could interfere with the crossing structure. Some channel processes that could contribute to risk of a bridge or culvert structure include:

- Channel bed degradation/lowering – this can lead to undercutting of bridge/culvert abutments/footings
- Channel migration – movement of meanders could cause erosion of culvert/bridge embankments
- Channel expansion – enlargement of cross-section areas (e.g., in response to urban hydromodification may lead to increased stress around culvert entrance leading to outflanking of a culvert and flow constriction
- Knickpoint regression along the channel bed profile

In many situations, risk to the crossing structure can be avoided by having a sufficiently wide span to minimize impacts to channel functions. Similarly, risk can be avoided by ensuring that the location of the crossing structure considers the existing and anticipated future platform configuration and position on the floodplain. The crossing type (open or closed) may also influence the risk from fluvial processes on structural integrity.

Crossing Risk to Watercourse and Aquatic Habitat

Crossings situated along a watercourse interact with, and exert an influence on, channel processes. The scientific literature has identified common impacts of watercourse crossings both on channel functions and on aquatic species. Common impacts include destabilization of channel form and function, impediments to fish migration, and destruction of aquatic habitat. In some situations, impacts of a crossing on the channel result in a risk to the crossing. Typical adverse effects attributed to crossings include:

- Scour of banks at culvert inlet/outlet – due to flow contraction/expansion;
- Establishment of a local base level control point (e.g., closed bottom culvert) that affects channel bed profile development
- Perched culvert – affecting channel profile and fish passage
- Sediment deposition – due to a loss in sediment transport capacity upstream or within the culvert
- Sediment loading – at road crossings due to the wash of road based sediment into the channel
- Channel bed degradation
- Channel bed instability

Reduction in potential impacts of crossing structures can be accomplished by minimizing the number of crossings that occur along a watercourse. Further reductions in potential risk to the watercourses and aquatic habitat can occur through proper design and placement of crossing structures along the watercourse. This requires consideration of channel sensitivity and processes at each crossing location.

9. References

AECOM. (2014). Eastern Light Rail Transit (Blair to Trim) – Natural Environment Existing Conditions Report.

AECOM. (2014). Memorandum: Ottawa ELRT – Alternatives Analysis for Noise.

AECOM. (2012). Fluvial Geomorphology Report: Ottawa Road 174/Prescott-Russell County Road 17 Environmental Assessment Study.

City of Ottawa. (2013). Official Plan.

City of Ottawa. (2013). Ottawa Cycling Plan.

City of Ottawa. (2013). Pedestrian Master Plan.

City of Ottawa. (2013). Transportation Master Plan.

City of Ottawa. (2013). Historical Land Use Inventory (HLUI).

City of Ottawa. (2009). National Capital Air Quality Mapping Pilot Project.

City of Ottawa (2006) Environmental Noise Control Guidelines

Golder Associates Ltd. (2013). Stage 1 Archaeological Assessment, Ottawa Road 174, Prescott-Russell County Road 17, Geographic Townships of Gloucester, Cumberland and Clarence, Carleton and Russell Counties.

Government of Canada. (2012). Canadian Environmental Assessment Act, 2012.

Government of Ontario. (2012). Ontario Regulation 231/08 – Transit Projects and Metrolinx Undertakings.

Government of Ontario. (2014). Provincial Policy Statement.

Houle Chevrier Engineering Ltd. (2014). Geotechnical Inventory.

Ministry of Environment of Ontario. (2013). Water Well Records.

Ministry of Natural Resources of Ontario. (2000). Significant Wildlife Habitat – Technical Guide.

Ministry of Natural Resources of Ontario. (2001). Understanding Natural Hazards.

Ministry of Natural Resources of Ontario. (2009). The Ecosystems of Ontario, Part 1: Ecozones and Ecoregions.

Ministry of Transportation of Ontario. (2012). Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects.

National Capital Commission. (1999). Plan for Canada's Capital.

National Capital Commission. (2013). Greenbelt Master Plan.

National Capital Commission and City of Ottawa. (2014). Assessment of Cumulative Effects of Transportation Infrastructure on the National Capital Greenbelt.

Natural Heritage Information Centre. (2014). Natural Heritage Information.

Annex B-1. Stage 1 Archaeological Assessment

February 25, 2013

REPORT

ORIGINAL REPORT

Stage 1 Archaeological Assessment Ottawa Road 174 Prescott-Russell County Road 17 Geographic Townships of Gloucester, Cumberland and Clarence Carleton and Russell Counties

PIF Number: P350-020-2012
Licencee: Ibrahim Noureddine (P350)

Submitted to:
Valerie McGirr P.Eng
Manager, Ottawa Office
AECOM Canada Ltd.
302-1150 Morrison Drive
Ottawa, Ontario
K2H 8S9

Report Number: 12-1126-0047
Distribution:

1 copy - AECOM Canada Ltd.
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1 cd - Ministry of Tourism, Culture and Sport
2 copies - Golder Associates Ltd.

Golder Associates

Executive Summary

The Executive Summary highlights key points from the report only, for complete information and findings as well as limitations, the reader should examine the complete report.

Golder Associates Ltd. (Golder) was retained by AECOM Canada Ltd. (AECOM) to complete a Stage 1 Archaeological Assessment for improvements to Ottawa Road 174 from Highway 417/Ottawa Road 174 Interchange (the "Split") to Canaan Road in Ottawa, and improvements to Prescott Russell County Road 17 from Canaan Road to County Road 8 (Landry Road) in Prescott Russell. The identified study area represents a corridor extending 34 kilometers in length and stretches across the Geographic Townships of Gloucester, Cumberland and Clarence. This archaeological assessment was triggered by the *Environmental Assessment Act* as a requirement prior to the commencement of any construction activities or disturbance to the environment.

The objectives of this archaeological study were to identify known archaeological resources within and in the vicinity of the study corridor, to provide information on previous archaeological investigations conducted in the area, to assess the archaeological potential of the study area and to provide recommendations as to whether any additional archaeological investigations are required.

In consultation with the Ontario Ministry of Tourism, Culture and Sport's (MTCS) archaeological database and additional archaeological data available for this report, eleven archaeological sites have been identified within and around the vicinity of the study corridor.

The potential for pre-contact archaeological material within parts of the study area is considered to be high based on the distribution of known archaeological sites and the proximity to primary and secondary watercourses. Specifically, the Ottawa River was a significant transportation corridor through the area for Indigenous populations as it was also the major transportation route for the first European explorers through the area to James Bay. In addition to these features, the historical archaeological potential is also considered to be high for portions of the study area based on known human occupation and settlement patterns, identified transportation routes and areas of known cemeteries and burial sites. Areas of exclusion of archaeological potential would include disturbed areas where archaeological resources would have been removed or significantly disturbed. Areas identified as possessing archaeological potential, but have previously undergone archaeological investigations by a licensed archaeologist, would not require additional archaeological field investigations.

Due to the high archaeological potential for both pre-contact and historical cultural residues for identified portions of the study area, this investigation has provided the basis for the following recommendations:

1) A detailed Stage 1 Archaeological Assessment is strongly recommended once a preferred alignment and infrastructure locations have been selected. This assessment would clarify areas where archaeological potential has been lost as a result of recent development, and would verify archaeological potential associated with nineteenth century structures located along the route;

2) In the absence of a more detailed Stage 1 Assessment of the selected alignment, any construction through areas identified as having archaeological potential in the present study should be preceded by a Stage 2 Archaeological Assessment undertaken by a licenced archaeologist. This investigation should consist of pedestrian survey at five meter intervals for any areas that can be ploughed and shovel test pits excavated in five meter intervals within areas not assessable by a plough. In areas where a significant amount of fill overlays the culturally significant stratums, especially in urban environments, removal of this fill using a mechanical excavator may be required. Areas identified as possessing archaeological potential, but have previously undergone archaeological investigations by a licensed archaeologist, would not require additional archaeological field investigations;

3) Wherever possible, the final alignment selected and associated infrastructure should avoid built heritage properties. Any potential direct or indirect impact on a built heritage property will necessitate a detailed property evaluation by a built heritage specialist in order to determine appropriate mitigative measures including landscaping, buffering and/or heritage recording. The City of Ottawa, the National Capital Commission, the City of Clarence-Rockland and/or Parks Canada should be consulted in this process depending on the status and location of the structure(s) in question;

4) If any underground disturbance is to be conducted within 50 meters of known cemeteries or burial sites with undetermined boundaries, additional archaeological investigations should be undertaken prior to construction activities in an attempt to determine the boundaries of internments. Additionally, archaeological monitoring is recommended for these areas if they are to be impacted during construction;

5) Known archaeological sites identified in the present study that have not been completely mitigated or deemed to merit further investigation should be avoided. In the event that planned construction is likely to approach within 250 meters of a known archaeological site, further investigation of the site by a licensed archaeologist is required; and,

6) If any portion of a navigable waterway, including the shoreline and riverbed, will be impacted by any future environmental or construction disturbances, an underwater Archaeological Assessment should be completed prior to any disturbance activities.

Project Personnel

Client Contact:	Valerie McGirr P.Eng, AECOM Canada Ltd.
Project Director:	Hugh Daechsel M.A. (P051)
Project Manager:	Ibrahim Noureddine M.A. (P350)
Licensed Archaeologist:	Ibrahim Noureddine M.A. (P350)
Project Archaeologist:	Aaron Mior M.MA. (R390)
Report Preparation:	Aaron Mior M.MA. (R390), Ibrahim Noureddine M.A. (P350), Shan Ling M.A. (P340)
Geographic Imaging:	Bojan Radojevic
Administrative Support:	Candice Butler

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STAGE 1 ARCHAEOLOGICAL ASSESSMENT
OTTAWA ROAD 174/PRESCOTT RUSSELL ROAD 17

1.0 OBJECTIVES

This Stage 1 Archaeological Assessment was completed to identify known archaeological and heritage resources on or in the vicinity of the study area, as well as to assess the archaeological potential of the study area. The objectives of a Stage 1 investigation are based on principals outlined in the *Ontario Heritage Act (consolidated 2007)* and the *Standards and Guidelines for Consulting Archaeologists (2011)*. More specifically, this Stage 1 Archaeological Assessment was completed with the following objectives:

- To provide information about the study area's geography, history, previous archaeological fieldwork and current land condition;
- To evaluate in detail the archaeological potential within the study area, which will support recommendations for Stage 2 survey for all or parts of the study area; and,
- To recommend appropriate strategies for a Stage 2 archaeological survey.

2.0 PROJECT CONTEXT

2.1 Development Context

The United Counties of Prescott and Russell (Prescott Russell) in partnership with the City of Ottawa (Ottawa) are undertaking a multi-jurisdictional Class Environmental Assessment (EA) Schedule C Study for improvements to Ottawa Road 174 from the Highway 417/Ottawa Road 174 Interchange (the "Split") to Canaan Road in Ottawa, and improvements to Prescott Russell County Road 17 from Canaan Road to County Road 8 (Landry Road) in Prescott Russell. The identified study area represents a corridor extending 34 kilometers in length that stretches across the Geographic Townships of Gloucester, Cumberland and Clarence (Maps 1, 2 & 3, pp.38, 39 & 40).

Golder Associates Ltd. (Golder) was retained by AECOM Canada Ltd. (AECOM) to complete a Stage 1 Archaeological Assessment as part of the Class EA study program. This Stage 1 Archaeological Assessment was triggered by the *Environmental Assessment Act* as a requirement prior to the commencement of any construction activities or disturbance to the environment.

2.2 Previous Research

A significant amount of archaeological research and field work has been undertaken in the vicinity of the study area. The corresponding reports provide a substantial amount of historical and archaeological data for both pre-contact and historical resources within the study area.

A chart outlining the year, project title, project information number (when known), project number (when known) and consultant are included as Appendix A.

STAGE 1 ARCHAEOLOGICAL ASSESSMENT
OTTAWA ROAD 174/PRESCOTT RUSSELL ROAD 17

3.0 HISTORICAL CONTEXT

3.1 Regional Pre-Contact History

The present understanding of the local sequence of human activity in the area following the recession of the last ice sheet and the Champlain Sea some 11,000 years ago is very incomplete. It is possible, however, to provide a general outline of prehistoric occupation in the area based on archaeological investigations of south-eastern Ontario.

The earliest human occupation of southern Ontario dates back approximately 12,000 years ago with the arrival of small groups of hunter-gatherers referred to by archaeologists as Paleo-Indians who moved into Ontario as the last of the glaciers retreated northward. Characterized by their nomadic lifestyle, these highly mobile people relied on the caribou, small game, fish and wild plants found in the sub-arctic environment of the time.

The Ottawa Valley remained very much on the fringe of occupation during this period. The ridges and old shorelines of the Champlain Sea and Ottawa River, including part of the Prescott Russell Sand Plain, would be the most likely areas to find evidence of Paleo-Indian occupation.

The environment of southern Ontario approached present conditions during the succeeding Archaic Period extending from 9,000 to 3,000 years ago. Stone tool technologies changed during this period as a broader range of tool types were created although the skill and workmanship declined from the Paleo-Indian standards. Ground stone tools appeared, such as adzes and gouges, tool types which indicate increased wood working and adaptation to new environmental conditions. During the middle and late portions of the Archaic Period, trading networks spanning the Great Lakes developed. By 6,000 years ago, copper was being mined in the Upper Great Lakes and was traded into the southern Ontario region.

Several Archaic sites have provided the first definitive evidence for human occupation in the general vicinity of the study area. Archaic artifacts have been found at Jessup's Falls near the mouth of the South Nation River and at Spencerville near the source of the river (Daechsel, 1980). There was a significant occupation of the St. Lawrence Valley with a number of "Laurentian" or Middle Archaic sites in the vicinity of Cornwall (Dailey and Wright, 1955), and Late Archaic sites have been identified at Leamy Lake near the junction of the Gatineau and Ottawa Rivers, in the Rideau Lakes (Watson, 1982).

The Archaic Period was followed by the Woodland Period, beginning around 2,500 years ago in Ontario, and lasting until 450 years ago. This period is distinguished by the first appearance of ceramics, while there is also evidence of ceremonial rituals including elaborate grave goods. Woodland subsistence strategies were still based on hunting and gathering and their migratory routes followed seasonal patterns to proven hunting locations rather than following migrating herds. Trade networks continued to flourish throughout the Woodland Period and reached their peak around 1,800 years ago when they covered much of North America.

Towards the end of the Middle Woodland Period (approximately 1,500 years ago) agriculture was introduced and began to take on a larger role in subsistence strategies. It began with the cultivation of corn, beans and tobacco and eventually led to the development of semi-permanent and permanent villages. Many of these villages were surrounded by palisades, indicating increased hostilities between neighbouring groups. This settlement pattern was more common in regions with arable land such as southern Ontario. The impact of these changes did not appear to have been significantly felt in the areas north of the St. Lawrence Valley which continued to be used as a hunting area and trade route where many groups retained a semi-nomadic lifestyle.

Middle Woodland sites have been identified in the South Nation Drainage Basin (Daechsel, 1980) and along the Ottawa River including the northwest end of Ottawa at Marshall's and Sawdust Bays (Daechsel, 1981).

During the Late Woodland Period, the South Nation River basin appears to have been a zone of interaction between Iroquoian speaking populations who relied primarily on domesticated crops to the south and Algonquian speaking groups who continued as hunter-gatherers to the north. The Huron peoples along the north shore of Lake Ontario had moved to the Lake Simcoe – Georgian Bay region, leaving the area of eastern Ontario, except for some small Algonquin groups, unoccupied by the time the first French explorers arrived in the beginning of the seventeenth century. Six St. Lawrence Iroquoian villages dating to ca. 1400 AD have been found in the Spencerville area, while an Algonquian site has been investigated near Casselman (Clark, 1905).

3.2 European Contact and Initial Settlement in the Ottawa Valley

The St. Lawrence Iroquois disappeared in the sixteenth century not long after initial contact with Jacques Cartier in 1535. Étienne Brûlé is reported to have been the first European to pass through what is now the Ottawa area. He portaged at the Rideau Falls in 1610, followed by Champlain in 1613. The Ottawa River served as a major route for explorers, traders and missionaries throughout the seventeenth and eighteenth centuries. A series of trading posts and forts were constructed by the French along the river in the early eighteenth century.

The French documented three Algonquin groups in the regional vicinity of the study area (Heidenreich & Wright, 1987). These included the Matouweskarini along the Madawaska River, the Onontchataronon in the Gananoque River Basin, and the Weskarini, the largest of the three, situated on the Petite Nation River Basin. It is likely that prolonged occupation in the Ottawa area was avoided at this time because of hostilities with Iroquoian speaking populations to the south, although it is suggested that at least the northern reaches of the South Nation River Basin were used as hunting territories by these groups.

Settlement in the Ottawa area was not actively encouraged by the colonial government until the late eighteenth century after John Stegman, the deputy surveyor for Upper Canada, established four townships straddling the Rideau River in 1793.

Commonly acknowledged as the first permanent European resident in the area, Philemon Wright settled in Hull Township with five families and thirty-three men in 1800 (Bond, 1984). This community grew over the next few years along the north shore of the Ottawa River and by 1805 Wright had begun significant lumbering activity in the area. Settlement of the south shore was very slow through the early nineteenth century. In 1809 another American, Jehiel Collins, erected a store at what was to become known as Bellows and later Richmond Landing. The first settler in the area was Ira Honeywell, who, in 1810, constructed a cabin west of the Chaudiere Rapids (Bond, 1984). Another early settler was Braddish Billings, who established a small cabin in Gloucester Township in 1812. Billings went into the lumbering business with Philemon Wright and developed his homestead into a large family estate along the banks of the Rideau River.

The construction of the Rideau Canal (1827 - 1832) provided the new settlement of Bytown with its first major growth in population. This resulted in the development of two areas: Lower Bytown to the east of the Canal, primarily populated by French Canadian and Irish labourers and merchants, and Upper Bytown to the west with a predominantly white Anglo-Saxon Protestant population. Bytown was incorporated as the City of Ottawa on January 1, 1855, with a population of 10,000. The selection of Ottawa as the capital of Canada in 1857 was the major catalyst in the subsequent development of the city.

STAGE 1 ARCHAEOLOGICAL ASSESSMENT
OTTAWA ROAD 174/PRESCOTT RUSSELL ROAD 17

3.3 Study Area History

3.3.1 Eighteenth Century Settlement and Occupation

Following the exploration down the Ottawa River by Brûlé, Champlain and others in the seventeenth century, this waterway became a primary aquatic transportation route facilitating the movement of people and goods through what would become the Ottawa area. Trading posts were established along the river in an effort to promote trade with the local First Nations population, and although minimal physical evidence of this early European activity is available, there is some historical documentation of this early occupation within the vicinity of the study area.

Following his retirement from the French military, a Count and his wife are purported to have settled in the Ottawa area with the intention of establishing a post to promote the fur trade with the local First Nations population. Accompanied by a man named Perault and three or four canoe men, they settled in an area known as Butternut Grove, probably near present-day Rockland. A settlement was established which included a contingent of First Nations people along the bank of the Ottawa River. The relationship between the French settlers and the native population is suggested to have been productive and continued for an extended period of time (Serre, 2005).

Just after the French defeat in New France by the British in 1760, Alexander Henry travelled up the Ottawa River and describes observing a small establishment somewhere "east of Lievre", probably near present-day Rockland. This compound appeared to have been recently abandoned when Henry passed through the area (Bond, 1968). It is possible this reference relates to the earlier French settlement in this area described above.

Another eighteenth century settlement along the Ottawa River was established by James Fox, a Revolutionary soldier originating from Ireland. After marrying his wife in Quebec, Fox is said to have settled in the area known as Foxes Point, near present-day Clarence Point and Thurso. After initially establishing a relationship with the First Nation population through the fur trade, Fox later abandoned this commercial enterprise and lived a more sedimentary lifestyle. He and his wife stayed in this area until their death and are believed to be buried at Foxes Point (Serrre, 2005).

By the late eighteenth century, John Graves Simcoe, Lieutenant Governor of Upper Canada, had issued a proclamation aimed at attracting new settlers to the Ottawa Valley. To help facilitate the influx of expected immigration to the area individual lots were surveyed within each township boundary and many of these settlement lots were granted by the Crown to United Empire Loyalists and other prospective immigrants.

3.3.2 Gloucester Township History

Originally identified as "Township B", Gloucester Township was first surveyed in 1772. Land registry records indicate that patents for some of the lots within the township were issued as early as 1802, although many of the grantees never actually came to the area or ever saw their granted property.

One person who did settle along the Ottawa River in Gloucester Township, a man named Ferguson, is known to have established himself as early as 1803, although his stay was short lived as he soon sold or abandoned his plot and left for another area (Belden, 1879). The lack of established overland transportation routes to convey supplies to the area, coupled with the thick deposits of clay making agricultural cultivation difficult, persuaded many early settlers to explore other areas around the Ottawa Valley to establish their homesteads.

The first settlers were dependant on waterways for travel and early residences were established along the Ottawa River. The development of the area was dependant on the logging industry and the Ottawa River played a vital role in the transport of felled lumber to commercial centers where it was sold for a profit. Coffin's 1825 plan of Gloucester Township shows the distribution of property ownership within the study area (Map 4, p.41). Unfortunately though, this map only provides the name of the property owner and does not identify who, if anyone was actually living within each lot. Another limitation of this map is that it does not identify built structures within Gloucester Township to this date.

Originally designed for military purposes and to help transport supplies for the construction of the Rideau Canal, the establishment of L'Orignal-Bytown Road (known today as Montreal Road) through the first concession from the Ottawa River in 1826 facilitated a shift in settlement distribution within the township. This new terrestrial transportation route connecting Bytown (Ottawa) to Montreal accelerated settlement within the study area and encouraged residents to build their homes and business along this new thoroughfare. Stimulated by overpopulated rural areas in Quebec, and the desire of the Catholic Church to establish greater influence in Upper Canada, many of the new migrants into this area of Gloucester Township were Quebecois.

Between 1851 and 1861 the population of Gloucester Township grew from 3,005 to 4,225 (Bond, 1968). Walling's 1863 Gloucester Township map illustrates the clustering of residential and commercial structures around Montreal Road, which represented the main roadway through Gloucester Township (Map 4, p.41). The majority of the identified structures within this section of the study area are bisected by this road, although some, for example in Lots 8, 23 and 25 are still located closer to the Ottawa River. Many of these early buildings were constructed with wood, although some more prominent residents were able to afford stone and brick.

With the growing population came the establishment of churches, schools, taverns and other social and commercial institutions. Many settlers chose to live within close proximity to these establishments and this clustering developed into the foundation of new towns such as St. Joseph/Orleans and Rockville. Belden's 1879 map of Gloucester Township shows another changing settlement dynamic as many of the original Crown lots have been subdivided (Map 4, p.41). Although this reduced the average property size for each landowner, it allowed for a greater number of people to achieve economic stability from the agricultural resources and provide subsistence for their families. The establishment of secondary roads through this part of Gloucester Township facilitated the ability for increased rural population growth while maintaining a connection to the urbanized centers. Although Belden's map only shows the structures of those who chose to pay for this service, and therefore does not represent the true settlement patterns of this area, it does show increased settlement along the south shore of the Ottawa River, especially in the eastern and western portion of the township.

In 1909, the Canadian National Railway was extended south of the Ottawa River, which increased the mobility of people and goods through Gloucester Township. The railway continued to service this area until the great depression when it no longer was economically viable to operate. It was along this former railway line that Ottawa Road 174 was constructed in 1952 (Andreae, 1997). Many of the residential and commercial buildings along this route were constructed following the creation of this new road and the increased settlement along this transportation route can be observed by comparing aerial photographs dating to 1952 and 2010 (Map 7, p.44).

3.3.3 Cumberland Township History

Originally named after the Duke of Cumberland Ernest Augustus, Cumberland Township was first surveyed in 1879 as part of an official policy to settle the area through Crown property grants. The majority of accessible land fronting the Ottawa River was granted to United Empire Loyalists and their descendants, many of whom never actually came to the area and remained absentee landowners.

Early settlers to Cumberland Township included the families of Amable Foubert and Abijah Dunning who immigrated to the area in the early nineteenth century. These two pioneering families settled close to each other along the Ottawa River, with the Foubert's occupying Lot 14 and the Dunning family owning Lots 12 and 13. By 1807, Foubert had established a trading post in the township. The Dunning family had arrived from Massachusetts and secured 800 acres within Cumberland Township. Frustrated with the lack of improvements to roads and bridges which impeded commerce and transportation through this area, Abijah left Cumberland by 1812. His son William, however, returned to the area in 1817 and re-established the Dunning family along the Ottawa River in Cumberland Township.

The scarcity of roads and the poor state of transportation beyond the shore of the Ottawa River slowed settlement within the Township in the early nineteenth century (Belden, 1881). While Coffin's 1825 map shows the ownership of individual lots along the Ottawa River, it does not differentiate between absentee landowners and those residing within the township and their associated built structures (Map 5, p.42). Census records reveal that by 1822 there were six families living along the waterfront lots of Concession 1 and by 1832 this number had risen to fifteen (Serre, 1998). The pace of settlement within Cumberland Township lagged about one generation behind the development of neighbouring Gloucester Township.

The construction of Montreal Road in 1826 established an overland transportation route through the study area and gradually some English, Irish, Scottish and French Canadians immigrated to the area and established homesteads. The Ottawa River continued to play a vital role in the commercial development of this area and many structures were maintained close to its shores, especially between Lots 18 and 26, as shown on a sketch from the 1840 census records (Map 5, p.42). This aquatic route retained its importance as a method to transport timber with mills and wharves operating along this area. The abundance of timber and proximity to the Ottawa River also gave rise to a small shipbuilding industry.

Schools, general stores, churches and other commercial and social structures were erected along Montreal Road to serve the growing population, which had increased to 2,863 by 1840. Walling's 1862 map shows the property and settlement distribution through the study area, while Belden's 1881 plan displays the majority of facilities located along the main transportation road, including churches within Lots 16 and 23, the Orange Hall and a general store on Lots 11 and 12, as well the location of the significant wharves and saw and grist mills along the Ottawa River (Map 5, p.42). The main center of economic activity was Cumberland Village, located within Lots 14 and 15, which by 1871 possessed a number of hotels, merchants and lumber agents, as well as five weaver's shops, six blacksmiths and a physician.

In 1909, the Canadian National Railway was extended through Cumberland Township, with Cumberland Village serving as a flag station responsible for freight and telegraph messages. This new transportation route facilitated the increased movement of people and goods through the region providing economic stability for the population. The CNR railway continued to operate through this area until the great depression when the improved roads and more efficient cars, concurrent with the general economic instability, no longer made the

railroad profitable. The route established by the CNR was transformed into Ottawa Road 174 in 1952 and provided those living in this area of Cumberland Township with a convenient route to travel greater distances, with easier access to urban centers where more lucrative employment opportunities were available (Andreae, 1997). Many of the residential and commercial buildings along Ottawa Road 174 were established after 1952 and the increased development of this area can be seen by comparing aerial photographs dating to 1952 and 2010 (Map 7, p.44).

3.3.4 Clarence Township History

The official survey of Clarence Township was completed by 1796. This created the boundaries of individual property lots in the township which were offered to prospective settlers. James Fox and his wife Mary had established roots in Clarence Township prior to the Crown survey, and are credited with being some of the few settlers in region in the early nineteenth century. In an effort to promote immigration to the area many of the individual lots were granted to United Empire Loyalists and their descendants, although due to the lack of transportation routes and general remoteness of the region, many of these land grantees remained absentee landlords and never actually established their properties. Census records for 1825 report the population of the township totaled 226 residents and growth remained fairly stagnant for the next few decades.

The major impetus facilitating settlement growth within this portion of the study area was the establishment of an overland transportation route in 1848 between Bytown (Ottawa) and L'Orignal. This new road followed the general alignment of Prescott-Russell Road 17 and created an avenue for immigrants to access this area generating an influx of francophone immigrants from Quebec. This thoroughfare also increased the ability to transport goods and supplies into the area which were necessary for settlement stability. Although many families relied on agricultural production, commercial enterprises such as saw mills took advantage of the abundance of timber.

Historic maps dating to 1862 and 1881 display the settlement distribution within the study area during the nineteenth century (Map 6, p.43). Although much of the population remained fairly rural through this period, a small town developed around Rockland where a large saw mill was established in 1868 and grew to employ up to 1,000 people. Many of the commercial and social establishments were centered here including general stores, churches, schools and taverns. The population of Rockland suffered from the decline of the lumber industry and the closure of the mill in the early twentieth century, but began to grow again in the 1960's serving as a satellite community to Ottawa. This settlement growth is reflected in the aerial photographs dating 1952 and 2010 (Map 7, p.44).

STAGE 1 ARCHAEOLOGICAL ASSESSMENT
OTTAWA ROAD 174/PRESCOTT RUSSELL ROAD 17

4.0 ARCHAEOLOGICAL CONTEXT

4.1 Study Area Environment

Diverse regions of surficial geological features are located within the study area (Map 8, p.45). In addition to the complex mixture of surficial deposits within the study area, ridges of terracing are present in the western and central area of the study corridor and represent the outline of a former floodplain.

The western section of the subject corridor consists primarily of offshore marine deposits of clay and silt underlying errosional terraces with areas classified as till plains. Alluvial deposits of silty sand, sand and clay mixture, and silt are also found in this section as are areas of exposed bedrock and an organic deposit of peat and muck.

The central section of the study area is dominated by offshore marine deposits of clay, silty clay and silt. This section also consists of limestone bedrock, till plains, organic sediments of muck and peat, alluvial deposits consisting of sand and silt in addition to deltaic and estuary deposits of medium to fine grained sand.

The eastern section of the study area is a confluence of many different elements including limestone bedrock, organic deposits consisting of peat and muck, till plains, deltaic and estuary deposits, alluvial deposits of sand and silt and offshore marine deposits consisting of clay and silt.

The majority of the study area lies within the Ottawa Valley Clay Plains Physiographic Region which consists of clay plains interrupted by ridges of rock or sand (Map 9, p.46). This region is characterized by generally low, level clay plains mixed with outcrops of bedrock and deposits of sand. In the western section of the subject corridor, there are drumlinized till plains with small areas of limestone and sand plains in addition to the clay deposits. The majority of the central section of the study area is covered by the clay plain with areas of undrumlinized till and limestone plains. The eastern portion of the study area consists of a large component of sand and clay plains with pockets of limestone (Chapman and Putnam, 1973).

There are numerous native soils within the study area (Map 10, p.47). As it is a vast area to cover, the soil types found in the study area will be listed and described below:

- St. Rosalie is comprised of light grey clay with light grey non-calcareous clay parent material. This soil is generally stone free, with level topography which provides poor drainage. This soil type is found in small pockets in the western sections but is one of the dominant soils in the central portion of the study area.
- Rideau soils consist primarily of grey to olive grey, heavy clays. Rideau soils are generally poorly drained and remain saturated or nearly saturated with water for the majority of the growing season. These soils are found in the western and central sections of the study area.
- Bearbrook soils are composed of dark grey clay with non-calcareous, layered, red and grey clay parent material. These soils are generally stone free with poor drainage as the topography is level except where cut by stream channels. Bearbroook soils are found in small pockets along the south shoreline of the Ottawa River in the central and eastern sections with larger deposits further inland.
- Farmington loam consists of a loamy soil approximately six to eighteen inches above the limestone bedrock. These stony soils are undulating with good drainage with large deposits found in the central and western sections of the study area.

- Grenville soils are characterized as brown loam over light brown and dark brown loam, with greyish till underneath and stony throughout. These soils are strongly undulating with good drainage. Grenville soils appear in medium sized pockets in the centre and eastern sections of the study area.
- Osgoode soils are identified as dark grey loam over light brown loam grading into mottled grey brown loam and clay loam. This soil matrix is generally stone free, gently undulating to level, with moderate to slow drainage. A pocket of Osgoode loam is located in the central portion of the study area.
- St. Thomas soils are fine sands that range in colour from light yellowish brown to olive grey. These soils are very well drained. St. Thomas soils are found in small pockets in the eastern section of the study area.
- Castor soils consist of brown silty loam and fine sandy loam over grey brown and brown silt and fine sand and are predominately mottled around twelve inches below the surface. This soil is generally stone free associated with gently undulating topography to level topography and moderate to slow drainage. A medium sized pocket of Castor silty loam soil is found in the eastern section of the study area.
- Cheney soils are classified as a very deep and well drained dark brown to dark yellowish brown soils consisting of coarse loam over sand. A small pocket of this soil type is located within the eastern section of the study area.
- Allendale soils are comprised of fine sandy loam with layered silt and fine sand parent materials usually found overtop of mottled greyish sand over grey clay. This soil is considered to be stone free and is found in level areas of poor drainage. Allendale soils are found in the western section of the study area.
- French Hill represents sandy soil of olive brown to brown in colour. French Hill is a well drained soil found in medium sized deposits in the eastern section of the study area.
- Wendover soils consist of grey clay with non-calcareous, layered, red and grey clay parent material. This soil type are associated with undulating topography with imperfect drainage and is considered to be stone free. Wendover soils are predominant in the eastern section of the study area.

The study area is within the Upper St. Lawrence sub-region of the Great Lakes - St. Lawrence Forest Region (Rowe, 1977). The deciduous trees characterizing this sub-region include sugar and red maple, beech, yellow and white birch, basswood, white ash, red and burr oak and largetooth aspen. Coniferous species include eastern hemlock, eastern white pine, alder, willow, white and black spruce and balsam fir.

The Ottawa River is located to the north of the study corridor and has traditionally been an important aspect of the surrounding cultural landscape. A number of rivers and creeks drain into the Ottawa River which provides the principal drainage for the majority of properties within the study area. These waterways include Green's Creek, Bilberry Creek, Taylors Creek, Cardinal Creek, Becketts Creek, Ruisseau Lafontaine Stream, Clarence Creek and Blais Creek. A number of smaller tributaries also extend from these waterways throughout the study area.

4.2 Built Heritage

The City of Ottawa and the surrounding districts have buildings and areas that reflect its rich history. Many of these have been officially recognized by the designated city and/or townships, the NCC or Parks Canada. These recognized properties include heritage buildings, Heritage Conservations Districts, Cultural Landscapes and National Historic Sites and Monuments.

Built Heritage resources means one or more significant buildings, structures, monuments, installations or remains associated with architectural, cultural, social, political, economic or military history and identified as being important to a community. These resources may be identified through designation or heritage conservation easement under the *Ontario Heritage Act*, or listed by local, provincial or federal jurisdictions (*MTCS*, *2006*).

At the provincial level, individual properties of heritage significance may be designated under Part IV of the *Ontario Heritage Act*. These properties are generally identified by the municipality and a designation report prepared and reviewed prior to provincial designation. Within the City of Ottawa limits, any planned alteration to, or demolition of, a designated property must be reviewed by City Council (City of Ottawa, n.d.). All properties identified under Part IV of the *Ontario Heritage Act* in Clarence-Rockland would also be provided with the same protection. The City of Ottawa and the City of Clarence-Rockland maintain a database of built heritage properties which was consulted for the present study.

There are also a large number of properties within the City of Ottawa that have been identified as having potential heritage significance but have not gone through the formal designation process. These properties are identified as "listed" in the built heritage inventory for the City of Ottawa. While these properties do not have the same level of protection as those designated under the *Ontario Heritage Act*, their potential heritage significance is such that further evaluation would be required in the event that any construction were to have an impact on them. Within the City of Ottawa's built heritage database, individual properties are graded, with Grade 1 buildings being considered 'prime heritage buildings'; Grade 2 buildings 'integral components of a heritage district'; Grade 3 buildings 'heritage components of an area' while Grade 4 buildings are generally modern but still considered significant elements in a heritage area.

There are a significant number of listed and designated heritage properties within the study area. A formal built heritage report produced by a built heritage specialist will be required to meet provincial standards and guidelines for built heritage properties. However, it is important to note the presence of heritage buildings and property in the area of an archaeological study area as the *2011 Standards and Guidelines for Consultant Archaeologists* states that properties "listed on a municipal register or designated under the *Ontario Heritage Act* or that is a federal, provincial or municipal historic landmark site" indicates archaeological potential (MTCS, 2011).

Maps 11, 12 and 13 (pp.48, 49 & 50) display the location of the listed and graded heritage buildings and those designated under Part IV of the *Ontario Heritage Act* within the study area for each township. These maps outline the entire parcel of land associated with a heritage property and are colour coded to indicate the category of its heritage status (designated, grade or listed). It should be noted that overlapping designated properties have been ordered such that the highest designation is on the top, possibly obscuring the view of other, smaller properties that have a lower designation on them as well. A complete listing of the heritage properties within the study area, showing all designations and addresses, is provided as Appendix B.

4.3 Archaeological Sites

The primary source of information regarding known archaeological sites in the region is the MTCS archaeological site database. A current version of this database was consulted for the present assessment. Additionally, there are a number of known sites within the general study area that have not been formally registered. Many of these sites were identified prior to the 1970's and are poorly documented. The location and nature of unregistered sites described in this report was obtained by consulting available archaeological and

historical sources. Archaeological research in the study area is ongoing and the MTCS site registration database may not include sites identified in the past few months or even years. As a result, all archaeological consultants' reports available to the author were consulted for this assessment.

Sites registered through the MTCS are designated using a national site registration number (Borden Number) consisting of a sequential number within a specific block based on latitude and longitude. Thus, BjFu-2 represents the second site identified within the geographic area identified as block BjFu.

There are eleven registered and unregistered archaeological sites in the study area or within close proximity to the corridor (Map 14, p.51). Formally registered sites have been identified with their Borden Numbers and unregistered sites have been given the prefix 'UR' followed by a cardinal number. The sites vary considerably in nature, size and level of investigation undertaken to date and represent a range of pre-contact and historic period occupations. Some of the sites consist of a single artifact while others contain numerous features and a large quantity of artifacts. Some isolated finds made in the nineteenth or early twentieth century are poorly documented and no systematic investigation was ever undertaken. In some cases, the sites have been fully mitigated and no further archaeological investigation is required, and, in some cases, the sites were deemed not worthy of continued excavation. In some instances, however, additional archaeological investigation would be necessary in the event of construction activity on or within 250 meters. Further, as will be discussed below, it must be noted that any area within 250 meters of a known archaeological site is considered to have archaeological potential and must be assessed prior to development in the area, unless already investigated (see Section 4.5).

Finally, as noted above, many of the built heritage sites identified in Section 4.2 can also be considered archaeological sites. An evaluation of the impact any construction activities may have on a built heritage resource would include an assessment of its potential as an archaeological site. This would apply to standing as well as demolished listed structures.

The following review of known archaeological resources has been divided according to pre-contact and historic time periods.

Pre-contact Archaeological Sites

BiFu-4 – Kings Pointe

This site was identified during a Stage 2 Assessment of a proposed Claridge Homes subdivision in Cumberland Township and is located west of Trim Road and north of Innes Road near the hydro easement. It contained a scatter of undiagnostic lithic material. No further investigation of the site was recommended (Swayze, 2003).

BiFu-6 – Cardinal Creek Findspot

This site represents a small scatter of undiagnostic lithic material identified during a Stage 2 Assessment for a proposed residential subdivision. It is located in Cumberland Township, north of Innes Road between Trim Road and the Cardinal Creek ravine. No further investigation of the site was recommended (Swayze, 2001).

UR-1&2 Pre-contact Sites

Two pre-contact sites dated to the Woodland Period have been identified near the eastern boundary of Cumberland Township. These sites are mentioned in consultants reports submitted to the MTCS (Adams, 2009; Heritage Quest, 2005a). These sites are not identified on the corresponding map due to imprecise locational information.

UR-3 Pre-contact Site

A single pre-contact period archaeological site has been identified close to the Village of Cumberland. As of 2009, no additional archaeological investigation had been conducted at this site. This find is mentioned in a consultants report submitted to the MTCS (Adams, 2009). This site is not identified on the corresponding map due to imprecise locational information.

UR-4 Pre-contact Findspot

A quartz biface was reported by W. J. Wintemberg as found by T. Graham in 1884 on Lot 20, Concession 3, Township of Gloucester. This findspot was mentioned in a consultants report submitted to the MTCS (Heritage Quest, 1999a). This site is not identified on the corresponding map due to imprecise locational information.

UR-5 Kettle Island

Artifacts attributed to First Nations settlement and occupations have been identified along the Ottawa River on Kettle Island (Bond, 1968). Unfortunately, detailed information regarding the specific location, context and provenience of these artifacts is not available.

Historic Archaeological Sites

BiFu-1 Cardinal Creek 1

This site is located near the junction of Innes and Frank Kenny Roads on the west bank of Cardinal Creek within Lot 1, Concession 8, Cumberland Township. This is the location of the late nineteenth century Scarf farmstead and was removed in 1995. This site was mentioned in a consultants report submitted to the MTCS (Heritage Quest, 1999a).

BiFu-5 Cardinal Creek Homestead

This site is located in Cumberland Township just north of Innes Road between Trim Road and the Cardinal Creek ravine and was identified during a Stage 2 Archaeological Assessment. This site represents an early twentieth century farm site and includes various structural remains, a midden deposit and associated artifacts. No further investigation of the site was recommended at this time (Swayze, 2001).

BjFu-2 Wilson Site

This site is located within Concession 1, Lots 12 and 13, Cumberland Township and consists of a Euro-Canadian period wharf, gristmill, sawmill and woollen mill complex dating to the mid to late nineteenth century. Additional work has been recommended prior to any disturbance of this area (Beaulieu, 1996).

UR-6 Sawmill Ruins

This site is located in Parc du Moulin, Edwards Street, Rockland, and has been identified as the former location of a sawmill complex owned by William Cameron Edwards (1844-1921). A plaque was placed at this location by the Ontario Heritage Trust (OHT, 2012). No known archaeological field investigations have been conducted at this site.

4.4 Study Area Site Inspection

A spot-checking site inspection of the study area was conducted on September 12, 2012, with sunny conditions and a temperature of 24 degrees Celsius. Map 15 (p.52) shows the location of images included in the report and a catalogue of photographs taken during the site inspection is included as Appendix C. Due to the size of the study area, only specific features of archaeological interest were inspected to assess their current condition.

Waterways have always been a significant aspect of the cultural landscape and have been traditionally utilized for food procurement (eg. fishing) and as aquatic transportation routes. Nine primary waterways located within the study area were visited to confirm their location and current condition.

The Ottawa River (Image 1, p.26) constitutes the northern boundary throughout a significant portion of the study area. This important waterway has been a primary transportation route facilitating the movement of people and goods through the Ottawa Valley since the original settlement of First Nations people in the area. Pre-contact artifacts and historic settlement sites have been identified along the shores and islands the length of the Ottawa River providing evidence of continued land use in this area.

Significant tributaries of the Ottawa River located within the study area include Green's Creek (Image 2, p.26), Bilberry Creek (Image 3, p.27), Taylors Creek (Image 4, p.27), Cardinal Creek (Image 5, p.28), Becketts Creek (Image 6, p.28), Ruisseau Lafontaine Stream (Image 7, p.29), Clarence Creek (Image 8, p.29) and Blais Creek (Image 9, p.30). Smaller tributaries extending out from these waterways also traverse the study area providing a natural water source and drainage channels.

Another purpose of the site inspection was to identify and confirm the location of known and suspected cemeteries and burial grounds. The locations of these cemeteries and burial grounds are shown on Map 16 (p.53).

The only identified burial ground within the study area in Gloucester Township is St. Joseph's Cemetery (Image 10, p.30). This cemetery is located north of St. Joseph Boulevard, between Cousineau Street and St. Pierce Street, within Lot 2, Concession 1. The only municipal burial ground within the study area in Cumberland Township is Dales Cemetery (Image 11, p.31) located south of Old Montreal Road beside the Cumberland Heritage Museum, within Lot 11, First Concession from the Ottawa River.

Two additional burial grounds within the study area are documented from historical research and were investigated during the site inspection. The first is known as the McMillan Family Cemetery, located "on the hydro line" south of Ottawa Road 174, within Lot 17, Concession 1 (Boyer, 2012). Two headstones were known to have been located here, the first identifying the burial location of Sarah McMillan (interred 1889) and the second, a double headstone, marking the location of Catherine McMillan (interred 1855) and Alexander McMillan (interred 1840). Although these burial markers were not identified during the present site visit, a photograph was taken showing the general vicinity of the burial ground (Image 12, p.31). Although the specific location of the headstones could not be identified during the site inspection, this does not exclude the possibility that human burial remains are present in this location. Also, although only two headstones were originally identified in this area, there is a possibility that additional burials related to the McMillan family were originally interred in this location.

STAGE 1 ARCHAEOLOGICAL ASSESSMENT
OTTAWA ROAD 174/PRESCOTT RUSSELL ROAD 17

The second private cemetery identified within the study area in Cumberland Township is located on Lot 13, Concession 1, between Ottawa Road 174 and the Ottawa River (Image 13, p.32). This burial ground is attributed to the Dunning family and is suggested to have been established sometime in the 1830s or early 1840s. Two headstones are currently visible (Image 14, p.32), although additional members of the family are known to have been interred in this location with their headstones having been previously disturbed (McConnell, 2007).

Two cemeteries are located within the boundaries of the study area in the Township of Clarence. Both are situated in the Town of Clarence-Rockland, the first being located north of Laurier Street in between Victor Street and Notre Dame Street (Image 15, p.33). The second is located approximately 150 meters north of County Road 17, west of Edwards Street (Image 16, p.33).

Although the significant number of listed and designated buildings within the study area prevented a systematic investigation, a select number of properties associated with known built heritage structures were visited to assess the current condition of the associated property and the corresponding archaeological potential.

1367 St. Joseph's Boulevard in Gloucester Township has been identified as the former location of Butler House and is designated as a listed heritage property under Part IV of the *Ontario Heritage Act*. The property is currently occupied by Orchardview Montessori School, although the surrounding area does not appear to have been significantly disturbed and therefore would still possess potential for discovery of material cultural remains associated with the former heritage residence (Image 17, p.34).

Cameron House (aka Clendenan House) is located at 2226 Old Montreal Road (Lot 18, Concession 1, Old Survey) and was designated by the Former Township of Cumberland under Part IV of the *Ontario Heritage Act* in 1984 (Saulnior, 1984). The stone residence on this property was erected prior to 1851 and is one of the oldest surviving buildings in the area (Image 18, p.34). Although some construction disturbance was observed during the site visit, the property between the residence and Old Montreal Road does not appear to have been significantly disturbed.

A visit to Clearview House, located at 2607 Old Montreal Road (Lot 14, Concession 1, Old Survey, Cumberland Township), was conducted to assess the current condition of the property. This property, in addition to the outlying areas, has been designated under Part IV of the *Ontario Heritage Act* and is currently under the auspices of the City of Ottawa. The stone structure fronting Old Montreal Road, as well as the surrounding property, does not appear to have been significantly disturbed (Image 19, p.35) and therefore has retained archaeological potential for material cultural residues associated with the historic settlement on this property.

Old Wilson House, located at 2800 Old Montreal Road (Lot 12, Concession 1, Old Survey), was designated by the Former Township of Cumberland under Part IV of the *Ontario Heritage Act* in 1984 (Saulnior, 1984). The stone residential structure was erected prior to 1861 and is currently located approximately 5 meters from the asphalt shoulder of Old Montreal Road (Image 20, p.35). No areas of significant disturbance were observed during the site inspection suggesting the surrounding property was retained it cultural and archaeological potential.

2537 and 2541 Old Montreal Road, located in the Village of Cumberland, are both situated within Lot 14, Township Concession 1, Old Survey, and are listed as heritage properties by the City of Ottawa. 2537 Old Montreal Road has been suggested to represent the original location of Leonard Foubert House, which was a log house built in the 19th century "next to the Maple Hall" (Blake, 2007). Although the original log house is no

longer standing, the surrounding property does not appear to have been significantly disturbed and therefore retains potential for archaeological resources dating to the early 19th century (Image 21, p.36).

The Foubert family originally purchased Lot 14, Cumberland Township Concession 1, Old Survey, from the Dunning family in 1807 (Smith, 2010). The land correlating to the listed heritage property on 2541 Old Montreal Road is identified as the Dunning Home and may be associated with the early 19th century settlement by this pioneering family. A red brick house currently stands on this property (Image 22, p.36), although the surrounding property appears relatively undisturbed and therefore has retained significant archaeological potential.

4.5 Archaeological Potential

4.5.1 General

A number of factors are employed when determining archaeological potential within a particular area. In addition to the proximity to known archaeological sites, factors for determining pre-contact and historical archaeological potential include watershed area (primary and secondary watercourses), distance from water, drainage patterns, identification of past water sources (beach ridges, river beds, relic creeks, ancient shorelines, etc), elevated topography and identification of significant physiological and geological features (knolls, drumlins, eskers, plateaus, etc), soil geomorphology, distinctive land formations (mounds, caverns, waterfalls, peninsulas, etc), known burials sites and cemeteries, biological features (distribution of food and animal resources before colonization), features identifying early Euro-Canadian settlements (monuments, structures, etc), historic transportation routes (historic roads, trails, portages, rail corridors, etc) and properties designated and/or listed under the *Ontario Heritage Act.* Local knowledge from aboriginal communities and heritage organizations as well as consultation of available historical and archaeological literature and cartographic resources aids in the identification of features possessing archaeological potential.

These criteria are based on the MTCS Checklist for Determining Archaeological Potential and were used to identify archaeological potential for the study area under investigation. Based on the identified features for both pre-contact and historic archaeological material culture resources within the study area, portions of land within the study corridor are deemed to possess archaeological potential.

Using the City of Ottawa archaeological potential master plan as a base map (ASI, 1999), the archaeological potential within the study area has been updated to reflect information collected from additional sources. The identified archaeological potential within the study area has been divided into three geographic areas representing historic township boundaries.

It should be stressed that the City of Ottawa archaeological master plan, and the modified version presented here, only provide a general indication of archaeological potential. Once the final area of development has been identified, a more detailed Stage 1 Archaeological Assessment of specific construction sites within the study corridor is recommended in order to provide a more accurate determination of archaeological potential and further define areas that require Stage 2 field testing. The settlement history for all property lots within the present study area is difficult to determine based on available historic maps alone. Once the final construction area is identified a detailed settlement history utilizing land registry records and census assessments for all properties to be effected would further identify areas of historical archaeological potential.

4.5.2 Gloucester Township

Map 17 (p.54) displays the archaeological potential identified within the study area located in Gloucester Township. Property within 200 meters of primary and secondary waterways, which includes the Ottawa River, Green Creek, Bilberry Creek, and their associated tributaries, is considered to possess archaeological potential and reflects a significant area identified on the map.

Historic maps of Gloucester Township published by Walling (1862) and Belden (1879) were used to identify transportation routes and structures of historical significance (Map 4, p.41). Although these maps do not delineate all the structures present during the nineteenth century, they do provide general locations documenting historic settlement patterns. A 200 meter buffer was included around structures identified on historic maps in an effort to account for any discrepancies between historic and modern mapping techniques and to capture outlying occupation areas associated with these structures.

Known burial sites and cemeteries are also identified as possessing archaeological potential (Map 16, p.53) and the only one identified within the study area in Gloucester Township is St. Joseph's Cemetery, which is located north of St. Joseph Boulevard within Lot 2, Concession 1. The boundaries of this cemetery appear to be well defined and the archaeological potential would be limited to the boundary of the cemetery.

No registered archaeological sites have been identified within the study area of Gloucester Township (Map 14, p.51), although this may be attributed to the paucity of archaeological field reconnaissance within this immediate region rather than a reflection of past demographic patterns. Known finds in the vicinity of the study area in Gloucester Township include a quartz biface found within Lot 20, Concession 3 and along the Ottawa River, specifically on Kettle Island.

Properties designated and/or listed under the *Ontario Heritage Act* have been identified as areas of archaeological potential by the MTCS. The listed and designated heritage properties identified within the study area in Gloucester Township containing archaeological potential are identified on Map 11 (p.48). Of particular interest is 1367 St. Joseph's Boulevard which has been identified as the former location of Butler House and has been designated as a listed property under Part IV of the *Ontario Heritage Act*.

Previous Stage 1 Archaeological Assessments within the study area have also identified areas of archaeological potential that have not yet undergone field investigations by a licensed archaeologist. These assessments include property within Concession 1, Lot 1 (Golder, 2011b), Concession 1, Lot 2 (Golder, 2010), Concession 1, Lot 13 (Heritage Quest, 2006) and properties within the study area located in Concession 2 (Heritage Quest, 2005b, 1999a). Larger studies documenting archaeological potential within the study area in Gloucester Township include the Interprovincial Crossing assessments (Arkeos, 2008; ASI, 2008) and the archaeological potential mapping project for the National Capital Commission (Laliberte, 2000).

The size of the study area prevented a comprehensive field investigation to assess properties affected by modern disturbances. Areas of exclusion of archaeological potential would include areas where any archaeologically significant material cultural residues have been removed or significantly disturbed. Also, any property previously field tested by a licensed archaeologist where the corresponding report has been accepted by the MTCS would be excluded from requiring additional investigations.

4.5.3 Cumberland Township

Map 18 (p.55) outlines the archaeological potential within the study area located in Cumberland Township. The MTCS has identified a buffer of 200 meters around primary and secondary waterways as areas of archaeological potential. This buffer zone encompasses a substantial portion of the archaeological potential within Cumberland Township with the Ottawa River, Taylors Creek, Cardinal Creek, Becketts Creek and their associated tributaries providing the principal drainage and historic water source in this area.

Transportation routes and structures of historical significance were identified from maps including the 1840 census assessment, Walling's 1862 plan and Belden's 1881 map delineating Cumberland Township (Map 5, p.42). Unfortunately, these maps do not portray all structures inhabited at the time of their production, although they do provide cartographic evidence of transportation routes and general settlement areas. A 200 meter buffer was included around structures identified on these historic maps in an effort to account for any discrepancies between historic and modern mapping techniques and to capture outlying occupation areas associated with these structures.

The MTCS also stipulates known burial sites and cemeteries as areas of archaeological potential. The only municipal cemetery within the study area in Cumberland Township is Dales Cemetery located south of Old Montreal Road beside the Cumberland Heritage Museum, within Lot 11, First Concession from the Ottawa River (Map 16, p.53). The boundaries of this cemetery appear to be well defined and the archaeological potential would be limited to the boundary of the cemetery.

Two additional burial grounds within the study area in Cumberland Township were identified from historical sources (Map 16, p.53). The first is known as the McMillan Family Cemetery, located "on the hydro line" south of Ottawa Road 174, within Lot 17, Concession 1. Although no headstones were observed during the site inspection, the possibility exists for human remains interred in this area and therefore is considered to possess high potential for archaeological resources.

The second private burial ground identified within the study area in Cumberland Township is located on Lot 13, Concession 1, between Ottawa Road 174 and the Ottawa River. This burial ground includes the remains of the Dunning family, one of the earliest families to settle in Cumberland Township in the nineteenth century. Two headstones were identified during the site inspection and there is a strong possibility of additional burials in this location. Both the McMillan and Dunning family cemeteries do not have visibly delineated boundaries and therefore the extent of the burial areas cannot be positively defined at this time. Archaeological potential in these areas should be considered to be 50 meters around the known and suspected burial locations.

Five registered archaeological sites are located within the study area in Cumberland Township (Map 14, p.51). Of these, two are documented as pre-contact era sites (BiFu-4 and BiFu-6) and three are listed as historic period sites (BiFu-1, BiFu-5 and BjFu-2). The location of archaeologically significant sites identifies these areas as places of past occupation and land use. The MTCS identifies all land within 250 meters of known archaeological sites as areas of archaeological potential, and these sites and their associated buffers are reflected on the corresponding archaeological potential map for Cumberland Township.

Three additional pre-contact period archaeological sites (UR-1, UR-2 and UR-3) have been identified within the study area in Cumberland Township, two near the eastern boundary of the township and one near the modern village of Cumberland. Unfortunately, information detailing the extent of these sites, their associated artifacts and exact locations are not available for analysis. Although these sites are not represented on the archaeological

potential map due to imprecise locational information, they do provide additional evidence documenting past human activity in the area.

A large number of properties within the study area in Cumberland Township have been either listed or designated under the *Ontario Heritage Act* (Map 11, p.48) and therefore are considered to possess archaeological potential. Properties of particular importance due to their official designation or historical significance include Cameron House (aka Clendenan House) located at 2226 Old Montreal Road, Clearview House located at 2607 Old Montreal Road, Wilson House at 2800 Old Montreal Road, 2537 and 2541 Old Montreal Road within Lot 14, Concession 1, which is associated with the early settlement of the Foubert family.

Additional lands recognized as containing archaeological potential have been identified from previous archaeological assessments and are reflected on the archaeological potential map for Cumberland Township. These properties, which are not known to have been subjected to Stage 2 field investigations, include land within Lot 1, Concession 1 (Golder, 2011), Lot 8, Concession 1 (Stantec, 2011), Lot 13, Concession 1 (Heritage Quest, 2006), Lots D and E, Concession 7 (Adams Heritage, 2009), Lots 27 to 33, Concession 1 (Golder, 2012), Lots 34 to 38, Concession 1 (Heritage Quest, 2005), property along Montreal Road (Jacques Whitford, 2008) and along Innes Road (Heritage Quest, 1999). Larger archaeological investigations encompassing property within the study corridor in Cumberland Township which have identified areas of archaeological potential include those for the Light Rail project (Heritage Quest, 2005), gas pipeline corridor (Heritage Quest, 1995) and Interprovincial Crossing assessments (Arkeos, 2008; ASI, 2008).

The expanse of land within the study area in Cumberland Township area prevented a comprehensive field investigation to assess properties affected by modern disturbances. Areas of exclusion of archaeological potential would include areas where any potential archaeological resources have been removed or significantly disturbed. Also, any property previously field tested by a licensed archaeologist where the corresponding report has been accepted by the MTCS would be excluded from requiring additional investigations.

4.5.4 Clarence Township

Map 19 (p.56) shows the archaeological potential within the study area in Clarence Township. The majority of the property identified as possessing archaeological potential is the 200 meter buffer around all primary and secondary waterways, the most prominent being the Ottawa River, Ruisseau Lafontaine Stream, Clarence Creek and Blais Creek. These waterways, and their associated tributaries, provide the main source of fresh water and principal drainage in this area.

Identification of historic transportation routes and the former location of historically significant structures was established from nineteenth century maps produced by W. F. Walling and H. Belden (Map 6, p.43). While these maps are useful when studying general settlement patterns, a significant limitation is that they do not provide information for all standing structures within the township, especially Belden's 1881 map which only plots the homesteads of those who subscribed to this publication. The features identified on the historic maps provide evidence of archaeological potential and a 200 meter buffer was included in an effort to account for any discrepancies between historic and modern mapping techniques and to capture outlying occupation areas associated with these structures.

Cemeteries and known burial sites are also areas identified as possessing archaeological potential. Within the town of Clarence-Rockland there are two such features, the first located north of Laurier Street, in between Victor Street and Notre Dame Street, and the second approximately 150 meters north of County Road 17, west of Edwards Street (Map 16, p.53). The first cemetery borders closely to both Laurier Street and Notre Dame Street, and the possibility exists that human remains may be contained in areas not previously disturbed by the construction of these roadways. The cemetery west of Edwards Street consists of a number of headstones in the northwest corner of an area surrounded by a chain linked fence. Although the boundaries of this cemetery appear to be confined inside this enclosure, the possibility exists that human remains may extend just outside this boundary in areas not previously disturbed.

The only known archaeological site within the vicinity of the study area in Clarence Township is located in Parc du Moulin on Edwards Street in the town of Clarence-Rockland (Map 14, p.51). This area has been identified by the Ontario Heritage Trust as the location of a nineteenth century sawmill complex owned by William Cameron Edwards. This location is north of the study area and any archaeological potential associated with this site does not extend to the study area boundary.

According to the MTCS checklist for determining archaeological potential, any property designated and/or listed under the *Ontario Heritage Act* is considered to possess potential for the recovery of archaeologically significant resources. Seven properties have been listed under Part IV of the *Ontario Heritage Act* within the study area in Clarence Township, all located on Laurier Street in the town of Clarence-Rockland (Map 13, p.50).

Previously completed archaeological assessments within the study area in Clarence Township also provide an additional resource when determining archaeological potential. Assessments consulted for this report which have identified areas of archaeological potential that are not known to have undergone field investigations by a licensed archaeologist include an overview study of Clarence Township completed by Heritage Quest (1996), a gas pipeline corridor (Heritage Quest, 1995) and property in the eastern portion of the study area that was previously assessed for a proposed waterworks project (CARF, 1997).

The size of the study area in Clarence Township made a comprehensive field investigation to assess all property for additional archaeological potential attributes and determine areas of modern disturbance difficult. Areas of exclusion of archaeological potential would include anywhere potential archaeological resources have been removed or significantly disturbed. Also, any property previously field tested by a licensed archaeologist where the corresponding report has been accepted by the MTCS would be excluded from requiring additional investigations.

5.0 ANALYSIS AND CONCLUSIONS

On behalf of AECOM, Golder completed a Stage 1 Archaeological Assessment for the proposed re-development of Ottawa Road 174/Prescott-Russell County Road 17 transportation corridor. The study area extended through Concessions 1 and 2 (Ottawa River) in the township of Gloucester, across the entire northern section of Cumberland Township and the northwestern portion of Clarence Township. The objective of this assessment was to identify known archaeological sites on and within the vicinity of the study corridor and to assess the archaeological potential of the properties under investigation.

The study area consisted of an east-west corridor approximately 34 kilometers in length extending between 1 – 5.5 km south of the Ottawa River. Land use in the area consists of a combination of residential, commercial, industrial, institutional and recreational, as well as agricultural. Archaeological evidence indicates that land within the study area was inhabited prior to the arrival of European explorers and additional sites of pre-contact archaeological significance may be located within the subject corridor. Archaeological and historical resources consulted for this report also confirm that some of the properties within the study area were settled by European descendants as early as the eighteenth century with census and land registry documents consulted for previously completed Stage 1 assessments confirming that portions of the study area have been continuously settled since the early nineteenth century to the present day.

The potential for pre-contact archaeological material within parts of the study area is considered to be high based on the distribution of known archaeological sites and the proximity to primary and secondary watercourses. Specifically, the Ottawa River would have been employed as a significant transportation corridor through the area for Indigenous populations as well as the major transportation route for the first European explorers through the area. In addition to these features, the historical archaeological potential is also considered to be high for portions of the study area based on known human occupation and settlement patterns, identified transportation routes and areas of known cemeteries and burial sites. Areas of exclusion of archaeological potential would include disturbed areas where the historical material cultural residues have been removed or significantly disturbed. Areas identified as possessing archaeological potential, but have previously undergone archaeological investigations by a licensed archaeologist, would not require additional archaeological field investigations.

6.0 RECOMMENDATIONS

Due to the high archaeological potential for both pre-contact and historical cultural residues for identified portions of the study area, this investigation has provided the basis for the following recommendations:

1) A detailed Stage 1 Archaeological Assessment is strongly recommended once a preferred alignment and infrastructure locations have been selected. This assessment would clarify areas where archaeological potential has been lost as a result of recent development, and would verify archaeological potential associated with nineteenth century structures located along the route;

2) In the absence of a more detailed Stage 1 Assessment of the selected alignment, any construction through areas identified as having archaeological potential in the present study should be preceded by a Stage 2 Archaeological Assessment undertaken by a licenced archaeologist. This investigation should consist of pedestrian survey at five meter intervals for any areas that can be ploughed and shovel test pits excavated in five meter intervals within areas not assessable by a plough. In areas where a significant amount of fill overlays the culturally significant stratums, especially in urban environments, removal of this fill using a mechanical excavator may be required. Areas identified as possessing archaeological potential, but have previously undergone archaeological investigations by a licensed archaeologist, would not require additional archaeological field investigations;

3) Wherever possible, the final alignment selected and associated infrastructure should avoid built heritage properties. Any potential direct or indirect impact on a built heritage property will necessitate a detailed property evaluation by a built heritage specialist in order to determine appropriate mitigative measures including landscaping, buffering and/or heritage recording. The City of Ottawa, the National Capital Commission, the City of Clarence-Rockland and/or Parks Canada should be consulted in this process depending on the status and location of the structure(s) in question;

4) If any underground disturbance is to be conducted within 50 meters of known cemeteries or burial sites with undetermined boundaries, additional archaeological investigations should be undertaken prior to construction activities in an attempt to determine the boundaries of internments. Additionally, archaeological monitoring is recommended for these areas if they are to be impacted during construction;

5) Known archaeological sites identified in the present study that have not been completely mitigated or deemed to merit further investigation should be avoided. In the event that planned construction is likely to approach within 250 meters of a known archaeological site, further investigation of the site by a licensed archaeologist is required; and,

6) If any portion of a navigable waterway, including the shoreline and riverbed, will be impacted by any future environmental or construction disturbances, an underwater Archaeological Assessment should be completed prior to any disturbance activities.

STAGE 1 ARCHAEOLOGICAL ASSESSMENT
OTTAWA ROAD 174/PRESCOTT RUSSELL ROAD 17

7.0 ADVICE ON COMPLIANCE WITH LEGISLATION

This report is submitted to the Ministry of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O 1990, c 0.18. The report has been reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeological Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.

The Cemeteries Act R.S.O. 1990 c. C.4 and the Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

8.0 IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the archaeological profession currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

This report has been prepared for the specific site, design objective, developments and purpose described to Golder by AECOM Canada Ltd. (the Client). The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent.

If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges the electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client cannot rely upon the electronic media versions of Golder's report or other work products.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project.

Special risks occur whenever archaeological investigations are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain archaeological resources. The sampling strategies incorporated in this study comply with those identified in the Ministry of Tourism and Culture's Standards and Guidelines for Consulting Archaeologists (2011).

STAGE 1 ARCHAEOLOGICAL ASSESSMENT
OTTAWA ROAD 174/PRESCOTT RUSSELL ROAD 17

9.0 IMAGES

Image 1: Ottawa River looking north, from County Road 17.

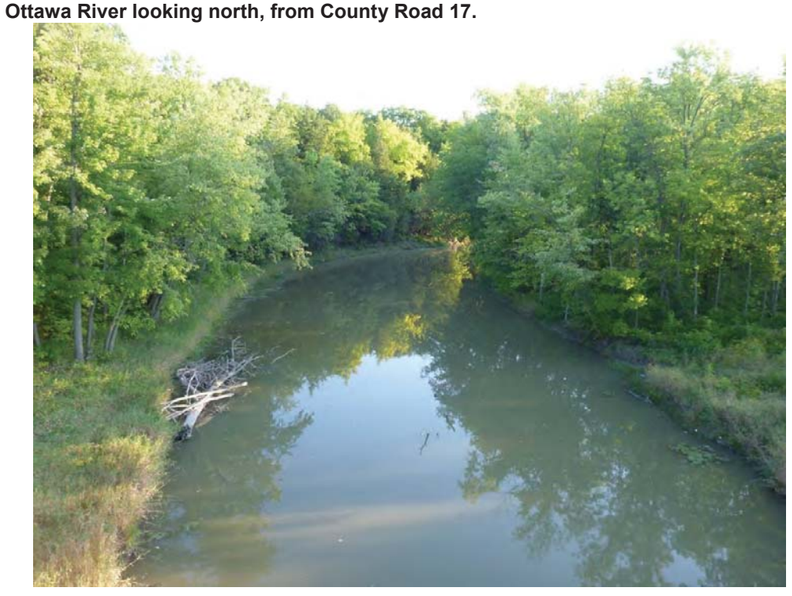

Image 2: Greens Creek in Gloucester Township, looking north from St. Joseph's Boulevard.

STAGE 1 ARCHAEOLOGICAL ASSESSMENT
OTTAWA ROAD 174/PRESCOTT RUSSELL ROAD 17

Image 3: Bilberry Creek in Gloucester Township, looking southeast from St. Joseph's Boulevard.

Image 4: Taylor's Creek in Cumberland Township, looking southeast from Old Montreal Road.

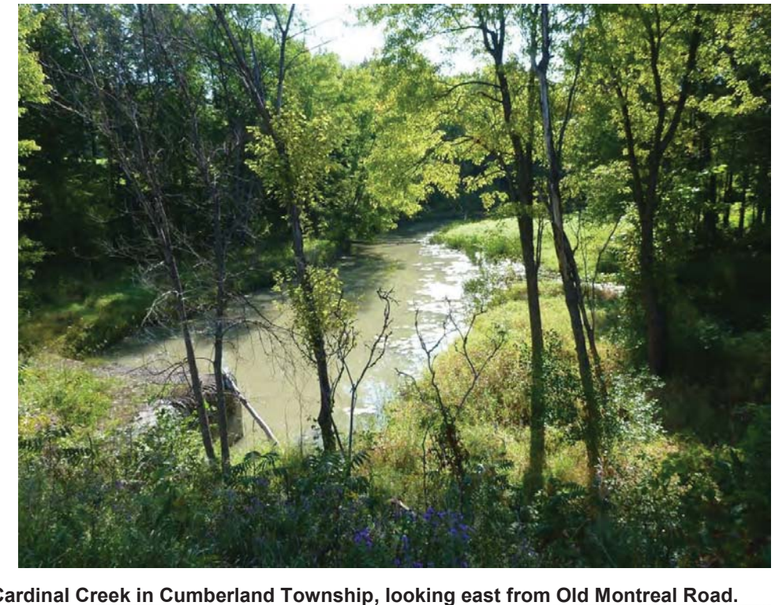

Image 5: Cardinal Creek in Cumberland Township, looking east from Old Montreal Road.

Image 6: Becketts Creek in Cumberland Township, looking north from north of County Road 17.

Image 7: Ruisseau Lafontaine Stream in Clarence Township, looking southeast from County Road 17.

Image 8: Clarence Creek in Clarence Township, looking southeast from County Road 17.

Image 9: Blais Creek in Clarence Township, looking northwest from County Road 17.

Image 10: St. Joseph's Cemetery located in Gloucester Township, looking northeast.

Image 11: Dales Cemetery located in Cumberland Township, looking southeast.

Image 12: Suggested location of McMillan family cemetery, looking west.

Image 13: Location of Dunning family cemetery, looking northeast.

Image 14: Close up of two headstones attributed to the Dunning family.

Image 15: Cemetery in Rockland located north of Laurier Street, looking north.

Image 16: Cemetery in Rockland located north of County Road 17, looking north.

Image 17: Butler House heritage property located at 1367 St. Joseph's Boulevard, looking northwest.

Image 18: Cameron House/Clendenon House heritage property located at 2226 Old Montreal Road, looking southeast.

Image 19: Clearview House heritage property located at 2607 Old Montreal Road, looking north.

Image 20: Old Wilson House heritage property located at 2800 Old Montreal Road, looking south.

Image 21: Leonard Foubert House heritage property located at 2537 Old Montreal Road, looking north.

Image 22: Dunning Home heritage property located at 2541 Old Montreal Road, looking north.

10.0 MAPS

LEGEND

STUDY AREA

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT No. 12-1126-0047/1000.

4,000 0 4,000

SCALE 1:200,000 METRES

REFERENCE

BASEMAP - STREET MAP BASE DATA PROVIDED BY ARCGIS ONLINE, ESRI CANADA, 2012. SOURCE: ESRI, DELORME, NAVTEQ, TOMTOM, USGS, INTERMAP, IPC, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI (THAILAND)
DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18

Golder Associates
Ottawa, Ontario

PROJECT No.	12-1126-0047
SCALE	AS SHOWN
REV.	0
DATE	06 Feb. 2013
DESIGN	AM
GIS	BR
CHECK	HJD
REVIEW	HJD

TITLE

KEY PLAN

PROJECT STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

MAP 1

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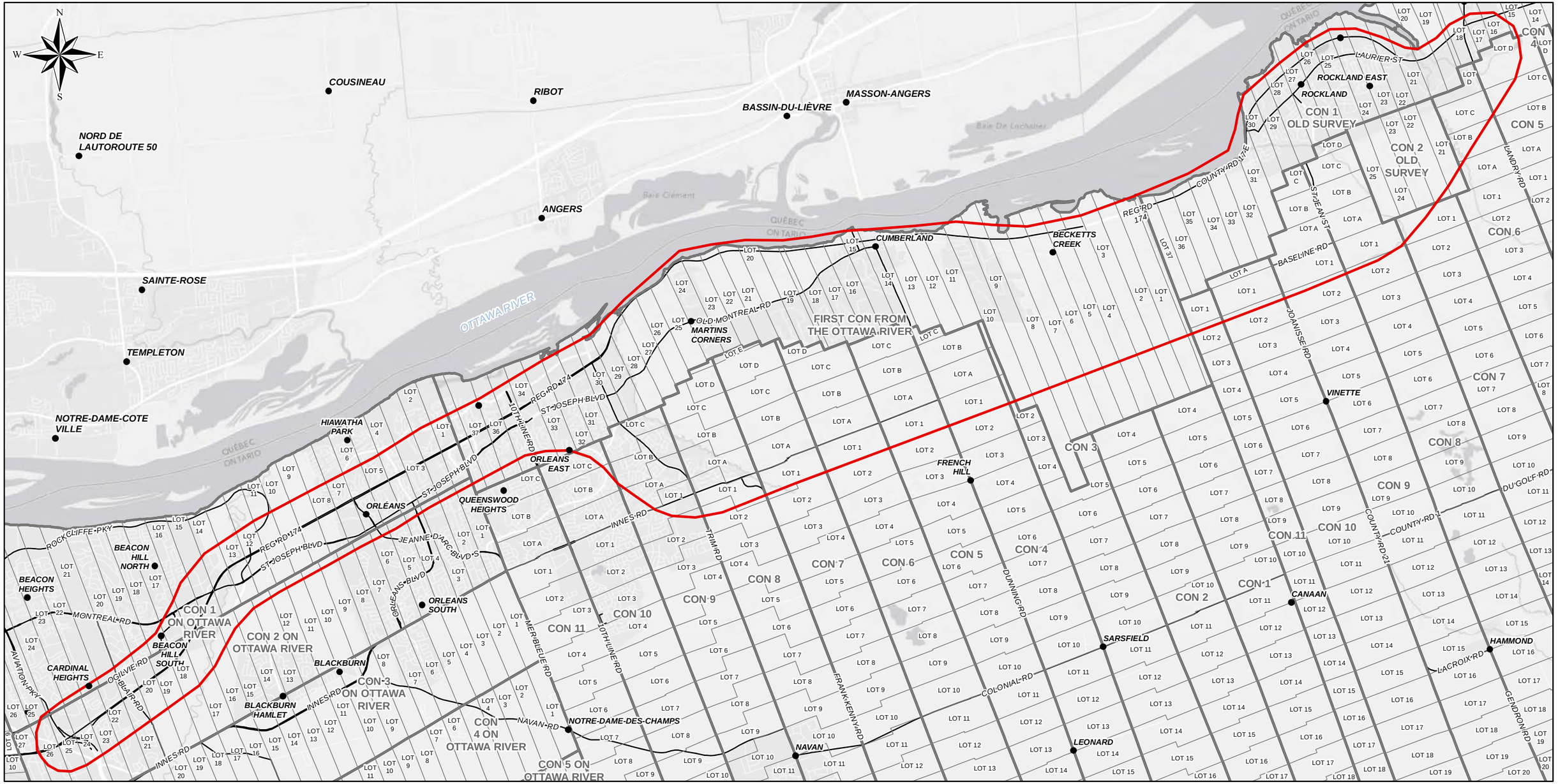

LEGEND

- POPULATED PLACE NAME
- MAJOR ROAD
- STUDY AREA
- LOT
- CONCESSION

2,000 0 2,000

SCALE 1:80,000 METERS

NOTE

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REFERENCE

DMTI CANMAP DATA. MARKHAM, ONTARIO: DMTI SPATIAL INC. 2012.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
BASEMAP - LIGHT GRAY CANVAS BASE DATA PROVIDED BY ARCGIS ONLINE, ESRI CANADA, 2012.
SOURCES: ESRI, DELORME, NAVTEQ.
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

INSET MAP

PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

SITE PLAN

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
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GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

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N
W E
S

COUSINEAU
RIBOT
BASSIN-DU-LIÈVRE
MASSON-ANGERS
NORD DE LAUTOROUTE 50
ANGERS
SAINTE-ROSE
TEMPLETON
QUEENSWOOD VILLAGE
HIAWATHA PARK
ORLEANS EAST
QUEENSWOOD HEIGHTS
ORLÉANS
ORLEANS SOUTH
BEACON HILL NORTH
BEACON HEIGHTS
BEACON HILL SOUTH
CARDINAL HEIGHTS
CYRVILLE
BLACKBURN
BLACKBURN HAMLET
NOTRE-DAME-COTE VILLE
NOTRE-DAME-DES-CHAMPS
NAVAN
MARTINS CORNERS
CUMBERLAND
BECKETTS CREEK
FRENCH HILL
CLARENCE-ROCKLAND
ROCKLAND
ROCKLAND EAST
VINETTE
CANAAN
SARSFIELD
LEONARD
HAMMOND

OTTAWA RIVER

RUE GEORGES
CH DE MASSON
AUT DE L'OUTAOUAIS
ROUTE 148
CH DE MONTRÉAL E
CH DE MONTRÉAL O
BOUL LORRAIN
BOUL SAINT RENÉ E
BOUL MALONEY E
RUE NOTRE DAME
REG RD 174
ST-JOSEPH BLVD
10TH LINE RD
JEANNE-D'ARC BLVD S
ORLEANS BLVD
INNES RD
TRIM RD
MER BLEUE RD
NAVAN RD
OLD MONTREAL RD
COUNTY RD 17 E
LAURIER ST
ST-JEAN ST
BASELINE RD
JOANISSE RD
LANDRY RD
DU GOLF RD
COUNTY RD 1
COUNTY RD 21
DUNNING RD
FRANK KENNY RD
COLONIAL RD
LACROIX RD
GENDRON RD
ROCKCLIFFE PKY
MONTREAL RD
GOULBURN RD
AVIATION PKY

LEGEND

- POPULATED PLACE NAME
- UTILITY LINE
- CONTOUR LINE (5m)
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER LINE
- WATER AREA
- WETLAND AREA
- WOODED AREA
- STUDY AREA

2,000 0 2,000
SCALE 1:80,000 METERS

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

DMTI CANMAP DATA. MARKHAM, ONTARIO: DMTI SPATIAL INC. 2012.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
BASEMAP - STREETS, ARCGIS ONLINE, ESRI, 2012. SOURCE: ESRI, DELORME, NAVTEQ, TOMTOM, USGS, INTERMAP, IPC, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI (THAILAND).
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

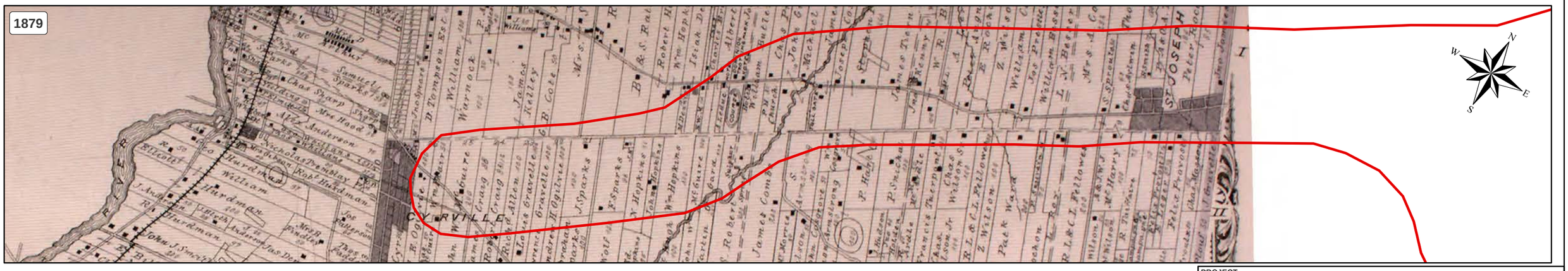
INSET MAP

PROJECT
STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE
TOPOGRAPHIC MAP

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	24 Jul. 2012	MAP 3	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		



LEGEND

STUDY AREA

1,000 0 1,000

SCALE 1:50,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

COFFIN, WILLIAM, 1825, PLAN OF CARLETON COUNTY. ARCHIVES AND LIBRARY CANADA NMC 3425.
WALLING, HENRY FRANCIS,1863, MAP OF THE COUNTY OF CARLETON, CANADA WEST. PRESCOTT, ONTARIO, D. P. PUTNAM.
BELDEN, H.,1879. ILLUSTRATED HISTORICAL ATLAS OF THE COUNTY OF CARLETON. TORONTO, H. BELDEN & CO.
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

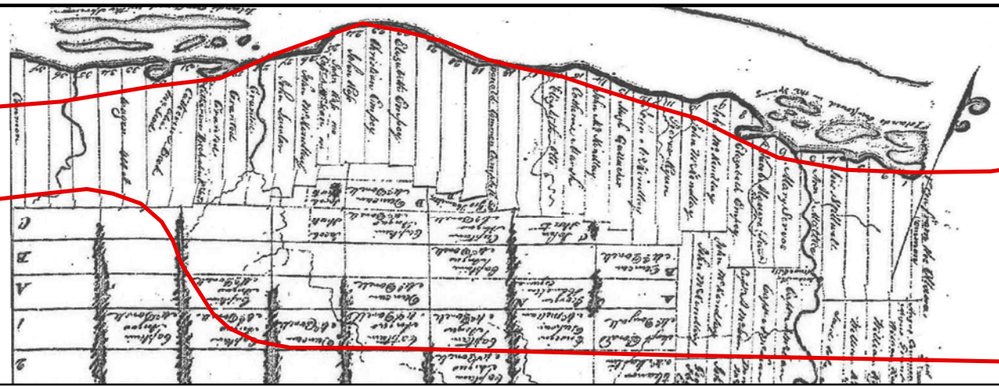
TITLE

HISTORICAL MAPS FOR GLOUCESTER TOWNSHIP (COFFIN 1825, WALLING 1863, BELDEN 1879)

Golder Associates
Ottawa, Ontario

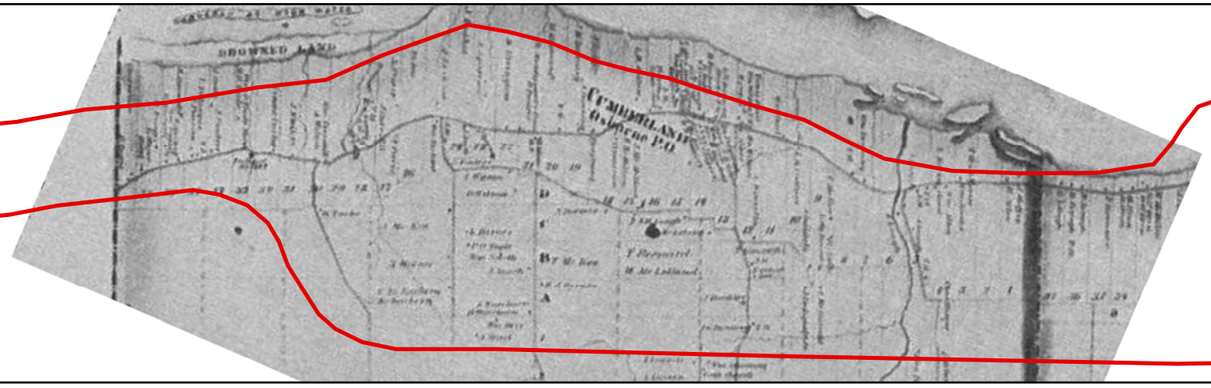
PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	31 Oct. 2012	MAP 4	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

1825

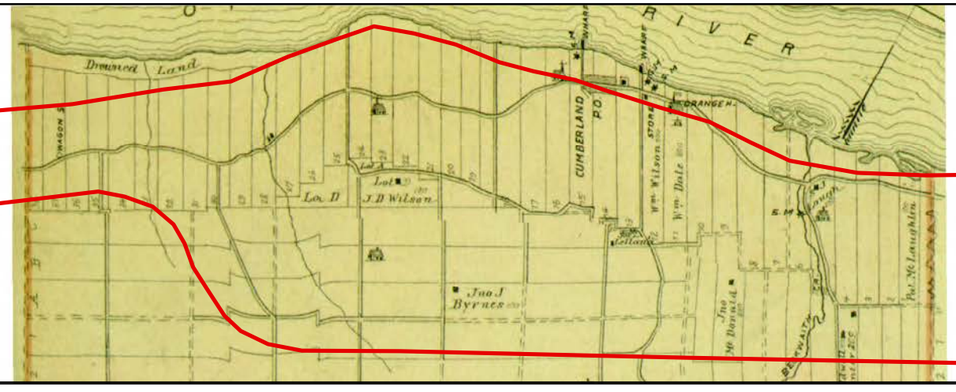


1840

1862



1881



LEGEND

STUDY AREA

2,000 0 2,000

SCALE 1:100,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

COFFIN, WILLIAM, 1825, PLAN OF CARLETON COUNTY. ARCHIVES AND LIBRARY CANADA NMC 3425.

ANONYMOUS,1840, PLAN ACCOMPANYING THE CENSUS ASSESSMENT ROLL FOR CUMBERLAND TOWNSHIP. ARCHIVES AND LIBRARY CANADA. MICROFILM REEL M-7735.

WALLING, HENRY FRANCIS, 1862, MAP OF THE COUNTIES OF STORMONT, DUNDAS, GLENGARRY, PRESCOTT AND RUSSELL, CANADA WEST.

BELDEN, H., 1881, ILLUSTRATED HISTORICAL ATLAS OF PRESCOTT AND RUSSELL COUNTIES. TORONTO, H. BELDEN & CO.

DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

PROJECT

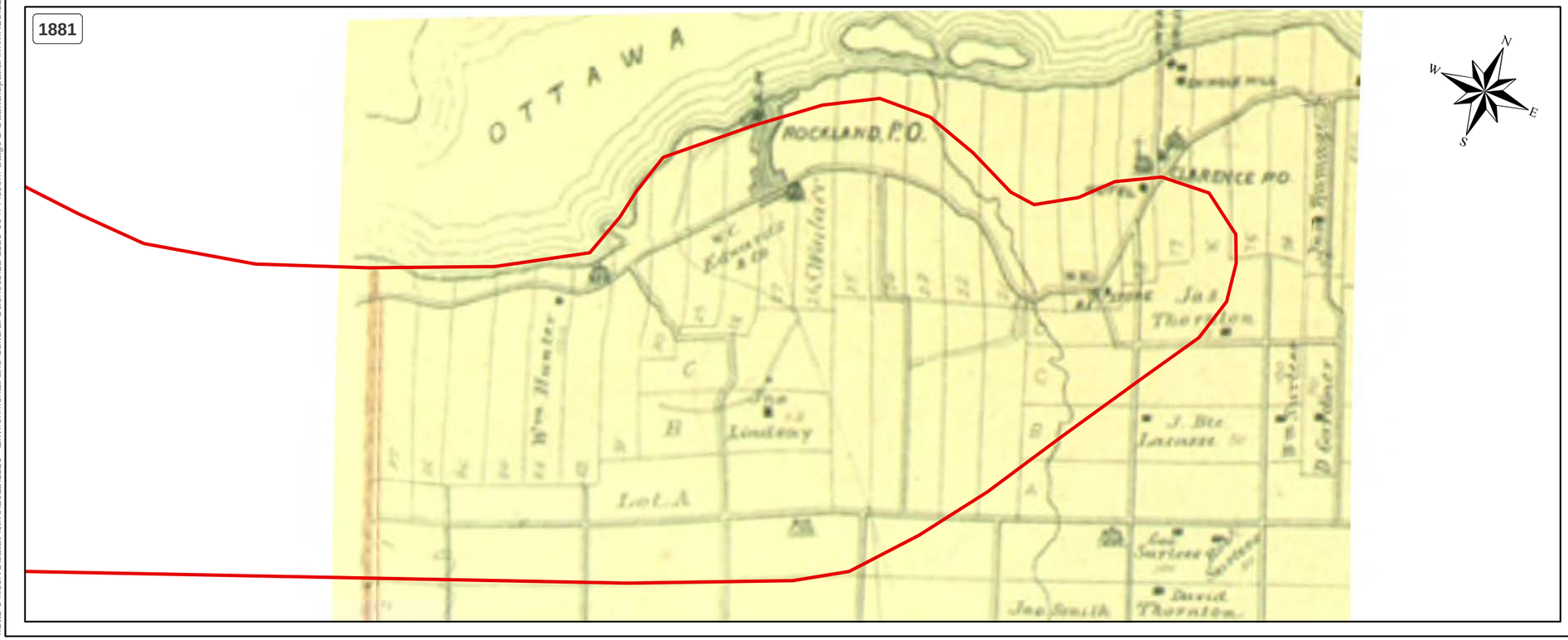
STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

HISTORICAL MAPS FOR CUMBERLAND TOWNSHIP (COFFIN 1825, 1840 MAP FROM CENSUS RECORDS, WALLING 1862, BELDEN 1881)

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	31 Oct. 2012	MAP 5	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		



LEGEND

STUDY AREA

1,000 0 1,000

SCALE 1:50,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

WALLING, HENRY FRANCIS, 1862, MAP OF THE COUNTIES OF STORMONT, DUNDAS, GLENGARRY, PRESCOTT AND RUSSELL, CANADA WEST.
BELDEN, H., 1881, ILLUSTRATED HISTORICAL ATLAS OF PRESCOTT AND RUSSELL COUNTIES. TORONTO, H. BELDEN & CO.
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

PROJECT

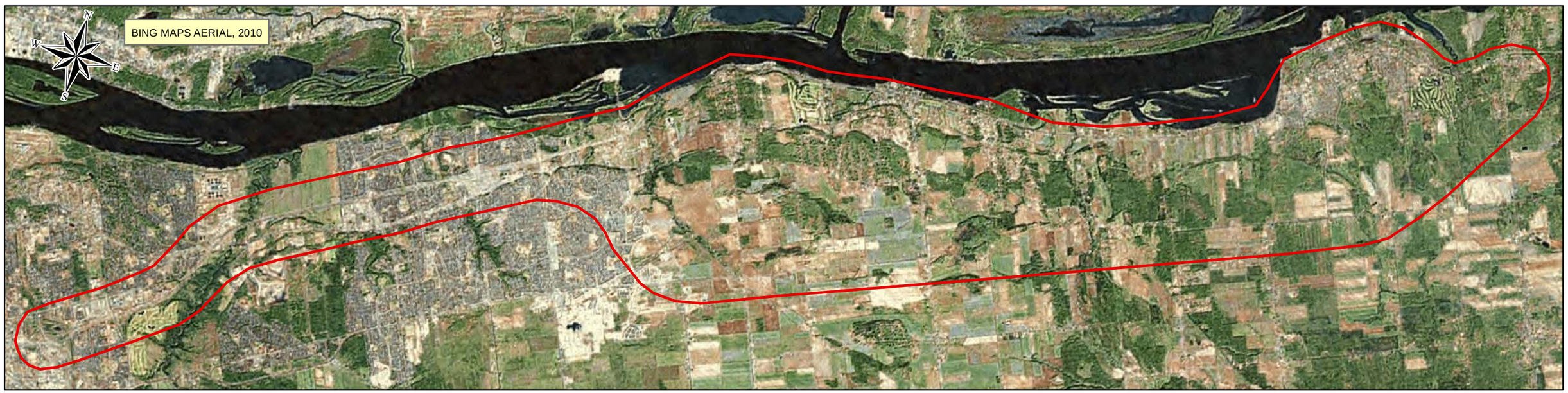
STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

HISTORICAL MAPS FOR CLARENCE TOWNSHIP (WALLING 1862, BELDEN 1881)

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	31 Oct. 2012	MAP 6	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		



LEGEND

STUDY AREA

2,000 0 2,000

SCALE1:85,000 METERS

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

1952 - AERIAL PHOTOS - NATIONAL AIR PHOTO LIBRARY (NAPL), A13427_064, A13427_066, A13427_085, A1
BASEMAP - BING MAPS AERIAL, 2010, (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
BASEMAP - STREETS, SOURCES: ESRI, DELORME, NAVTEQ, TOMTOM, USGS, INTERMAP, IPC, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI (THAILAND).
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

INSET MAP

PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

AERIAL PHOTOS

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	24 Jul. 2012	MAP 7	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

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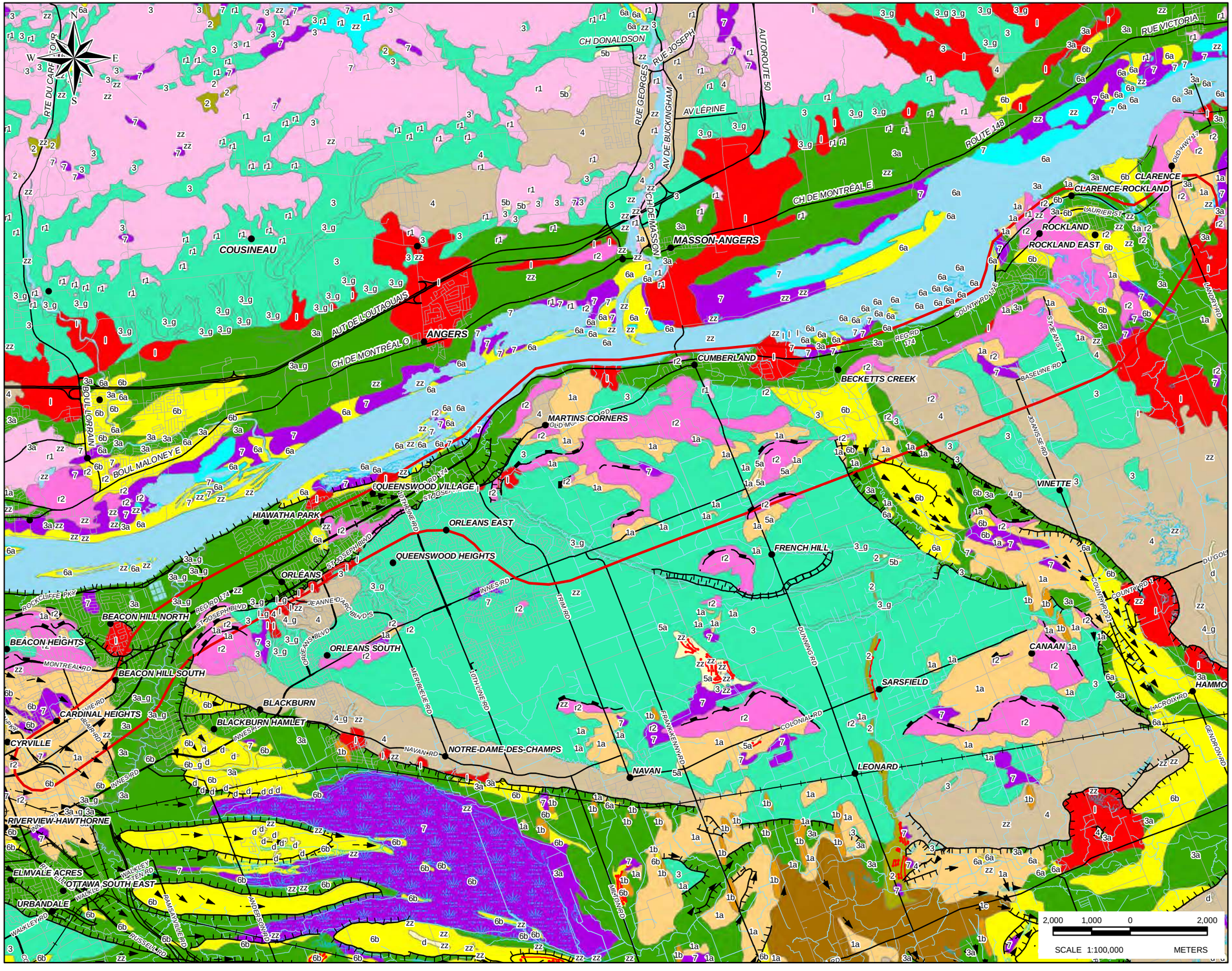


LEGEND

- POPULATED PLACE NAME
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER LINE
- WATER AREA
- WETLAND AREA
- STUDY AREA

SURFICIAL GEOLOGY, LINEAR FEATURES

- BEACH RIDGES AND NEAR SHORE BARS
- BEDROCK ESCARPMENT
- MELTWATER CHANNEL, INFERRED DIRECTION OF FLOW
- FLUVIAL TERRACE

SURFICIAL GEOLOGY

7	Organic Deposits: Muck & Peat
6a	Alluvial Deposits: Silty Sand, Silt, Sand & Clay
6b	Alluvial Deposits: Medium Grained Stratified Sand With Some Silt
5a	Nearshore Sediments: Gravel, Sand & Boulders
5b	Nearshore Sediments: Fine To Medium Grained Sand
4	Deltaic And Estuary Deposits: Medium To Fine Grained Sand
3	Offshore Marine Deposits: Clay, Silty Clay & Silt
3a	Offshore Marine Deposits: Clay, Silt Underlying Erosional Terraces
2	Ice Contact Stratified Drift: Gravel & Sand
1a	Till, Plain With Local Relief <5m
1b	Till, Drumlinized
1c	Till, Hummocky To Rolling With Local Relief 5 To 10m
d	Dune
l	Landslide Area
r1	Bedrock: Intrusive & Metamorphic
r2	Bedrock: Limestone, Dolomite, Sandstone & Local Shale
zz	Waterbody

NOTE

THIS FIGURE SHOULD BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. PROJECT NO. 12-1126-0047/1000.

REFERENCE

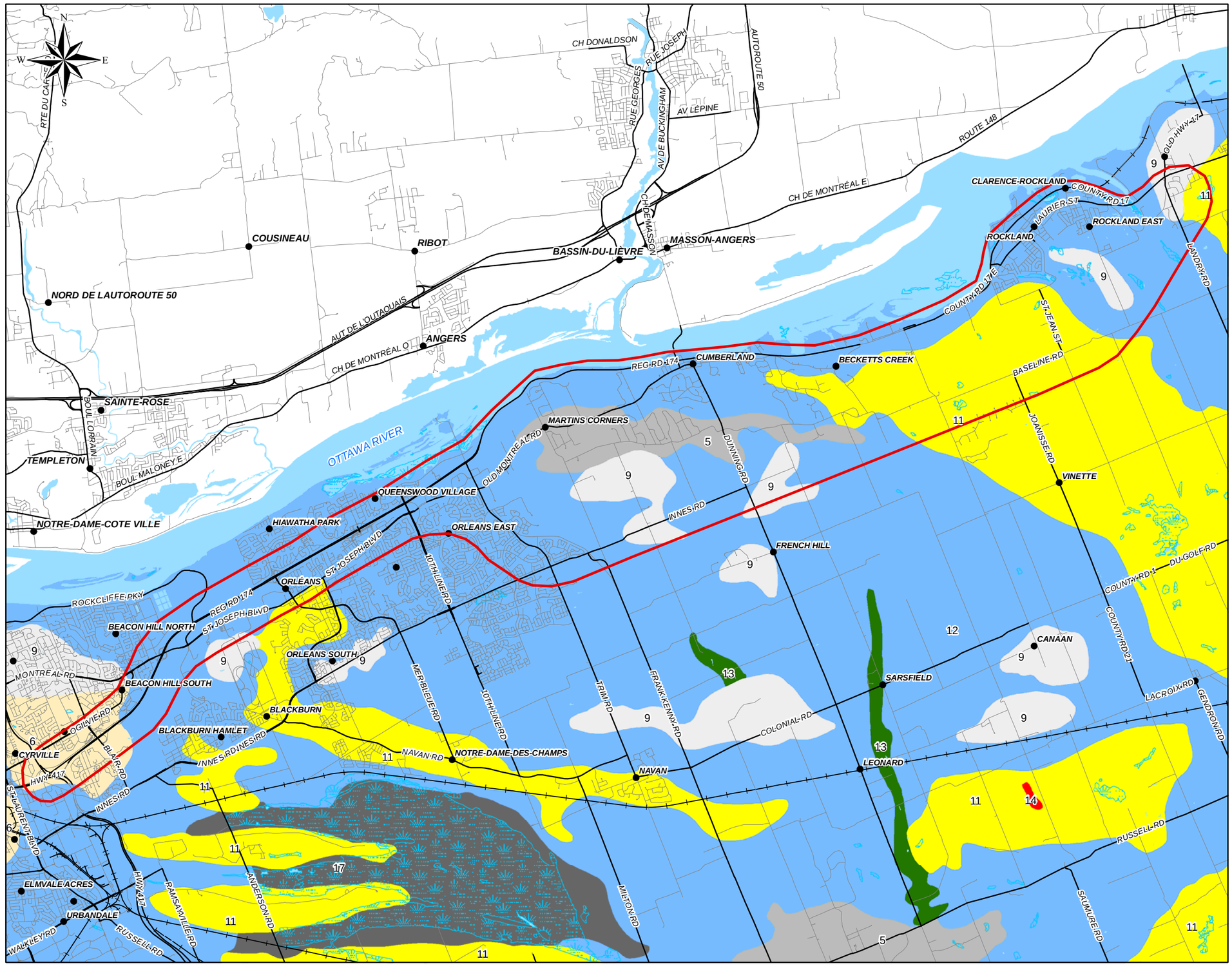
DMTI CANMAP DATA. MARKHAM, ONTARIO: DMTI SPATIAL INC. 2012.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
BÉLANGER, J. R. 2008 URBAN GEOLOGY OF THE NATIONAL CAPITAL AREA, GEOLOGICAL SURVEY OF CANADA, OPEN FILE 5311, 1 DVD.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: MTM ZONE 9

PROJECT
STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE
SURFICIAL GEOLOGY

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0
DESIGN	AM	25 July 2012	MAP 8	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		



LEGEND

- POPULATED PLACE NAME
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER AREA
- WETLAND AREA
- STUDY AREA

PHYSIOGRAPHY DESCRIPTION

- 1: ESCARPMENTS
- 2: TILL MORAINES
- 3: SPILLWAYS
- 4: KAME MORAINES
- 5: TILL PLAINS (UNDRUMLINIZED)
- 6: TILL PLAINS (DRUMLINIZED)
- 7: DRUMLINS
- 8: BEVELLED TILL PLAINS
- 9: LIMESTONE PLAINS
- 10: SHALE PLAINS
- 11: SAND PLAINS
- 12: CLAY PLAINS
- 13: ESKERS
- 14: BEACHES
- 15:SHALLOW TILL AND ROCK RIDGES
- 16: BARE ROCK RIDGES AND SHALLOW TILL
- 17: PEAT AND MUCK

2,000 1,000 0 2,000

SCALE 1:100,000 METERS

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LIMITED REPORT No. 12-1126-0047/1000.

REFERENCE

DMTI CANMAP DATA. MARKHAM, ONTARIO: DMTI SPATIAL INC. 2012.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
CHAPMAN, L.J. AND PUTNAM, D.F. 2007. PHYSIOGRAPHY OF SOUTHERN ONTARIO; ONTARIO GEOLOGICAL SURVEY, MISCELLANEOUS RELEASE—DATA 228.

PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: MTM ZONE 9

PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

PHYSIOGRAPHY MAP

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	25 Jul. 2012	MAP 9	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

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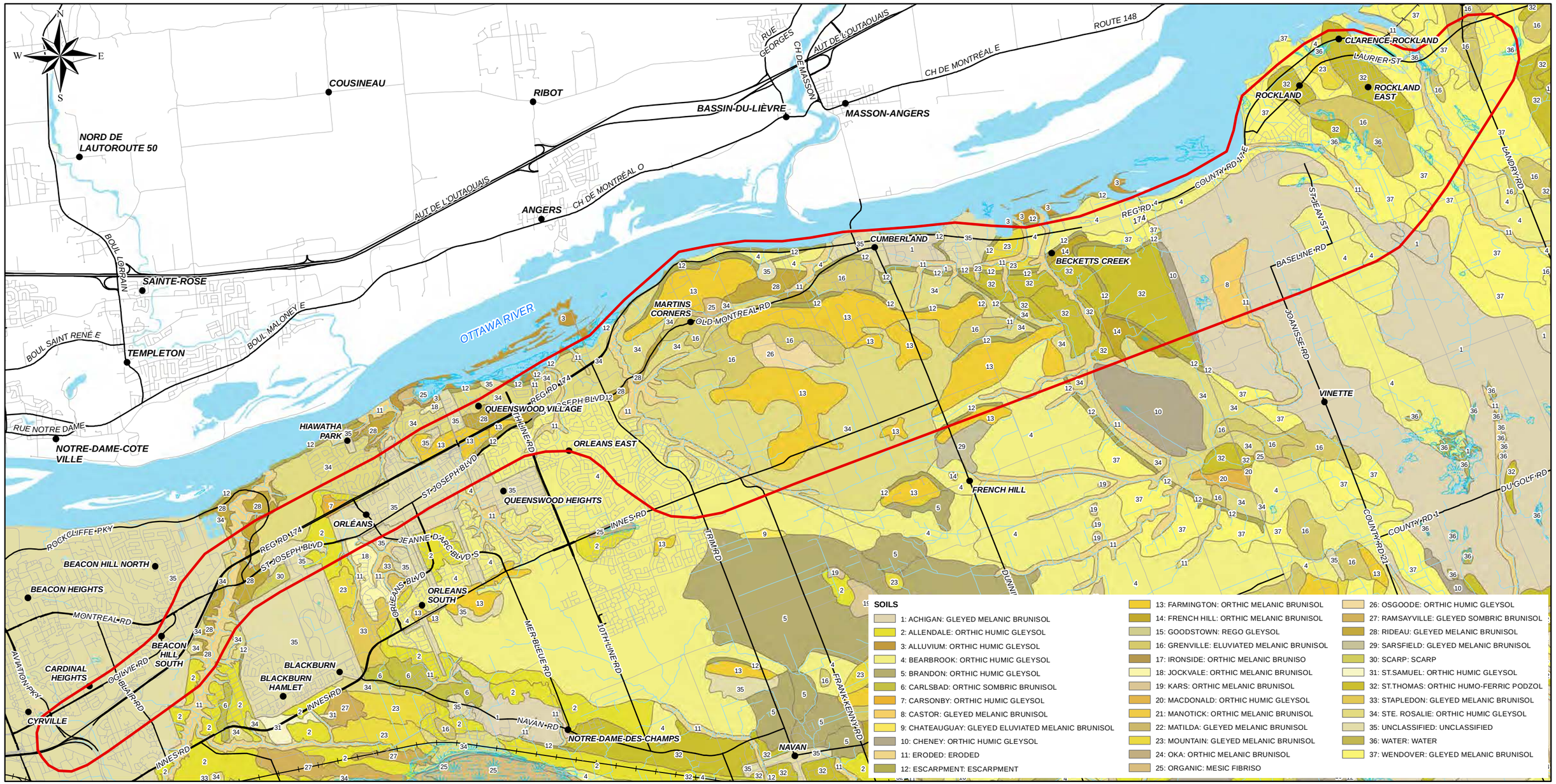

LEGEND

- POPULATED PLACE NAME
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER LINE
- WATER AREA
- WETLAND AREA
- STUDY AREA

2,000 0 2,000

SCALE 1:80,000 METERS

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

DETAIL SOIL SURVEY DATASET - AGRICULTURE AND AGRI-FOOD CANADA.
DMTI CANMAP DATA. MARKHAM, ONTARIO: DMTI SPATIAL INC. 2012.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
BASEMAP - STREETS, ARCGIS ONLINE, ESRI, 2012. SOURCE: ESRI, DELORME, NAVTEQ, TOMTOM, USGS, INTERMAP, IPC, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI (THAILAND).
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

INSET MAP

PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

SOILS

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	24 Jul. 2012	MAP 10	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

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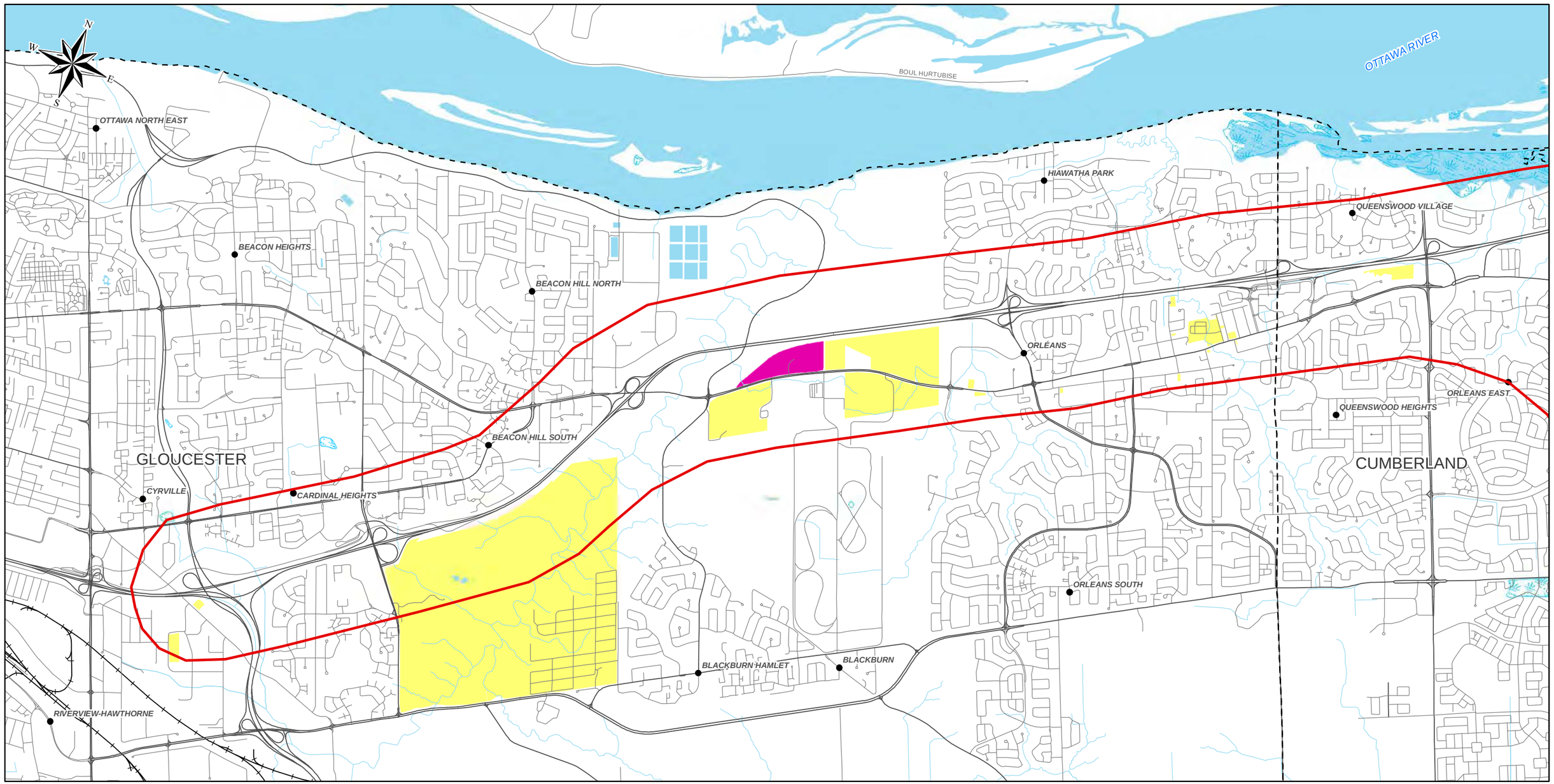

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LEGEND

- POPULATED PLACE NAME
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER LINE
- WATER AREA
- WETLAND AREA
- STUDY AREA
- GEOGRAPHIC TOWNSHIP BOUNDARY

BUILT HERITAGE

- LISTED
- DESIGNATED UNDER PART IV OF THE ONTARIO HERITAGE ACT

1,000 0 1,000

SCALE 1:35,000 METERS

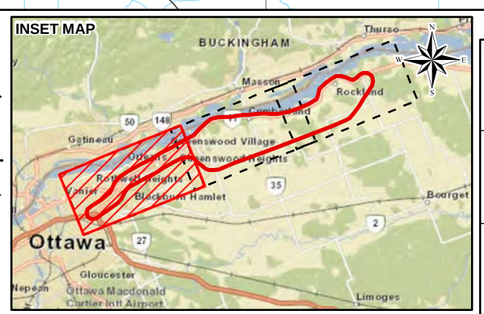
NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

CITY OF OTTAWA HERITAGE PARCEL DATA PROVIDED BY AECOM IN SHAPEFILE FORMAT;
CLARENCE-ROCKLAND HERITAGE FOOTPRINT DATA PROVIDED BY THE TOWN OF CLARENCE-ROCKLAND.
DMTI CANMAP DATA. MARKHAM, ONTARIO: DMTI SPATIAL INC. 2012.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
BASEMAP - STREETS BASE DATA PROVIDED BY ARCGIS ONLINE, ESRI CANADA, 2012. SOURCES: ESRI, DELORME, NAVTEQ, TOMTOM, USGS, INTERMAP, IPC, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI (THAILAND).
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

INSET MAP



PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

BUILT HERITAGE PROPERTIES WITHIN THE STUDY AREA IN GLOUCESTER TOWNSHIP

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	29 Aug. 2012	MAP 11	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

LEGEND

- POPULATED PLACE NAME
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER LINE
- WATER AREA
- WETLAND AREA
- STUDY AREA
- GEOGRAPHIC TOWNSHIP BOUNDARY

BUILT HERITAGE

- LISTED
- DESIGNATED UNDER PART IV OF THE ONTARIO HERITAGE ACT

1,000 0 1,000

SCALE 1:35,000 METERS

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

CITY OF OTTAWA HERITAGE PARCEL DATA PROVIDED BY AECOM IN SHAPEFILE FORMAT;
CLARENCE-ROCKLAND HERITAGE FOOTPRINT DATA PROVIDED BY THE TOWN OF CLARENCE-ROCKLAND.
DMTI CANMAP DATA. MARKHAM, ONTARIO: DMTI SPATIAL INC. 2012.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
BASEMAP - STREETS BASE DATA PROVIDED BY ARCGIS ONLINE, ESRI CANADA, 2012. SOURCES: ESRI, DELORME, NAVTEQ, TOMTOM, USGS, INTERMAP, IPC, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI (THAILAND).
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

INSET MAP

PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

BUILT HERITAGE PROPERTIES WITHIN THE STUDY AREA IN CUMBERLAND TOWNSHIP

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	29 Aug. 2012	MAP 12	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

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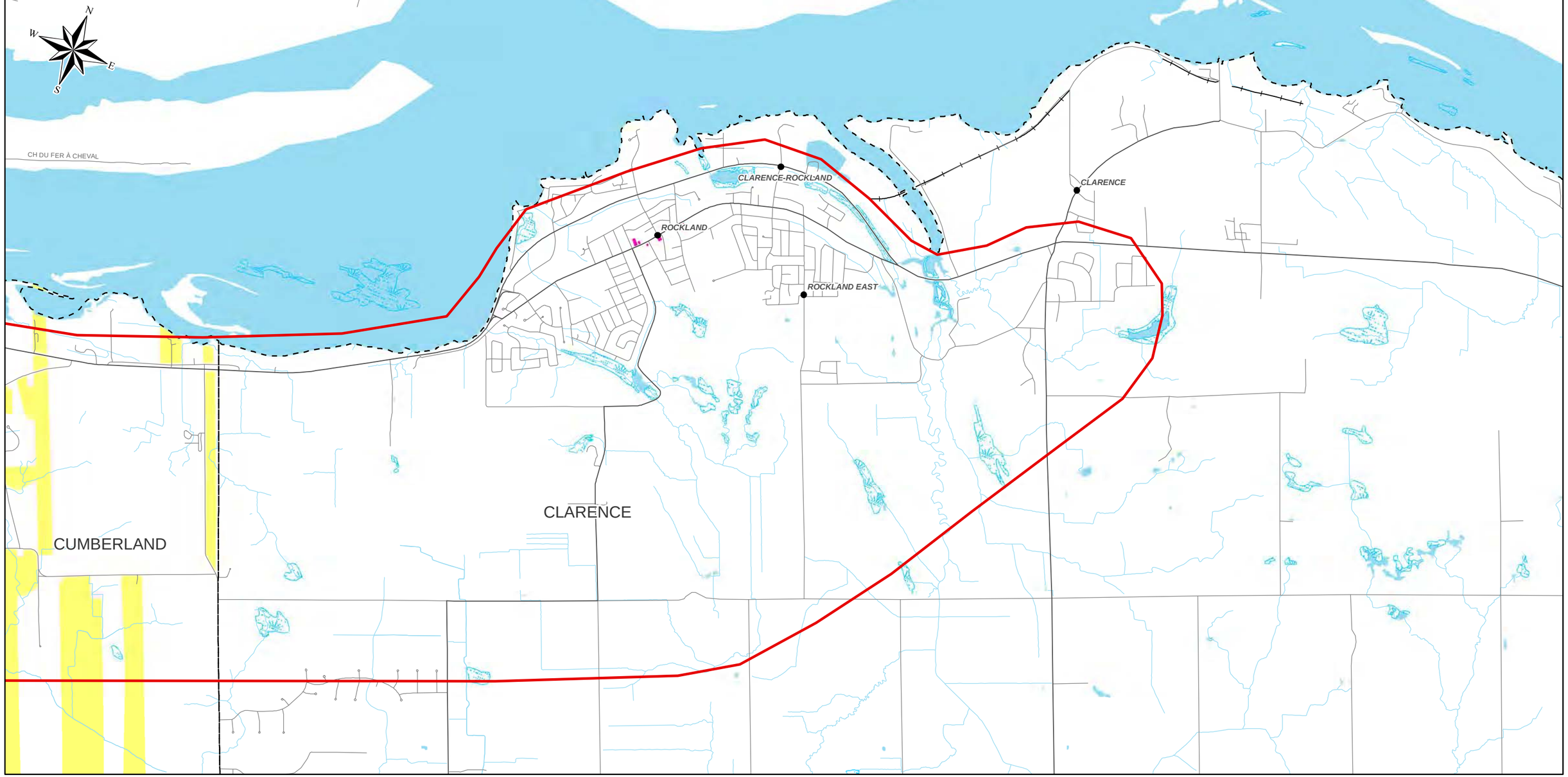

LEGEND

- POPULATED PLACE NAME
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER LINE
- WATER AREA
- WETLAND AREA
- STUDY AREA
- GEOGRAPHIC TOWNSHIP BOUNDARY

BUILT HERITAGE

- LISTED
- DESIGNATED UNDER PART IV OF THE ONTARIO HERITAGE ACT

1,000 0 1,000

SCALE 1:35,000 METERS

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

CITY OF OTTAWA HERITAGE PARCEL DATA PROVIDED BY AECOM IN SHAPEFILE FORMAT;
CLARENCE-ROCKLAND HERITAGE FOOTPRINT DATA PROVIDED BY THE TOWN OF CLARENCE-ROCKLAND.
DMTI CANMAP DATA. MARKHAM, ONTARIO: DMTI SPATIAL INC. 2012.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
BASEMAP - STREETS BASE DATA PROVIDED BY ARCGIS ONLINE, ESRI CANADA, 2012. SOURCES: ESRI, DELORME, NAVTEQ, TOMTOM, USGS, INTERMAP, IPC, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI (THAILAND).
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

INSET MAP

PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

BUILT HERITAGE PROPERTIES WITHIN THE STUDY AREA IN CLARENCE TOWNSHIP

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	29 Aug. 2012	MAP 13	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

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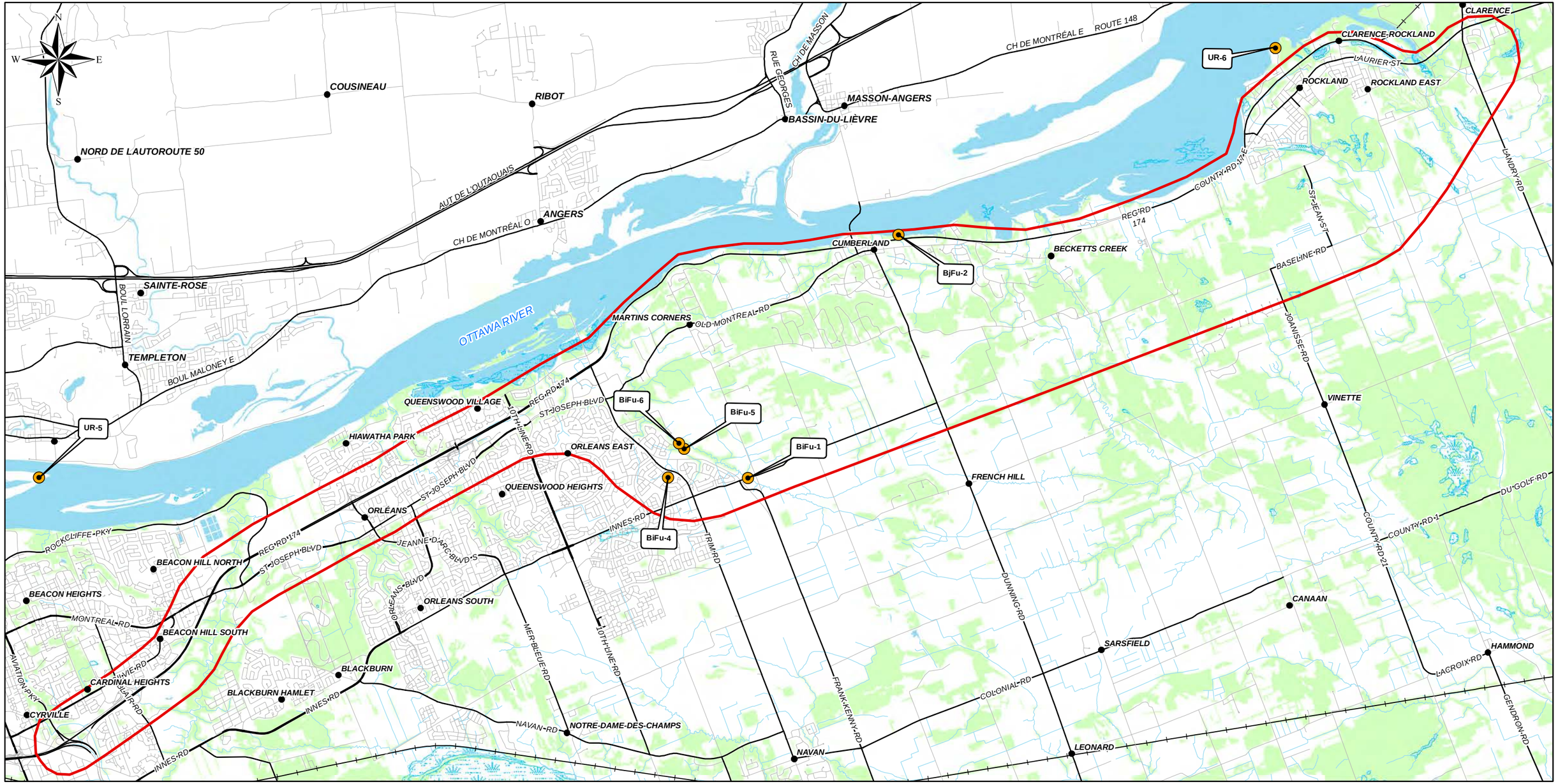

LEGEND

- APPROXIMATE LOCATION OF KNOWN ARCHAEOLOGICAL SITE
- POPULATED PLACE NAME
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER LINE
- WATER AREA
- WETLAND AREA
- WOODED AREA
- STUDY AREA

2,000 0 2,000

SCALE 1:80,000 METERS

NOTE

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REFERENCE

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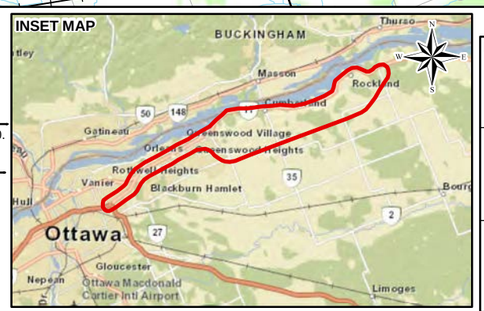
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

INSET MAP



PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

APPROXIMATE LOCATION OF KNOWN ARCHAEOLOGICAL SITES

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	24 Jul. 2012	MAP 14	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

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LEGEND

- PHOTO LOCATION AND DIRECTION
- PHOTO LOCATION (NO DIRECTION)
- POPULATED PLACE NAME
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER LINE
- WATER AREA
- WETLAND AREA
- WOODED AREA
- STUDY AREA

2,000 0 2,000

SCALE 1:80,000 METERS

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

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DMTI CANMAP DATA. MARKHAM, ONTARIO: DMTI SPATIAL INC. 2012.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
BASEMAP - STREETS BASE DATA PROVIDED BY ARCGIS ONLINE, ESRI CANADA, 2012. SOURCES: ESRI, DELORME, NAVTEQ, TOMTOM, USGS, INTERMAP, IPC, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI (THAILAND).
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

INSET MAP

PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

PHOTO LOCATION AND DIRECTION

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	24 Jul. 2012	MAP 15	
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CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

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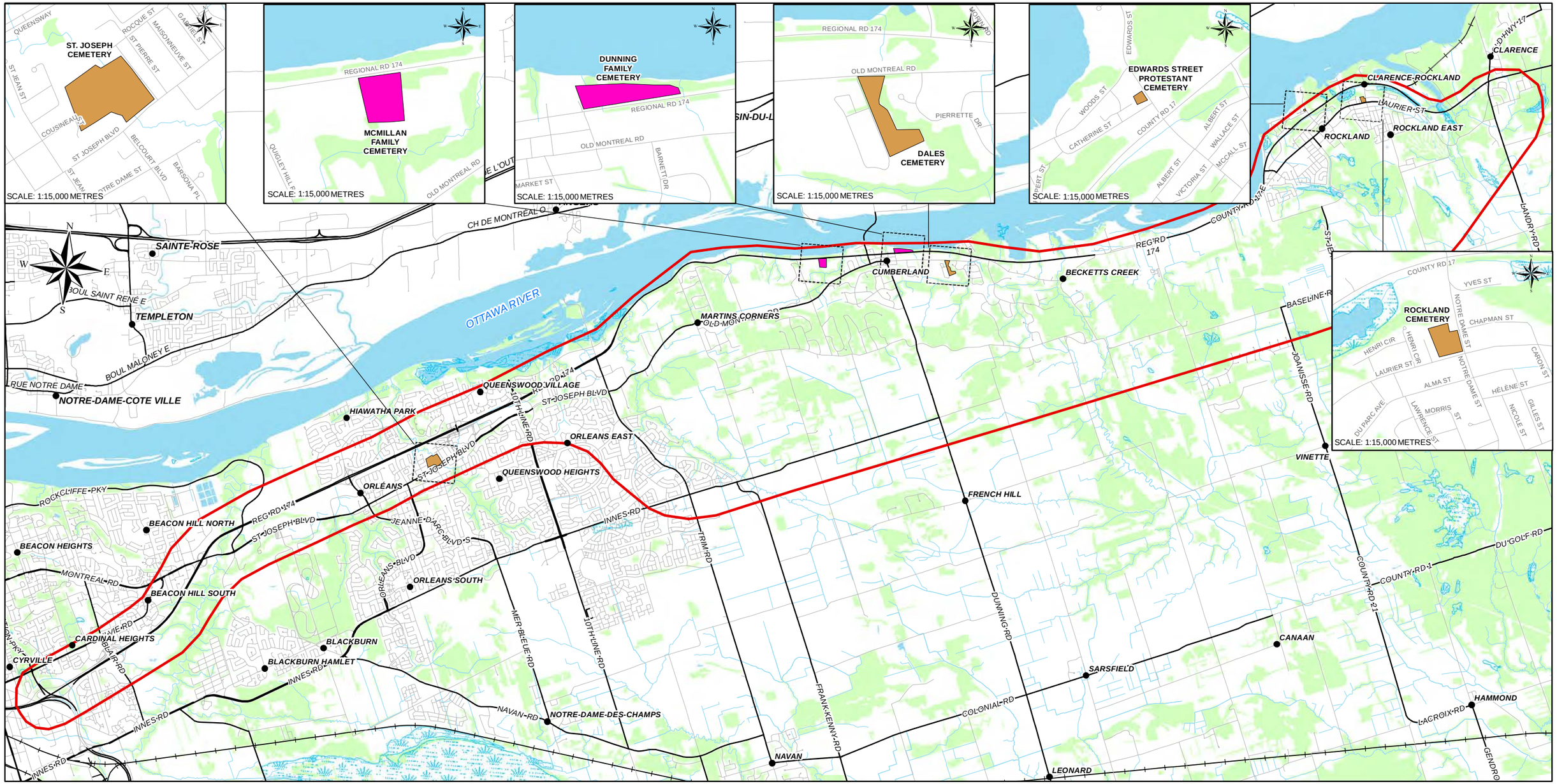

LEGEND

- POPULATED PLACE NAME
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER LINE
- BURIAL SITE (BASED ON HISTORICAL RECORDS)
- CEMETERY PRESENT
- WATER AREA
- WETLAND AREA
- WOODED AREA
- STUDY AREA

2,000 0 2,000

SCALE 1:80,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

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DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

INSET MAP

PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

LOCATION OF CEMETERIES

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	24 Jul. 2012	MAP 16	
GIS	BR	19 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

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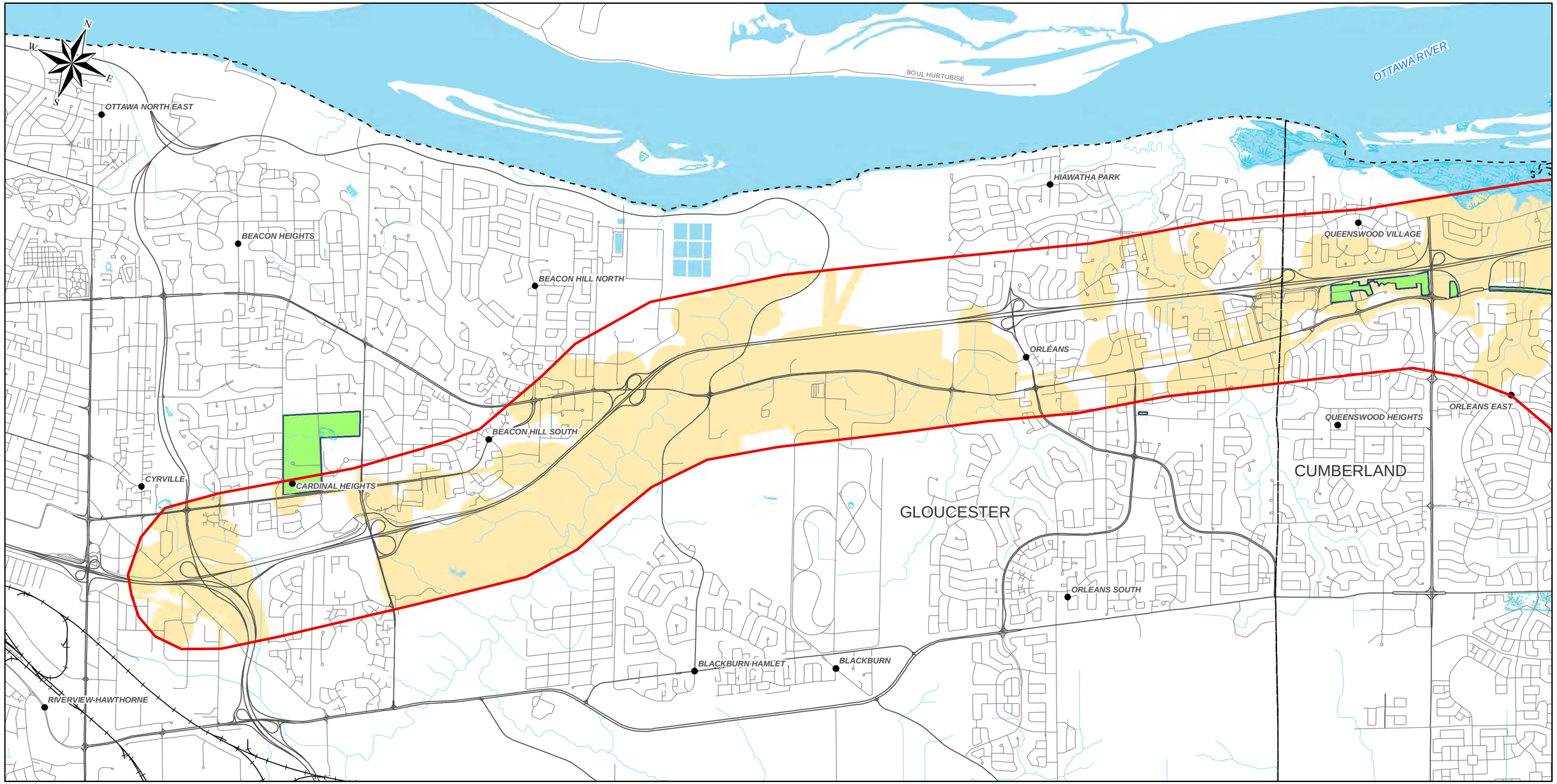

LEGEND

- POPULATED PLACE NAME
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER LINE
- WATER AREA
- WETLAND AREA
- STUDY AREA
- GEOGRAPHIC TOWNSHIP BOUNDARY
- ARCHAEOLOGICAL POTENTIAL
- CLEARED BY MTCS

1,000 0 1,000

SCALE 1:35,000 METERS

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

CITY OF OTTAWA ARCHAEOLOGICAL POTENTIAL DATA PROVIDED BY AECOM IN SHAPEFILE FORMAT; OTHER ARCHAEOLOGICAL POTENTIAL DATA OBTAINED FROM OTHER REPORTS & GOLDER PROJECTS.
DMTI CANMAP DATA. MARKHAM, ONTARIO: DMTI SPATIAL INC. 2012.
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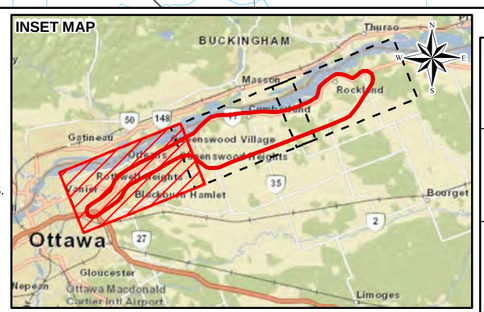
BASEMAP - STREETS BASE DATA PROVIDED BY ARCGIS ONLINE, ESRI CANADA, 2012. SOURCES: ESRI, DELORME, NAVTEQ, TOMTOM, USGS, INTERMAP, IPC, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI (THAILAND).
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

INSET MAP



PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

ARCHAEOLOGICAL POTENTIAL WITHIN STUDY AREA IN GLOUCESTER TOWNSHIP

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	29 Aug. 2012	MAP 17	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

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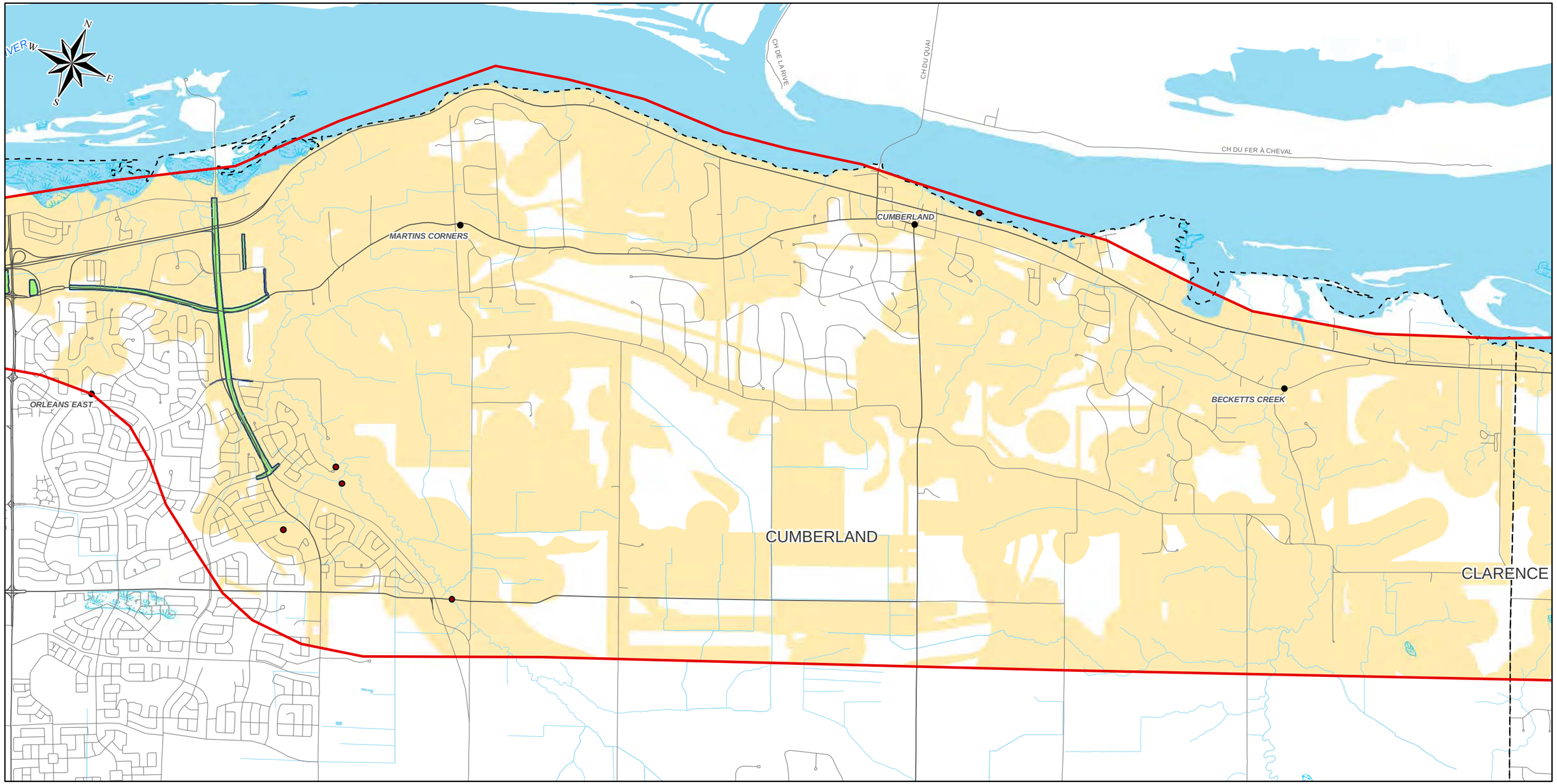

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LEGEND

- POPULATED PLACE NAME
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER LINE
- WATER AREA
- WETLAND AREA
- STUDY AREA
- GEOGRAPHIC TOWNSHIP BOUNDARY
- ARCHAEOLOGICAL POTENTIAL
- CLEARED BY MTCS

1,000 0 1,000

SCALE 1:35,000 METERS

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

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DMTI CANMAP DATA. MARKHAM, ONTARIO: DMTI SPATIAL INC. 2012.
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BASEMAP - STREETS BASE DATA PROVIDED BY ARCGIS ONLINE, ESRI CANADA, 2012. SOURCES: ESRI, DELORME, NAVTEQ, TOMTOM, USGS, INTERMAP, IPC, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI (THAILAND).
DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

INSET MAP

PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

ARCHAEOLOGICAL POTENTIAL WITHIN STUDY AREA IN CUMBERLAND TOWNSHIP

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
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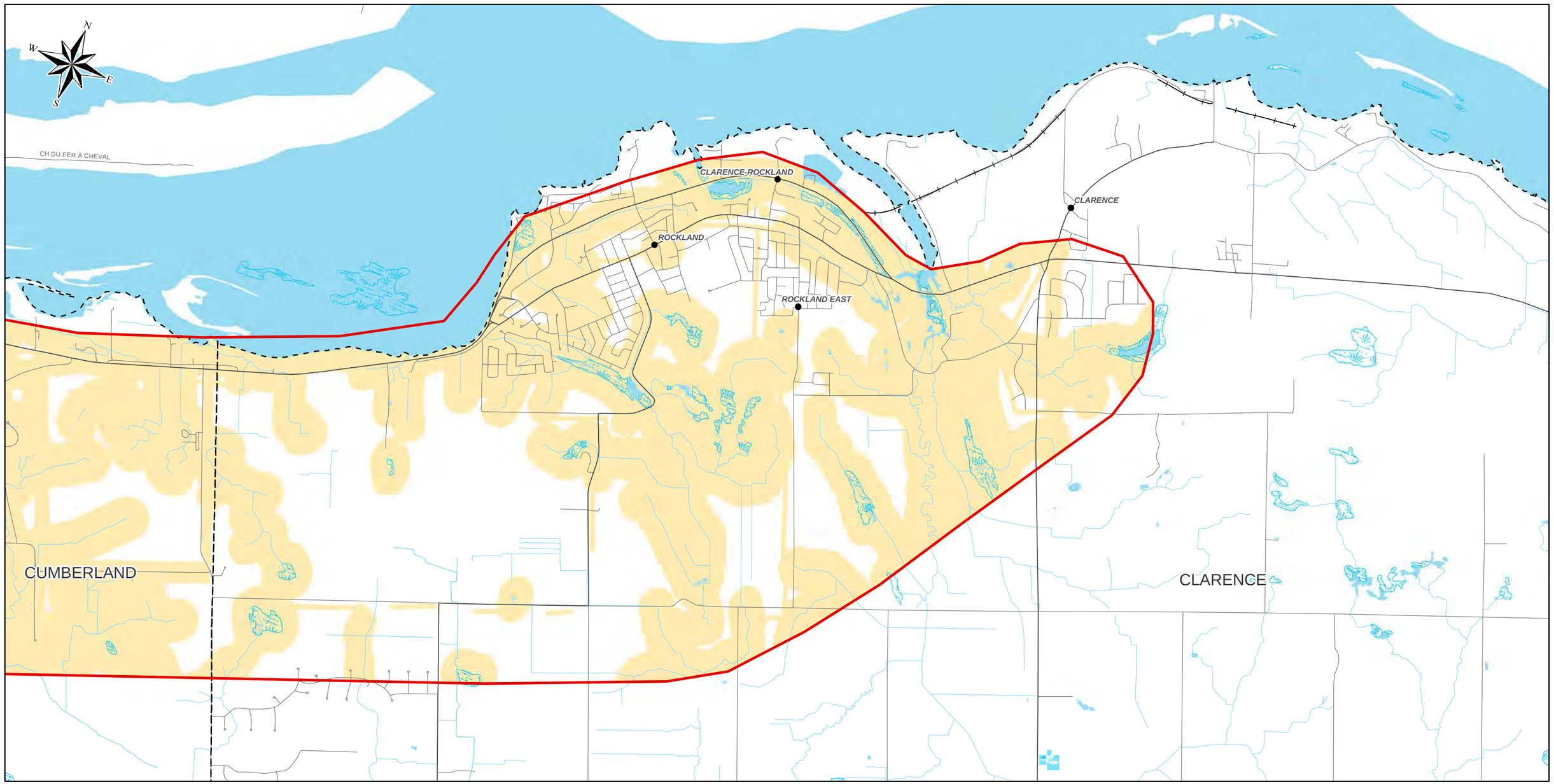
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		



LEGEND

- POPULATED PLACE NAME
- MAJOR ROAD
- LOCAL ROAD
- RAIL WAY
- WATER LINE
- WATER AREA
- WETLAND AREA
- STUDY AREA
- GEOGRAPHIC TOWNSHIP BOUNDARY
- ARCHAEOLOGICAL POTENTIAL
- CLEARED BY MTCS

1,000 0 1,000

SCALE 1:35,000 METERS

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1126-0047/1000.

REFERENCE

CITY OF OTTAWA ARCHAEOLOGICAL POTENTIAL DATA PROVIDED BY AECOM IN SHAPEFILE FORMAT; OTHER ARCHAEOLOGICAL POTENTIAL DATA OBTAINED FROM OTHER REPORTS & GOLDER PROJECTS. DMTI CANMAP DATA. MARKHAM, ONTARIO: DMTI SPATIAL INC. 2012.
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DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9

INSET MAP

PROJECT

STAGE 1 ARCHAEOLOGICAL ASSESSMENT FOR OTTAWA ROAD 174/PRESCOTT-RUSSELL COUNTY ROAD 17

TITLE

ARCHAEOLOGICAL POTENTIAL WITHIN STUDY AREA IN CLARENCE TOWNSHIP

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1126-0047			SCALE AS SHOWN	REV. 0.0
DESIGN	AM	29 Aug. 2012	MAP 19	
GIS	BR	06 Feb. 2013		
CHECK	HJD	06 Feb. 2013		
REVIEW	HJD	06 Feb. 2013		

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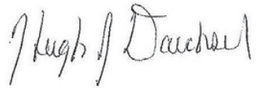
CLOSURE

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please contact the undersigned.

GOLDER ASSOCIATES LTD.

Aaron Mior, M.MA
Archaeologist



Hugh J. Daechsel, M.A.
Principal/Senior Archaeologist

AM/HJD/clb
n:\active\2012\1126 - environmental and cultural sciences\12-1126-0047 aecom stage 1 ottawa\final report\for client\p350-002-2012_15feb2013_re_st1_hwy174.docx

REFERENCES

Anonymous
1840 Plan accompanying the Census Assessment Roll for Cumberland Township. Archives and Library Canada. Microfilm Reel M-7735.

Adams Heritage
2009 An Archaeological Assessment (Stage 1) of the Proposed Development Lands at 1730 Wilhaven Road near Orleans, Ontario, Part Lots 'D' and 'E', Concession 7 and Part Lot 21, Concession 7 (Old Survey) (geographic) Township of Cumberland, County of Russell, City of Ottawa. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F # P003-260-2009.

Andreae, Christopher
1997 Lines of Country: An Atlas of Railway and Waterway History in Canada. Boston Mills Press, Erin, Ontario.

Archaeological Services Inc. (ASI)
2008 Stage 1 Archaeological Assessment Interprovincial Crossings Environmental Assessment Study, National Capital Region, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P057-438-2007

Archaeological Services Inc. (ASI) & Geomatics International Inc.
1999 The Archaeological Resource Potential Mapping Study of the Regional Municipality of Ottawa-Carleton: Planning Report. Archaeological master plan study prepared for the Regional Municipality of Ottawa-Carleton.

Archaeological Services Inc. and Unterman McPhail Cuming Associates
1998 Trim Road Environmental Assessment: Heritage Component. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport.

Arkeos Inc.
2008 Interprovincial Crossings Environmental Assessment Study: Archaeological Potential Study – Gatineau/Ottawa Area. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport.

Beaulieu, Jean-Francois
1996 The Wilson Site and Area BjFu-2. Archaeological report submitted to the Ontario Ministry of Tourism, Culture and Sport.

Belden, H.
1881 Illustrated Historical Atlas of Prescott and Russell Counties. Toronto, H. Belden & Co.

1879 Illustrated Historical Atlas of the County of Carleton. Toronto, H. Belden & Co.

Blake (nee Gonneau), Ann
2007 The Foubert Family. The Caboose: Newsletter of the Cumberland Township Historical Society 19(1):4.

Bond, Courtney C. J.
1984 Where Rivers Meet: An Illustrated History of Ottawa. Ottawa, Historical Society of Ottawa.

1968 The Ottawa Country: A Historical Guide to the National Capital Region. Ottawa, Windsor Publications Limited.

Boyer, Gerard
2012 The McMillian Family Burial Plot: Lot 17, Concession 1, Old Survey, Cumberland, Ontario. The Caboose: Newsletter of the Cumberland Township Historical Society 20(3):7-8.

Cataraqui Archaeological Research Foundation (CARF)
1997 Stage 1 Archaeological Assessment of Clarence Area Waterworks Project, Clarence Township, Prescott-Russell County, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. C.I.F. # 96-039

Chapman, L. J. and D. F. Putnam
1973 The Physiography of Southern Ontario. Toronto, University of Toronto Press.

City of Ottawa
n.d. Heritage Designation: Individual Properties, Planning and Developing Department, Pamphlet available through the Heritage Section, Planning and Infrastructure Approvals Branch. City of Ottawa.

Clark, T. E.
1905 The Report of the Council of Ottawa Field Naturalists Club for the year ending March 1904. The Ottawa Naturalist 19(1):10-11.

Coffin, William
1825 Plan of Carleton County. Archives and Library Canada NMC 3425.

Daechsel, Hugh J.
1981 Sawdust Bay-2. The Identification of a Middle Woodland Site in the Ottawa Valley. M.A. Thesis, Department of Anthropology, McMaster University.

1980 An Archaeological Overview of the South Nation River Drainage Basin: Background Paper No. 3. Report manuscript on file, South Nation Conservation Authority, Berwick

Dailey, R.C., and J.V. Wright
1955 The Malcolm Site: A Late Stage of the Middle Point Peninsula Culture in Eastern Ontario. Transactions of the Royal Canadian Institute 31(1):3-23.

Golder Associates Ltd.
2012a Stage 1 Archaeological Assessment Ottawa Road 174 Safety Improvements Trim Road Realignment Part of Lots 27 to 33, Former Township of Cumberland, Russell County City of Ottawa. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P350-014-2012

2012b Stage 2 Archaeological Assessment for the Storm Water Management Pond, Dairy Drive, Part Lot 29, Concession 1, Ottawa Front, Geographic Township of Cumberland, Ottawa, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P350-018-2012

2012c Stage 1 Archaeological Assessment for the Orleans Watermain Link (OWL) West, Geographic Township of Gloucester, Carleton County, City of Ottawa. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P350-022-2012

2011a Stage 1 Archaeological Assessment of the Ottawa Light Rail Transit, City of Ottawa. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P332-017-2011

2011b Stage 1 Archaeological Assessment of the Orleans Business Park Project Lot 1, Concession 1, Ottawa Front, Geographic Township of Gloucester, Carleton County, Ottawa, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P332-012-2011

2011c Stage 2 Archaeological Assessment Trim Road Widening, Priority 1, Part Lots A & B, Concession 8 & 9, Ottawa Front, Geographic Township of Cumberland, Ottawa, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P311-054-2011

2011c Stage 2 Archaeological Assessment Trim Road Realignment, Priority 2 Area, Part Lot 30, Concession 1 Ottawa Front and Part Lots C and B, Concession 9, Geographic Township of Cumberland, Ottawa, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P311-051-2011

2011d Stage 2 Archaeological Assessment Trim Road Realignment, Priority 3 Area, Part Lot 29, 30, 31, 32, Concession 1 Ottawa Front, Geographic Township of Cumberland, Ottawa, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P311-051-2011

2011e Stage 2 Archaeological Assessment for Department of National Defense Property, Project BORR, Lots 20 & 21, Concession 1 Ottawa Front, Geographic Township of Gloucester, City of Ottawa. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P311-055-2011

2010 Stage 1 Archaeological Assessment of the Minto Quarry Glen Subdivision Lot 2, Concession 1 Ottawa Front, Geographic Township of Gloucester, Carleton County, City of Ottawa, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P311-021-2010

2009 An Archaeological Assessment (Stage 1) of the proposed Development Lands 1730 Wilhaven Road near Orleans, Ontario Part Lots ‘D’ and ‘E’, Concession 7 and Part Lot 21, Concession 7 (Old Survey) (geographic) Township of Cumberland County of Russell City of Ottawa. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P003-260-2009

2008a Stage 1 Archaeological Assessment 800 Montreal Road, Lot 24, Concession 1, Ottawa Front, Geographic Township of Gloucester, City of Ottawa, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P302-011-2008

2008b Stage 1/2 Archaeological Assessment Orleans Hotel Geographic Township of Cumberland Ottawa, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P302-014-2008

Heidenreich, C., & Wright, J. V.
1987 Population and Subsistence. In R. C. Harris (Ed.), Historical Atlas of Canada (Vol. I: From the Beginning to 1800). Toronto, University of Toronto Press.

Heritage Quest
2006 Stage 1 Archaeological Assessment CR 174 Culvert Renewal Crossing, Lot 13, Concession 1, Ottawa Front, Geographic Township of Gloucester, City of Ottawa. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P051-099-2006

2005a Stage 1 Archaeological Assessment for the Orleans Town Centre Servicing Study, Part Lots 34-38, Concession 1 (Old Survey), Geographic Township of Cumberland, City of Ottawa, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. C.I.F. # P051-068

2005b Stage 1 Archaeological and Heritage Assessment of the Proposed East-West Corridor Light Rail Project, Geographic Townships of Cumberland, Gloucester, Goulbourn, March and Nepean, City of Ottawa. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. C.I.F. # P051-044

1999a Stage 1 Archaeological Assessment of Innes Road Widening Highway 417 to Blair Road and Orleans Blvd. to Trim Road, Cities of Gloucester and Cumberland, Regional Municipality of Ottawa Carleton. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. C.I.F. # 1999-027-10

1999b Stage 1 Archaeological Assessment of the Hydro Transmission Corridor from the Hawthorne Transformer Station (Ottawa) to the Cumberland Junction, Regional Municipality of Ottawa Carleton. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport.

1996 Phase 1 Heritage/Archaeological Assessment of Clarence Township Prescott Russell County. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. C.I.F. # 96-018

1995a Stage 1 and 2 Archaeological Assessment of Canier Street, Orleans, City of Gloucester. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. C.I.F. # 94-021

1995b A Stage 1 Heritage/Archaeological Assessment of proposed Consumers Gas Pipeline, Orleans to Rockland Townships of Cumberland & Clarence - Prescott/Russell County. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. C.I.F. # 95-023

1994 Stage I & 2 Archaeological Assessment of the North Service Road/Trim Road Water Feedermain, Cumberland Township, Regional Municipality of Ottawa - Carleton, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. C.I.F. # 94-021.

STAGE 1 ARCHAEOLOGICAL ASSESSMENT
OTTAWA ROAD 174/PRESCOTT RUSSELL ROAD 17

Jacques Whitford Consultants
2008 Stage 1 Archaeological Assessment, NRC Montreal Road Campus Site, City of Ottawa, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P002-120-2008

2007 Stage 1 and 2 Archaeological Assessment, City of Ottawa Property, Orleans City Centre, Ottawa, Ontario. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P002-060-2005, P002-095-2006

Laliberte, Marcel et al
2000 Potentiel Archeologique: Terrains federaux de la Region de la capital nationale Volume 2. National Capital Commission, Ottawa. Consultants report prepared for the National Capital Commission (NCC).

McConnell, Randy
2007 The Dunning Family. The Caboose: Newsletter of the Cumberland Township Historical Society 18(3):3-5.

Ontario Heritage Trust (OHT)
2012 Plaque Information for William Cameron Edwards 1844-1921. [online] Available at: <http://www.heritagetrust.on.ca/Resources---Learning/Online-Plaque-Guide/Plaque-Information.aspx?searchtext=283> [Accessed 3 September 2012].

Ontario Ministry of Tourism, Culture and Sport
2011 Standards and Guidelines for Consulting Archaeologists.

2006 Heritage Property Evaluation: A Guide to Listing, Researching and Evaluating Cultural Heritage Property in Ontario Communities.

Rowe, J.S.

1977 Forest Regions of Canada. Ottawa, Canadian Forestry Service, Department of Fisheries and the Environment.

Saulnior, H. E.
1984 Notice of Intention to Designate. The Ottawa Citizen, 16 March. p. 36.

Schut, L.W. and E.A. Wilson
1987 The Soils of the Regional Municipality of Ottawa-Carleton: Volume 1. Report No. 58 of the Ontario Institute of Pedology.

1987 The Soils of the Regional Municipality of Ottawa-Carleton: Volume 2. Report No. 58 of the Ontario Institute of Pedology.

Serre, Robert
2005 Early Settlers of the Lower Ottawa Valley Whose Ghosts Still Haunt Me! The Caboose: Newsletter of the Cumberland Township Historical Society 17(6):7-8.

1998 Feature Listing. The Caboose: Newsletter of the Cumberland Township Historical Society 11(2):2-3.

Smith, Jeannie
2010 This is the house that the Fouberts built... but who really called it home? The Caboose: Newsletter of the Cumberland Township Historical Society 21(5):10-12.

Stantec Consulting Limited
2011 Stage 1 Archaeological Assessment, YRR Spa and Wellness Centre, Part Lot 8, Concession 1, Township of Cumberland, City of Ottawa, ON. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport. P.I.F. # P002-226-2011

Swayze, Ken
2003 Stage 1 and 2 Archaeological Assessment of a Proposed Subdivision on Part of Lot A, Concession 9, Cumberland Township (Geo), City of Ottawa. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport.

2001 Stage 1 and 2 Archaeological Assessment of a Proposed Subdivision on Part of Lots A, B & C, Conc. 8 & 9, Cumberland Township (Geo), City of Ottawa. Consultants report submitted to the Ontario Ministry of Tourism, Culture and Sport.

Walling, Henry Francis
1863 Map of the County of Carleton, Canada West. Prescott, Ontario, D. P. Putnam.

1862 Map of the Counties of Stormont, Dundas, Glengarry, Prescott and Russell, Canada West.

Watson, Gordon D.
1982 “Prehistoric Peoples in the Rideau Waterway”, Archaeological Historical Symposium, Rideau Ferry, Ontario, F.C.I. Wyght, Lombardi, Ontario, pp. 24-55.

STAGE 1 ARCHAEOLOGICAL ASSESSMENT
OTTAWA ROAD 174/PRESCOTT RUSSELL ROAD 17

APPENDIX A

Previous Archaeological Assessments

February 25, 2013
Report No. 12-1126-0047

APPENDIX A
Previous Archaeological Assessments

Year	Project Title	Project Information Number (PIF)	Project Number	Consultant
1994	Stage I & 2 Archaeological Assessment of the North Service Road/Trim Road Water Feedermain, Cumberland Township, Regional Municipality of Ottawa - Carleton, Ontario	94-021	HQ 94-24	Heritage Quest
1995	Stage 1 and 2 Archaeological Assessment of Canier Street, Orleans, City of Gloucester	94-021	HQ 94-28	Heritage Quest
1995	A Stage 1 Heritage/Archaeological Assessment of proposed Consumers Gas Pipeline, Orleans to Rockland Townships of Cumberland & Clarence - Prescott/Russell County	95-023	HQ 95-06	Heritage Quest
1996	A Phase 1 Heritage/Archaeological Assessment of Clarence Township Prescott Russell County	96-018	HQ 96-38	Heritage Quest
1997	Stage 1 Archaeological Assessment of Clarence Area Waterworks Project, Clarence Township, Prescott-Russell County, Ontario	96-039	96-07	Cataraqui Archaeological Research Foundation (CARF)
1998	Trim Road Environmental Assessment: Heritage Component			Archaeological Services Inc. and Unterman McPhail Cuming Associates
1999	Stage 1 Archaeological Assessment of the Hydro Transmission Corridor from the Hawthorne Transformer Station (Ottawa) to the Cumberland Junction, Regional Municipality of Ottawa Carleton	99-027	HQ 99-29	Heritage Quest
1999	Stage 1 Archaeological Assessment of Innes Road Widening Highway 417 to Blair Road and Orleans Blvd. To Trim Road, Cities of Gloucester and Cumberland, Regional Municipality of Ottawa Carleton		HQ99-36	Heritage Quest

APPENDIX A
Previous Archaeological Assessments

Year	Project Title	Project Information Number (PIF)	Project Number	Consultant
2000	Potentiel Archeologique: Terrains federaux de la Region de la capital nationale Volume 2. National Capital Commission, Ottawa			Marcel Laliberte *et al*
2005	Stage 1 Archaeological and Heritage Assessment of the Proposed East-West Corridor Light Rail Project, Geographic Townships of Cumberland, Gloucester, Goulbourn, March and Nepean, City of Ottawa	P051-044	HQ 04-20	Heritage Quest
2005	Stage 1 Archaeological Assessment for the Orleans Town Centre Servicing Study, Part Lots 34-38, Concession 1 (Old Survey), Geographic Township of Cumberland, City of Ottawa, Ontario	P051-068	HQ 05-17	Heritage Quest
2006	Stage 1 Archaeological Assessment CR 174 Culvert Renewal Crossing, Lot 13, Concession 1, Ottawa Front, Geographic Township of Gloucester, City of Ottawa	P051-099-2006	HQ 06-29	Heritage Quest
2007	Stage 1 and 2 Archaeological Assessment, City of Ottawa Property, Orleans City Centre, Ottawa, Ontario.	P002-060-2005, P002-095-2006	1005171	Jacques Whitford
2008	Interprovincial Crossings Environmental Assessment Study: Archaeological Potential Study – Gatineau/Ottawa Area			Arkeos Inc.
2008	Stage 1 Archaeological Assessment Interprovincial Crossings Environmental Assessment Study, National Capital Region, Ontario	P057-438-2007	06EA-056	Archaeological Services Inc
2008	Stage 1 Archaeological Assessment, NRC Montreal Road Campus Site, City of Ottawa, Ontario	P002-120-2008	1037029	Jacques Whitford
2008	Stage 1 Archaeological Assessment 800 Montreal Road, Lot 24, Concession 1, Ottawa Front, Geographic Township of Gloucester, City of Ottawa, Ontario	P302-011-2008	08-1122-0153	Golder Associates

APPENDIX A
Previous Archaeological Assessments

Year	Project Title	Project Information Number (PIF)	Project Number	Consultant
2008	Stage 2 Archaeological Assessment 800 Montreal Road, Lot 24, Concession 1, Ottawa Front, Geographic Township of Gloucester, Ottawa, Ontario	P302-001-2008	08-1122-0153/2000	Golder Associates
2008	Stage 1/2 Archaeological Assessment Orleans Hotel Geographic Township of Cumberland Ottawa, Ontario	P302-014-2008	08-1122-0098	Golder Associates
2009	An Archaeological Assessment (Stage 1) of the proposed Development Lands 1730 Wilhaven Road near Orleans, Ontario Part Lots 'D' and 'E', Concession 7 and Part Lot 21, Concession 7 (Old Survey) (geographic) Township of Cumberland County of Russell City of Ottawa	P003-260-2009		Adams Heritage
2010	Stage 1 Archaeological Assessment of the Minto Quarry Glen Subdivision Lot 2, Concession 1 Ottawa Front, Geographic Township of Gloucester, Carleton County, City of Ottawa, Ontario	P311-021-2010	10-1126-0058	Golder Associates
2011	Stage 1 Archaeological Assessment, YRR Spa and Wellness Centre, Part Lot 8, Concession 1, Township of Cumberland, City of Ottawa, ON	P002-226-2011	140011027	Stantec Consulting Ltd.
2011	Stage 1 Archaeological Assessment of the Ottawa Light Rail Transit, City of Ottawa	P332-017-2011	10-1121-0222/2300	Golder Associates
2011	Stage 1 Archaeological Assessment of the Orleans Business Park Project Lot 1, Concession 1, Ottawa Front, Geographic Township of Gloucester, Carleton County, Ottawa, Ontario	P332-012-2011	10-1126-0086	Golder Associates
2011	Stage 2 Archaeological Assessment Trim Road Widening, Priority 1, Part Lots A & B, Concession 8 & 9, Ottawa Front, Geographic Township of Cumberland, Ottawa, Ontario	P311-054-2011	10-1121-0142/4000	Golder Associates

APPENDIX A
Previous Archaeological Assessments

Year	Project Title	Project Information Number (PIF)	Project Number	Consultant
2011	Stage 2 Archaeological Assessment Trim Road Realignment, Priority 2 Area, Part Lot 30, Concession 1 Ottawa Front and Part Lots C and B, Concession 9, Geographic Township of Cumberland, Ottawa, Ontario	P311-051-2011	10-1121-0142/4000 Report 2	Golder Associates
2011	Stage 2 Archaeological Assessment Trim Road Realignment, Priority 3 Area, Part Lot 29, 30, 31, 32, Concession 1 Ottawa Front, Geographic Township of Cumberland, Ottawa, Ontario	P311-051-2011	10-1121-0142/4000 Report 3	Golder Associates
2011	Stage 2 Archaeological Assessment for Department of National Defense Property, Project BORR, Lots 20 & 21, Concession 1 Ottawa Front, Geographic Township of Gloucester, City of Ottawa	P311-055-2011	11-1126-0024	Golder Associates
2012	Stage 1 Archaeological Assessment Ottawa Road 174 Safety Improvements Trim Road Realignment Part of Lots 27 to 33, Former Township of Cumberland, Russell County City of Ottawa	P350-014-2012	10-1121-0142/4000	Golder Associates
2012	Stage 2 Archaeological Assessment for the Storm Water Management Pond, Dairy Drive, Part Lot 29, Concession 1, Ottawa Front, Geographic Township of Cumberland, Ottawa, Ontario	P350-018-2012	10-1121-0142/4000 Report 4	Golder Associates
2012	Stage 1 Archaeological Assessment for the Orleans Watermain Link (OWL) West, Geographic Township of Gloucester, Carleton County, City of Ottawa	P350-022-2012	11-1121-0291	Golder Associates

APPENDIX B
Heritage Properties

PIN #	Address #	Road Name	Road Type	Former Municipality	Address Type	Category	Designation
044250093	1144	ST. PIERRE	ST	Gloucester	Main	Listed	
044250267	1233	ST. JEAN	ST	Gloucester	Subordinate	Listed	
044250113	2803	ST. JOSEPH	BLVD	Gloucester	Subordinate	Listed	
044250404	1297	ST. JEAN	ST	Gloucester	Main	Listed	
044250266	1233	ST. JEAN	ST	Gloucester	Main	Listed	
044250156	2757	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
042630351	1100	ALGOMA	RD	Gloucester	Main	Listed	
042630351	1100	ALGOMA	RD	Gloucester	Subordinate	Listed	
042630351	1100	ALGOMA	RD	Gloucester	Subordinate	Listed	
042630351	1100	ALGOMA	RD	Gloucester	Historical	Listed	
042630351	1100	ALGOMA	RD	Gloucester	Historical	Listed	
042630351	1100	ALGOMA	RD	Gloucester	Subordinate	Listed	
044200799	2828	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
042630349	1100	ALGOMA	RD	Gloucester	Main	Listed	
042630349	1100	ALGOMA	RD	Gloucester	Subordinate	Listed	
042630349	1100	ALGOMA	RD	Gloucester	Subordinate	Listed	
042630349	1100	ALGOMA	RD	Gloucester	Historical	Listed	
042630349	1100	ALGOMA	RD	Gloucester	Subordinate	Listed	
042630349	1100	ALGOMA	RD	Gloucester	Historical	Listed	
042630349	1100	ALGOMA	RD	Gloucester	Historical	Listed	
044170070	6654	NOTRE DAME	ST	Gloucester	Main	Listed	
043610252	1353	CYRVILLE	RD	Gloucester	Main	Listed	
047460655	1471	BLAIR	RD	Gloucester	Subordinate	Listed	
043921326	1300	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
043921326	1300	ST. JOSEPH	BLVD	Gloucester	Subordinate	Listed	
043921274	1811	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
043921351	1367	ST. JOSEPH	BLVD	Gloucester	Subordinate	Listed	
043921351	1367	ST. JOSEPH	BLVD	Gloucester	Subordinate	Listed	IV
044220156	6958	NOTRE DAME	ST	Gloucester	Main	Listed	
044250117	2831	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
044250231	1233	ST. JEAN	ST	Gloucester	Main	Listed	
043921310	1485	ST. JOSEPH	BLVD	Gloucester	Subordinate	Listed	
043921310	1485	ST. JOSEPH	BLVD	Gloucester	Subordinate	Listed	
042630377	1100	ALGOMA	RD	Gloucester	Main	Listed	
042630377	1100	ALGOMA	RD	Gloucester	Subordinate	Listed	
042630377	1100	ALGOMA	RD	Gloucester	Subordinate	Listed	
042630377	1100	ALGOMA	RD	Gloucester	Historical	Listed	
042630377	1100	ALGOMA	RD	Gloucester	Historical	Listed	
042630377	1100	ALGOMA	RD	Gloucester	Subordinate	Listed	

PIN #	Address #	Road Name	Road Type	Former Municipality	Address Type	Category	Designation
044250112	2821	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
044200824	2712	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
043921315	1510	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
043921315	1510	ST. JOSEPH	BLVD	Gloucester	Subordinate	Listed	
044140597	1820	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
145370072	2557	OLD MONTREAL	RD	Cumberland	Main	Listed	
145370121	2530	OLD MONTREAL	RD	Cumberland	Main	Listed	
145410160	2972	CANAAN	RD	Cumberland	Main	Listed	
145300028	1291	OLD MONTREAL	RD	Cumberland	Main	Listed	
145300028	1291	OLD MONTREAL	RD	Cumberland	Subordinate	Listed	
145420123	2845	DUNNING	RD	Cumberland	Main	Listed	
145370068	2545	OLD MONTREAL	RD	Cumberland	Main	Listed	
145280091	2226	OLD MONTREAL	RD	Cumberland	Main	Listed	IV
145350025	3702	OLD MONTREAL	RD	Cumberland	Main	Listed	
145280005	2490	OLD MONTREAL	RD	Cumberland	Main	Listed	
145400089	3460	WILHAVEN	DR	Cumberland	Main	Listed	
145400102	3576	WILHAVEN	DR	Cumberland	Main	Listed	
145390281	2188	DUNNING	RD	Cumberland	Main	Listed	
145390008	2264	O'TOOLE	RD	Cumberland	Main	Listed	
145400026	2247	DUNNING	RD	Cumberland	Main	Listed	
145400019	2025	DUNNING	RD	Cumberland	Main	Listed	
145400107	3736	WILHAVEN	DR	Cumberland	Main	Listed	
145390056	2105	O'TOOLE	RD	Cumberland	Main	Listed	
145390058	2029	O'TOOLE	RD	Cumberland	Main	Listed	
145350017	1699	BECKETT'S CREEK	RD	Cumberland	Main	Listed	
145350002	1553	BECKETT'S CREEK	RD	Cumberland	Main	Listed	
145400108	3726	WILHAVEN	DR	Cumberland	Main	Listed	
145410096	3155	LAFLEUR	RD	Cumberland	Main	Listed	
145410099	3012	BIRCHGROVE	RD	Cumberland	Main	Listed	
145400091	3494	WILHAVEN	DR	Cumberland	Main	Listed	
145350023	3596	OLD MONTREAL	RD	Cumberland	Main	Listed	
145350021	3596	OLD MONTREAL	RD	Cumberland	Main	Listed	
145400078	2185	SARSFIELD	RD	Cumberland	Main	Listed	
145400055	2553	DUNNING	RD	Cumberland	Main	Listed	
145410147	3486	FRENCH HILL	RD	Cumberland	Main	Listed	
145400137	1695	DUNNING	RD	Cumberland	Main	Listed	

APPENDIX B
Heritage Properties

PIN #	Address #	Road Name	Road Type	Former Municipality	Address Type	Category	Designation
145400008	1695	DUNNING	RD	Cumberland	Main	Listed	
145320009	1717	FRANK KENNY	RD	Cumberland	Main	Listed	
145360074	3521	OLD MONTREAL	RD	Cumberland	Main	Listed	
145390002	5650	INNES	RD	Cumberland	Main	Listed	
145330219	2805	WILHAVEN	DR	Cumberland	Main	Listed	
145330236	2887	WILHAVEN	DR	Cumberland	Main	Listed	
145320084	1860	DUNNING	RD	Cumberland	Main	Listed	
145300238	1291	OLD MONTREAL	RD	Cumberland	Main	Listed	
145300238	1291	OLD MONTREAL	RD	Cumberland	Subordinate	Listed	
145360053	3825	MCTEER	RD	Cumberland	Main	Listed	
145360053	3825	MCTEER	RD	Cumberland	Subordinate	Listed	
145360050	3925	MCTEER	RD	Cumberland	Main	Listed	
145370130	2629	OLD MONTREAL	RD	Cumberland	Main	Listed	
145370095	2556	OLD MONTREAL	RD	Cumberland	Main	Listed	
145320174	2344	WILHAVEN	DR	Cumberland	Main	Listed	
145370081	2591	OLD MONTREAL	RD	Cumberland	Main	Listed	
145370134	2805	OLD MONTREAL	RD	Cumberland	Main	Listed	
145330242	1435	DUNNING	RD	Cumberland	Main	Listed	
145330215	2940	OLD MONTREAL	RD	Cumberland	Main	Confirm w/ Heritage Staff	IV
145360040	3521	OLD MONTREAL	RD	Cumberland	Main	Listed	
145260018	1177	WATTERS	RD	Cumberland	Main	Listed	
145370058	2511	SPARKLE	ST	Cumberland	Main	Listed	
145360035	3325	OLD MONTREAL	RD	Cumberland	Main	Listed	
145360034	3325	OLD MONTREAL	RD	Cumberland	Main	Listed	
145320035	1865	O'TOOLE	RD	Cumberland	Main	Listed	
145370073	2561	OLD MONTREAL	RD	Cumberland	Main	Listed	
145370093	2560	OLD MONTREAL	RD	Cumberland	Main	Listed	
145350044	1445	CANAAN	RD	Cumberland	Main	Listed	
145270063	1968	OLD MONTREAL	RD	Cumberland	Main	Confirm w/ Heritage Staff	
145370084	2619	OLD MONTREAL	RD	Cumberland	Main	Listed	
145370083	2607	OLD MONTREAL	RD	Cumberland	Main	Listed	IV
145320007	1655	FRANK KENNY	RD	Cumberland	Main	Listed	
145280390	1430	DUNNING	RD	Cumberland	Main	Listed	
145370078	1001	KILRAE	ST	Cumberland	Main	Listed	
145330211	2800	OLD MONTREAL	RD	Cumberland	Main	Listed	IV

PIN #	Address #	Road Name	Road Type	Former Municipality	Address Type	Category	Designation
044250093	1144	ST. PIERRE	ST	Gloucester	Main	Listed	
044250267	1233	ST. JEAN	ST	Gloucester	Main	Listed	
044250113	2803	ST. JOSEPH	BLVD	Gloucester	Subordinate	Listed	
044250404	1297	ST. JEAN	ST	Gloucester	Main	Listed	
044250266	1233	ST. JEAN	ST	Gloucester	Main	Listed	
044250156	2757	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
044200799	2828	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
145390128	2460	FRENCH HILL	RD	Cumberland	Main	Listed	
044220156	6958	NOTRE DAME	ST	Gloucester	Main	Listed	
044250117	2831	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
044250231	1233	ST. JEAN	ST	Gloucester	Main	Listed	
145410118	2921	BIRCHGROVE	RD	Cumberland	Main	Listed	
145420126	2780	SARSFIELD	RD	Cumberland	Main	Listed	
145300207	1789	OLD MONTREAL	RD	Cumberland	Main	Listed	
145320021	2040	WILHAVEN	DR	Cumberland	Main	Listed	
145320038	5901	INNES	RD	Cumberland	Main	Listed	
145390062	2042	DUNNING	RD	Cumberland	Main	Listed	
145390072	2414	DUNNING	RD	Cumberland	Main	Listed	
145400031	2399	DUNNING	RD	Cumberland	Main	Listed	
145400025	2165	DUNNING	RD	Cumberland	Main	Listed	
145400077	2185	SARSFIELD	RD	Cumberland	Main	Listed	
145400075	2405	SARSFIELD	RD	Cumberland	Main	Listed	
145400075	2405	SARSFIELD	RD	Cumberland	Subordinate	Listed	
145400103	3628	WILHAVEN	DR	Cumberland	Main	Listed	
145400384	3424	WILHAVEN	DR	Cumberland	Main	Listed	
145320088	2416	WILHAVEN	DR	Cumberland	Main	Listed	
145360060	3702	OLD MONTREAL	RD	Cumberland	Main	Listed	
145410014	2779	SARSFIELD	RD	Cumberland	Main	Listed	
145360036	3415	OLD MONTREAL	RD	Cumberland	Main	Listed	
145360037	3419	OLD MONTREAL	RD	Cumberland	Main	Listed	
145360048	3702	OLD MONTREAL	RD	Cumberland	Main	Listed	
145370091	2566	OLD MONTREAL	RD	Cumberland	Main	Listed	
145370135	2823	OLD MONTREAL	RD	Cumberland	Main	Listed	
145080266	241	CENTRUM	BLVD	Cumberland	Main	Heritage Register	
145400013	2866	WILHAVEN	DR	Cumberland	Main	Listed	
145400022	2014	SARSFIELD	RD	Cumberland	Main	Listed	
145370075	2565	OLD MONTREAL	RD	Cumberland	Main	Listed	

PIN #	Address #	Road Name	Road Type	Former Municipality	Address Type	Category	Designation
145370085	2622	OLD MONTREAL	RD	Cumberland	Main	Listed	
044250112	2821	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
044200824	2712	ST. JOSEPH	BLVD	Gloucester	Main	Listed	
145400071	3152	WILHAVEN	DR	Cumberland	Main	Listed	
145370065	2537	OLD MONTREAL	RD	Cumberland	Main	Listed	
145370066	2541	OLD MONTREAL	RD	Cumberland	Main	Listed	
145261928	1508	FRANK KENNY	RD	Cumberland	Subordinate	Listed	
145320196	1730	WILHAVEN	DR	Cumberland	Main	Listed	
	2055	LAURIER	ST	Clarence-Rockland		Listed	IV
	1560	LAURIER	ST	Clarence-Rockland		Listed	IV
	2178	LAURIER	ST	Clarence-Rockland		Listed	IV
	2180	LAURIER	ST	Clarence-Rockland		Listed	IV
	2184	LAURIER	ST	Clarence-Rockland		Listed	IV
	1595	LAURIER	ST	Clarence-Rockland		Listed	IV
	1587	LAURIER	ST	Clarence-Rockland		Listed	IV

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APPENDIX C
Photographic Catalogue

Exp. #	Subject	Direction	Date	Photographer
D001	Greens Creek	N	12/09/2012	IN
D002	Greens Creek	S	12/09/2012	IN
D003	Butler House heritage property located at 1367 St. Joseph's Boulevard	NW	12/09/2012	IN
D004	Butler House heritage property located at 1367 St. Joseph's Boulevard	N	12/09/2012	IN
D005	St. Joseph's Cemetery located in Gloucester Township	NE	12/09/2012	IN
D006	St. Joseph's Cemetery located in Gloucester Township	NE	12/09/2012	IN
D007	Bilberry Creek	SE	12/09/2012	IN
D008	Bilberry Creek	SE	12/09/2012	IN
D009	Taylor's Creek	SE	12/09/2012	IN
D010	Taylor's Creek	SE	12/09/2012	IN
D011	Cardinal Creek	E	12/09/2012	IN
D012	Cardinal Creek	W	12/09/2012	IN
D013	Suggested location of McMillan family cemetery	W	12/09/2012	IN
D014	Suggested location of McMillan family cemetery	E	12/09/2012	IN
D015	Suggested location of McMillan family cemetery	E	12/09/2012	IN
D016	Suggested location of McMillan family cemetery	N/A	12/09/2012	IN
D017	Old Wilson House heritage property located at 2800 Old Montreal Road	S	12/09/2012	IN
D018	Old Wilson House heritage property located at 2800 Old Montreal Road	SE	12/09/2012	IN
D019	Old Wilson House heritage property located at 2800 Old Montreal Road	E	12/09/2012	IN
D020	Clearview heritage property located at 2607 Old Montreal Road	NW	12/09/2012	IN
D021	Clearview heritage property located at 2607 Old Montreal Road	N	12/09/2012	IN
D022	Clearview heritage property located at 2607 Old Montreal Road	NE	12/09/2012	IN
D023	Dunning home heritage property located at 2541 Old Montreal Road	NE	12/09/2012	IN
D024	Dunning home heritage property located at 2541 Old Montreal Road	N	12/09/2012	IN

Exp. #	Subject	Direction	Date	Photographer
D025	Dunning home heritage property located at 2541 Old Montreal Road	NW	12/09/2012	IN
D026	Leonard Foubert house heritage property located at 2537 Old Montreal Road	N	12/09/2012	IN
D027	Leonard Foubert house heritage property located at 2537 Old Montreal Road	N	12/09/2012	IN
D028	Cameron House/Clendenon House heritage property located at 2226 Old Montreal Road	E	12/09/2012	IN
D029	Cameron House/Clendenon House heritage property located at 2226 Old Montreal Road	SE	12/09/2012	IN
D030	Dunning family cemetery	N/A	12/09/2012	IN
D031	Dunning family cemetery	NE	12/09/2012	IN
D032	Dales Cemetery located in Cumberland Township	SE	12/09/2012	IN
D033	Dales Cemetery located in Cumberland Township	SE	12/09/2012	IN
D034	Dales Cemetery located in Cumberland Township	N/A	12/09/2012	IN
D035	Dales Cemetery located in Cumberland Township	S	12/09/2012	IN
D036	Becketts Creek	S	12/09/2012	IN
D037	Becketts Creek	N	12/09/2012	IN
D038	Ottawa River	N	12/09/2012	IN
D039	Ottawa River	N	12/09/2012	IN
D040	Ruisseau Lafontaine Stream	E	12/09/2012	IN
D041	Ruisseau Lafontaine Stream	SE	12/09/2012	IN
D042	Ruisseau Lafontaine Stream	E	12/09/2012	IN
D043	Ruisseau Lafontaine Stream	W	12/09/2012	IN
D044	Cemetery in Rockland located north of Laurier Street	N	12/09/2012	IN
D045	Cemetery in Rockland located north of Laurier Street	NE	12/09/2012	IN
D046	Cemetery in Rockland located north of County Road 17	W	12/09/2012	IN
D047	Cemetery in Rockland located north of County Road 17	N	12/09/2012	IN
D048	Clarence Creek	SE	12/09/2012	IN
D049	Clarence Creek	SW	12/09/2012	IN

APPENDIX C
Photographic Catalogue

Exp. #	Subject	Direction	Date	Photographer
D050	Blais Creek	SE	12/09/2012	IN
D051	Blais Creek	SE	12/09/2012	IN
D052	Blais Creek	NW	12/09/2012	IN
D053	General view of Ottawa Road 174	NE	12/09/2012	IN
D054	General view of Ottawa Road 174	NE	12/09/2012	IN
D055	General view of Old Montreal Road	NW	12/09/2012	IN
D056	General view of Old Montreal Road	NW	12/09/2012	IN

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Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

Golder Associates Ltd.
32 Steacie Drive
Kanata, Ontario, K2K 2A9
Canada
T: +1 (613) 592 9600

Golder Associates

Annex B-2. Visual Assessment Photo Inventory

1 LOOKING NORTHEAST AT HWY 417/174 INTERCHANGE - EXISTING PLANTING TREATMENT THROUGHOUT INTERCHANGE HELPING TO SCREEN CORRIDOR FROM SURROUNDING AREAS

2 LOOKING WEST AT HWY 417/174 INTERCHANGE - EXISTING PLANTING TREATMENT AND GRADE CHANGES EFFECTIVELY SCREEN CORRIDOR FROM ADJACENT AREAS

3 LOOKING WEST AT BLAIR ROAD INTERCHANGE - WELL PLACED EXISTING PLANT MATERIAL SCREENS AND MINIMIZES ADVERSE VIEWS (PARKING LOTS, ETC.)

4 LOOKING EAST TO PINEVIEW GOLF COURSE - WELL ESTABLISHED VEGETATION ADDS AESTHETICES TO THE CORRIDOR

5 LOOKING NORTH AT BEACON HILL SOUTH AREA - EXISTING VEGETATION AND SOUND BARRIER PROVIDE CONTINUOUS SCREEN OF CORRIDOR FROM ADJACENT RESIDENTIAL AREA

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Photgraphic Images taken from Google Streetview (Oct. 2012)

Visual Assessment of Existing Conditions
Corridor Views and Vistas 1

Ottawa PARSONS AECOM

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21 LOOKING EAST AT TAYLOR CREEK CROSSING - DISTANT VIEWS OF ESCARPMENT AND VEGETATION IN THE FOREGROUND ADD AESTHETICS TO THE CORRIDOR.

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Photgraphic Images taken from Google Streetview (Oct. 2012)

Visual Assessment of Existing Conditions
Corridor Views and Vistas 2

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Annex B-3. Natural Environment

AECOM

City of Ottawa

Eastern Light Rail Transit (Blair to Trim) – Natural Environment Existing Conditions Report

Report

Environment AECOM

City of Ottawa

Eastern Light Rail Transit (Blair to Trim) – Natural Environment Existing Conditions Report

Prepared by:

AECOM
50 Sportsworld Crossing Road, Suite 290 519.650.5313 tel
Kitchener, ON, Canada N2P 0A4 519.650.3424 fax
www.aecom.com

Project Number:

60323982

Date:

August 18, 2015 (updated March 15, 2016)

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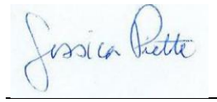
Report Prepared By:

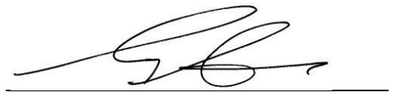


Jessica Piette, B.Es
Terrestrial Ecologist

Michael Godard, H.BSc
Fisheries Biologist

Jillian deMan, H.BSc
Senior Terrestrial and Wetland Ecologist

Report Reviewed By:



Gary Epp, Ph.D
Manager of Ecological Services

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Revision Log

Revision #	Revised By	Date	Issue / Revision Description
0		August 18, 2015	Finalized for draft EPR
1		March 15, 2016	Updates to Section 4.1, 5.2 and 5.9 as per MNRF Comments for final EPR

LIST OF ACRONYMS

CR	County Road
EA	Environmental Assessment
LRIA	Lakes and Rivers Improvement Act
LRT	Light Rail Transit
MNRF	Ministry of Natural Resources and Forestry (formerly MNR)
NCC	National Capital Commission
OR	Ottawa Road
RVCA	Rideau Valley Conservation Authority
TMP	Transportation Master Plan

AECOM City of Ottawa Eastern Light Rail Transit (Blair to Trim) – Natural Environment Existing Conditions Report

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AECOM City of Ottawa Eastern Light Rail Transit (Blair to Trim) – Natural Environment Existing Conditions Report

1. Introduction

The City of Ottawa is undertaking a Planning and Environmental Assessment (EA) Study for the Eastern Light Rail Transit Project along Ottawa Road (OR) 174 from Trim Road to Blair Station.

AECOM, in association with Parsons and Houle Chevrier Engineering Limited were retained to undertake this EA study. To better understand the existing aquatic and terrestrial environments along the proposed Eastern LRT Route, a combination of background sources, field work, and agency consultation was undertaken. Work completed for the OR 174-CR 17 Class EA Study coincides with the same corridor and was incorporated into this report.

The purpose of this Natural Environment Existing Conditions Report is to provide an understanding of the existing aquatic and terrestrial environments along the proposed Eastern LRT Route.

1.1 Project Background

The choice of a rapid transit facility and/or other improvements to the existing transportation corridor must be made to assist in achieving modal split objectives and must consider the potential impact on existing and future developments within the identified growth management objectives. Whatever the outcome, there will be impacts on future planning and land use, and these must be considered in context.

The under-construction Confederation Line LRT project will see implementation of LRT operations west of Blair Station in 2018. It is expected that construction of the Eastern LRT extension will commence almost immediately after that to help ensure implementation by the 2023 horizon year identified in the 2013 TMP. Development of a solution that minimizes disruption to transit users from Orléans, who will be experiencing varying levels of delay and inconvenience due to Confederation Line construction, and that maximizes the benefits that the LRT will bring in terms of service quality is therefore important to providing a successful transit project. With implementation of the Eastern LRT extension, and elimination of existing direct-to-downtown express bus services, a modified local bus network is required to serve Orléans. Transfers to/from LRT at stations will require high quality facilities designed to minimize transfer times and connect to local amenities. Clarence-Rockland will need to consider whether and where CRTranspo services will connect with the LRT in Orléans or continue direct to downtown and/or Gatineau.

The extension of the Eastern LRT from Blair Rd to Trim Rd is consistent with the City's planning objectives and is identified as a Phase 2 project in the 2013 Transportation Master Plan (TMP).

1.2 Project Study Area

The study area includes Ottawa Road (OR) 174 from the vicinity of Blair Station to Trim Road. Figure 1 presents the location of the study area.

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DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

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LEGEND

- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Wards \ Quartier
- Railways \ Chemin de fer
- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale
- Watercourse \ Courant
- Parks \ Parcs
- Lot Fabric \ Propriété
- Urban Area \ Zone Urbaine

Data sources:
Base Data: (c) 2014 City of Ottawa, Land Information Ontario & Statistics Canada

STUDY AREA

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
1

ANSI B

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2. Approach

2.1 Study Approach

The approach in determining existing environmental conditions along the proposed Eastern LRT study area was to use a combination of existing background information (including work completed for the OR 174-CR 17 Class EA Study in the same area) and aquatic and terrestrial field investigations. Information collected through the background review and fieldwork is based on relevant legislation and provincial policies. The purpose of the field investigations is to provide a general understanding of both the aquatic and terrestrial environments, especially in areas where there are data gaps, and to use the information to help with the selection of a preferred location for the Eastern LRT.

2.2 Relevant Legislation and Policies

Consideration of legislation and policies at all three levels of government, federal, provincial and municipal is required for the project. Some legislation and policies apply more directly than others with respect to natural heritage features and functions. The following is an outline of the legislation and policies relevant to natural heritage features and functions as they relate to the Environmental Assessment Study:

Table 1. Relevant Legislation, Policies & Guidelines

Level of Government	Legislation	Policies/Regulations	Guidelines
Federal	*Fisheries Act*	*Policy for the Management of Fish Habitat*	
	Migratory Birds Act		
	Species at Risk Act		
Provincial	*Planning Act*	*Provincial Policy Statement (1997)*	Natural Heritage Reference Manual
	Conservation Authorities Act	*Ontario Regulation 174/06 and 170/06*	Rideau Valley Conservation Authority Policies for the Administration of the Development, Interference, with Wetlands and Alterations to Shorelines and Water Courses Regulation
	Endangered Species Act 2007	*Ontario Regulation 230/08 updated July 2013*	
	Public Lands Act *Lakes and Rivers Improvements Act*		
Municipal	*Official Plans*	*Environmental Policies*	

The following legislative requirements are relevant to the alternatives and the natural features within the study area.

2.2.1 Federal Legislation

Fisheries Act - The *Fisheries Act* is one of Canada's most important pieces of legislation for the protection and management of aquatic species and habitat. The Act is administered by the Department of Fisheries and Oceans (DFO). Changes in Regulations came into force on November 25th 2013 that focus the Act's regulatory regime on managing threats to the sustainability and ongoing productivity of Canada's commercial, recreational and Aboriginal fisheries.

Migratory Birds Act - Canada's *Migratory Birds Convention Act* is intended to protect migratory birds, their habitat and their nests. The act includes more than 700 species of birds, including songbirds, woodland birds, waterfowl, shorebirds and seabirds. The Canadian Wildlife Service administers the act, but numerous other agencies are responsible for consideration of migratory birds under the act.

The *Migratory Birds Convention Act* prohibits the destruction of the nests of migratory birds during the breeding season and prohibits the release of harmful substances in areas frequented by migratory birds.

The application of the *Migratory Birds Convention Act* is likely to be relevant only to the removal of the limited number of trees and woody vegetation identified within the study area. To avoid contravention of the Act, recommendations will be outlined within the Environmental Study Report to:

1) avoid construction during breeding and nesting periods for migratory birds, and,
2) to conduct nest surveys prior to construction in relevant areas.

Species at Risk Act - The *Species at Risk Act* (SARA, 2002) is federal legislation whose goal is to monitor and protect disappearing species; provide recovery strategies for extirpated, endangered or threatened species, as well as to manage species of special concern. This legislation applies to federal lands or projects or approvals administered by a federal agency.

2.2.2 Provincial Legislation

***Planning Act*/Provincial Policy Statement -** The Ontario Provincial Policy Statement (PPS) is issued under Section 3 of the Ontario *Planning Act*, R.S.O. 1990. Section 3 of the Act requires that decisions affecting planning matters "shall be consistent with" policy statements issued under the Act. The current PPS came into effect on April 30th, 2014 and applies to applications submitted on or after this date. The PPS provides policy direction on land use planning and development matters that are of provincial interest which protect the natural environment as well as public health and safety.

The PPS identifies seven types of natural heritage features to be protected:

- significant habitat of endangered species and threatened species;
- provincially significant wetlands;
- significant woodlands south and east of the Canadian Shield;
- significant valleylands south and east of the Canadian Shield;
- significant wildlife habitat;
- significant areas of natural and scientific interest, and;
- fish habitat.

Conservation Authorities Act –The Conservation Authorities are authorized by the *Development, Interference with Wetlands and Alterations to Shorelines and Watercourse Regulation* (Ontario Regulations 174/06 and 170/06, respectively, also known as the "Generic Regulation"). These Regulations, passed under the *Conservation Authorities Act*, regulate activities in natural and hazardous areas (i.e., areas in and near rivers, streams, floodplains, wetlands, slopes and woodlands).

Lakes & Rivers Improvement Act - Approval may be required under the *Lakes and Rivers Improvement Act* (LRIA), if any dyking, dredging or damming activities are planned along or near watercourses or wetland areas. This is administered by the Ministry of Natural Resources and Forestry (MNRF).

Public Lands Act - Except for federal canals and harbours, the beds of most lakes and streams are public land in Ontario. A Work Permit under the *Public Lands Act* (PLA) may be required if work is proposed in water or near shore (shoreline) areas below the spring high water mark. This legislation is administered by the MNRF.

Endangered Species Act 2007 - The *Endangered Species Act 2007* (ESA, 2007), provides protection for Species at Risk in Ontario and requires the Province to develop and implement a recovery strategy for each regulated species. The Regulations apply to Extirpated (a wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild); Endangered (a wildlife species that is facing imminent extirpation or extinction); and Threatened (a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction species). Special Concern species are those that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats; however, these species are not regulated under the ESA. Should the project directly affect a Species at Risk permitting requirements under the ESA will be identified through consultation with MNRF and completion of a Species at Risk screening. The ESA was updated by MNRF on July 1, 2013 providing new regulations with regard to the species listed under the act and their habitat.

2.2.3 Municipal Legislation

Applicable Municipal Legislation includes the Official Plans for the City of Ottawa. Descriptions of these documents are provided in Section 1.1.1 of this Report.

3. Background Review

To determine which natural heritage features that may be present along the Eastern LRT, a comprehensive background review was conducted. The purpose of the background review was to compile a general overview of the natural heritage features and functions within the study area and to identify data gaps, if any.

The following documents and data sources were reviewed and summarized:

- An Ecological Inventory of the Green's Creek Sector (NCC Greenbelt, 1986)
- City of Ottawa: Transportation Master Plan, November 2013
- City Stream Watch: Annual Reports (RVCA, 2004, 2007, 2008, 2009, 2010)
- Correspondence with the Ministry of Natural Resources and Forestry (MNRF), Kemptville District
- Correspondence with Rideau Valley Conservation Authority (RVCA)
- Correspondence with the City of Ottawa
- Drainage for Culvert Design Brisbois to Taylor Creek (Delcan, 1993)
- East Transitway Extension Place D 'Orléans Station to Trim Road Feasibility Study (McCormick Rankin, 2011)
- Geotechnical Investigation-Proposed Pipe Crossing Regional Road 174 at Green's Creek (R.V. Anderson Associates Lim., 2006)
- Green's Creek Watershed Study, (A.J. Robinson & Associates. Jan. 1990. Vol. 1)
- Green's Creek Watershed Study, (A.J. Robinson & Associates. October 1985. Vol. 2)
- Highway 174 Culvert over Taylor Creek (Genivar, 2012)
- Highway 174 Culvert over Taylor Creek: Detailed Condition Survey and Renewal Options Analysis (Genivar, 2012)
- Highway 17 Widening Study – Class Environmental Assessment (UMA, 1992)
- Highway 417/17 Preliminary Design Report (IBI Group, 1993)
- Land Information Ontario Database (LIO)
- Memo: Taylor Creek Erosion Control – Hydraulic Modelling (Stantec, 2007)
- Phases 1 & 2 Class EA Report – Taylor Creek Erosion Control (Stantec Ltd., June 26, 2007)
- Slope Stability Considerations Green's Creek Section Proposed Greenbelt Recreational Pathway (Golder, March 2003)
- The Ecosystems of Ontario, Part 1: Ecozones and Ecoregions published in 2009, Ecozones and Ecoregions
- Ministry of Natural Resources Wetland Evaluation Report for Petrie Islands PSW.

From this, a description of the physical, aquatic, terrestrial, wildlife and species at risk conditions is documented within Sections 3.1 through 3.5 below.

3.1 Background Physical Conditions

3.1.1 Physiography

The physiography of the Ottawa area is related largely to the former occupancy of the region by the Champlain Sea. Following glacial retreat and prior to isostatic uplift, the current Ottawa area was part of an inlet connected by the St. Lawrence River to the Atlantic Ocean. Marine water occupied the area for 2,000 – 3,000 years during which time marine clay was deposited on the underlying bedrock and till beds of the sea floor forming the clay plains that make up much of the Ottawa area physiography today. As the Champlain Sea receded, becoming an estuarine environment, sand was deposited overtop the clays. Glacial melt water continued to flow through this area, creating finely textured deltaic deposits. The Ottawa River, at that time, occupied a much larger area than it does currently

and was split into two branches around what is now Orleans. The shifting channels of the Ottawa River created terraces and abandoned channels and also left fluvial sediments in some areas. Most of what was the south branch of the Ottawa River is now occupied by the Mer Bleue bog. Bedrock outcrops and glacial tills were affected by the presence of the Champlain Sea, and many of these features that are present at surface have been modified and reworked, such as by wave action (Marshall et al., 1979). Most of the watercourses in the study area flow over areas of the marine clay beds and these clays can be seen on eroded beds and banks.

3.1.2 Geology and Soils

The Ottawa area lies in a rift valley known as the Ottawa Bonnechere Grabben, bounded by the Mattawa and Pettawawa Faults. Locally, the City of Ottawa and study area are surrounded by the Precambrian rocks of the Canadian Shield to the North and by the Frontenac Axis to the West (Chapman and Putnam, 1973). The underlying bedrock within the basin is predominantly limestone and dolomite of the Ordovician period. The bedrock is gently folded, resulting in broad bedrock-controlled plains, tilting to the west. Bedrock is generally near the surface and exposed at faults, which form the major topographic features of the area and cross the study area in several locations. Bedrock is also exposed in some areas where fluvial erosion has removed surface sediments. The complex form of block faulting in the Ottawa area created a basin into which marine sediments were deposited during the time that the Champlain Sea occupied the area (Marshall et al., 1979).

3.2 Background Aquatic Conditions

The following aquatic sections are based upon available background information and secondary-source reports. Additional information and confirmation regarding natural area descriptions and locations within the study area were secured from the Ministry of Natural Resources and Forestry (MNRF), the Rideau Valley Conservation Authority (RVCA) and Fisheries and Oceans Canada (DFO). This information was used to confirm existing conditions and to determine any data-gaps for field-based assessments.

For the purpose of this aquatic description, the following documents and data sources were reviewed and summarized:

- City Stream Watch 2010 (RVCA, 2010)
- City Stream Watch 2009 (RVCA, 2009)
- City Stream Watch 2008 (RVCA, 2008)
- City Stream Watch 2007 (RVCA, 2007)
- City Stream Watch 2004 (RVCA, 2004)
- City Stream Watch Voyageur Creek Summary Report 2013 (RVCA, 2013)
- City Stream Watch Taylor Creek Summary Report 2012 (RVCA, 2012)
- Phases 1 & 2 Environmental Assessment Report Taylor Creek Erosion Control (Stantec Ltd., 2007)
- DFO SAR mapping Rideau Valley 2014
- Natural Heritage Information Centre (NHIC) - Biodiversity Explorer Database
- Fish records from RVCA and MNRF

For each watershed in the study area characteristics such as area, land-use, and fish records were summarized. This information provides a high-level understanding of the known features at the watershed level.

To aid in the general sensitivity classification for each site, a review of Provincial Status and Species at Risk rankings was completed for each fish species noted in the study area (**Appendix B**). In general, these rankings are based on the total number of extant Ontario populations and the degree to which they are potentially or actively threatened with destruction. Provincial (or Subnational) ranks are used by the Natural Heritage Information Centre to set protection priorities for rare species and natural communities. These ranks are not legal designations and

consider only those factors within the political boundaries of Ontario. By comparing the provincial ranks, the status, rarity and the urgency of conservation needs can be ascertained. Rankings were also included based on the species' risk of extinction, extirpation or endangerment within Canada.

A tolerance level was assigned based on the assessments in The Ontario Freshwater Fish Life History Database (Eakins, 2014). These tolerance levels are defined as:

- Tolerant – species that are fairly insensitive or adaptive to environmental or anthropogenic stresses;
- Intermediate – species that are neither particularly sensitive nor insensitive to environmental or anthropogenic stresses;
- Intolerant – species that are sensitive to environmental or anthropogenic stresses.

These descriptors aid in the understanding of significance, especially for those species which are classified as common or not at risk.

The study area is located within the MNRF Fisheries Management Zone (FMZ) 18 and is the most easterly fisheries management zone in Ontario.

Species identified through the background review, as well as fish records for the entire study area received from RVCA, are presented in the Fish Life History Table in **Appendix B**.

Water quality data obtained through the background review was confirmed during field investigations. The thermal regime describes the typical summer water temperature of a waterbody. Thermal regime is determined using measures of water temperature and/or inferred from knowledge of the resident fish community. The MNRF groups fish into three broad fish community classifications:

- coldwater - mean summer temperature of <19 ºC;
- coolwater - 19-25ºC; or,
- warmwater - >25 ºC.

A warmwater community is characterized by species such as Largemouth Bass, Bluegill, Bullheads, and Carp. Coolwater assemblages are characterized by percids such as Walleye or esocids such as Northern Pike. Given the overlap in thermal ranges between these species, it is not uncommon to find overlap between these community types. In addition, habitat requirements may vary with the life stage of the fish. Coldwater species are characterized by salmonids that generally have more sensitive habitat requirements, such as cold groundwater upwellings for spawning, or clear, unimpaired quality to feed, and to conserve energy in the cooler waters. Coldwater species are generally more sensitive to anthropogenic influences, and their habitat can consequently be considered as more sensitive than the habitat of some warmwater habitat generalist species.

3.2.1 Watersheds

The study area is located within the Ottawa River Watershed and within the jurisdiction of the Rideau Valley Conservation Authority (RVCA). There are four (4) subwatersheds located within the current EA study area:

- Taylor Creek
- Bilberry Creek
- Green's Creek
- Voyager Creek

An initial evaluation of available mapping within the Study Area indicates there at least four major creeks found within the study area including Greens Creek, Bilberry Creek, Voyager Creek and Taylor Creek. Voyager Creek wasn't assessed as it is buried under OR 174. In addition, OR 174 runs adjacent to the Ottawa River.

The Ottawa River is the receiving water body for the four subwatersheds located within the study area. The Ottawa River originates at Lake Capitmitchigama in Quebec and is a major tributary to the St. Lawrence River. The watershed is approximately 146,000 km^2 of which 65% is located within Quebec (MNR, 2002).

3.2.1.1 Taylor Creek

Taylor Creek is a tributary of the Ottawa River located just west of Trim Road. Approximately 1.7 kilometers in length, the creek originates in the Fallingbrook Community east of 10th Line Road from a stormwater retention pond located above the Orleans escarpment and empties into the Ottawa River at Petrie Island, a provincially significant wetland (RVCA, 2012). The subwatershed is approximately 407 ha in area (MRC, 2011). Taylor Creek flows through residential, commercial and agricultural land uses and is transected by OR 174 where it is enclosed in a concrete box culvert (Stantec, 2007). A large majority of the stream has been altered by human influences including urban development and road crossings.

Fish community surveys were completed by RVCA (RVCA, 2012) at four locations along Taylor Creek in which nine fish species were collected. Brook Stickleback was identified at five of the eight stations. The fish habitat in Taylor Creek was assessed by Stantec and is described as poor fish habitat availability. This is likely due to the dominance of clay substrates and that the banks are susceptible to erosion during high flows (Stantec, 2007).

Table 2. Fish Species in Taylor Creek

Family /Species	Common Name	Scientific Name	SRank	SARA	SARO	Origin*	Abundance*	Tolerance*	Thermal Regime*	Spawning Season*
Centrarchidae	Pumpkinseed	*Lepomis gibbosus*	S5	No	No	Native	Common	Intermediate	Warmwater	Spring /summer
Cyprinidae	Brassy Minnow	*Hybognathus hankinsoni*	S5	No	No	Native	Common	Intermediate	Coolwater	Spring /summer
	Creek Chub	*Semotilus atromaculatus*	S5	No	No	Native	Common	Tolerant	Coolwater	Spring
	Common Shiner	*Luxilus cornutus*	S5	No	No	Native	Common	Intermediate	Coolwater	Spring
	Fathead Minnow	*Pimephales promelas*	S5	No	No	Native	Common	Tolerant	Warmwater	Spring /summer
Catostomidae	White Sucker	*Catostomus commersonii*	S5	No	No	Native	Common	Tolerant	Coolwater	Spring
Gasterosteidae	Brook Stickleback	*Culaea inconstans*	S5	No	No	Native	Common	Intermediate	Coolwater	Spring /summer
Fundulidae	Banded Killifish	*Fundulus diaphanus*	S5	No	No	Native	Common	Tolerant	Coolwater	Summer
Umbridae	Central Mudminnow	*Umbra limi*	S5	No	No	Native	Common	Tolerant	Coolwater	Spring

Notes – please see **Appendix B**.

All fish species identified in Taylor Creek were classified as S5, i.e. Secure; common, widespread and abundant in Ontario. This assemblage was described as fairly tolerant to environmental or anthropogenic stresses. Four of the documented species spawn during the spring season, one during the summer and four during both spring and summer.

Two temperature dataloggers were deployed in Taylor Creek in 2012, and from this data, it was determined that Taylor Creek is a coolwater system.

3.2.1.2 Bilberry Creek

Bilberry Creek is an urban subwatershed in central Orleans originating north of Innes Road in a forested ravine. The creek flows in a northerly direction to the Ottawa River and drains a variety of land uses including natural areas, residential subdivisions, recreational areas and several road crossings (RVCA, 2009). During 2009, the City Stream Watch completed an assessment of Bilberry Creek. The majority of the watercourse was documented as natural with no major alterations. Bilberry Creek was classified as a cool water system according to RVCA (2009) temperature data.

Stream morphology for Bilberry Creek was described as mostly runs with areas of pools and riffles. Substrates were dominated by clay, silt, cobble and gravel. Streambank erosion was observed near the mouth of the creek and certain areas throughout and was attributed to the lack of adequate stormwater runoff management (RVCA, 2009).

Fish community sampling was completed at six sites along Bilberry Creek using a variety of sampling methods (RVCA, 2009). A total of 18 fish species was captured.

Table 3: Fish Species in Bilberry Creek

Family /Species	Common Name	Scientific Name	SRank	SARA	SARO	Origin*	Abundance*	Tolerance*	Thermal Regime*	Spawning Season*
Centrarchidae	Black Crappie	*Pomoxis nigromaculatus*	S4	No	No	Native /introduced	Common	Tolerant	Coolwater	spring
	Pumpkinseed	*Lepomis gibbosus*	S5	No	No	Native	Common	Intermediate	Warmwater	spring/summer
	Rock Bass	*Ambloplites rupestris*	S5	No	No	Native	Common	Intermediate	Coolwater	spring
	Smallmouth Bass	*Micropterus dolomieu*	S5	No	No	Native /introduced	Common	Intermediate	Warmwater	spring
Cyprinidae	Bluntnose Minnow	*Pimephales notatus*	S5	No	No	Native	Common	Intermediate	Warmwater	summer
	Creek Chub	*Semotilus atromaculatus*	S5	No	No	Native	Common	Tolerant	Coolwater	spring
	Emerald Shiner	*Notropis atherinoides*	S5	No	No	Native	Common	Intermediate	Coolwater	summer
	Fallfish	*Semotilus corporalis*	S4	No	No	Native	Uncommon	Intermediate	Coolwater	spring
	Fathead Minnow	*Pimephales promelas*	S5	No	No	Native	Common	Tolerant	Warmwater	spring/summer
	Longnose Dace	*Rhinichthys cataractae*	S5	No	No	Native	Common	Intermediate	Coolwater	Spring/summer

Family /Species	Common Name	Scientific Name	SRank	SARA	SARO	Origin*	Abundance*	Tolerance*	Thermal Regime*	Spawning Season*
	Spotfin Shiner	*Cyprinella spiloptera*	S4	No	No	Native /introduced	Common	Intermediate	Warmwater	summer
	Spottail Shiner	*Notropis hudsonius*	S5	No	No	Native	Common	Intermediate	Coolwater	spring
Catostomidae	White Sucker	*Catostomus commersonii*	S5	No	No	Native	Common	Tolerant	Coolwater	spring
Gadidae	Burbot	*Lota lota*	S5	No	No	Native	Common	Intermediate	Coldwater	spring
Gasterosteidae	Brook Stickleback	*Culaea inconstans*	S5	No	No	Native	Common	Intermediate	Coolwater	spring/summer
Ictaluridae	Brown Bullhead	*Ameiurus nebulosus*	S5	No	No	Native	Common	Intermediate	warmwater	spring
Percidae	Yellow Perch	*Perca flavescens*	S5	No	No	Native	Common	Intermediate	Coolwater	spring
Umbridae	Central Mudminnow	*Umbra limi*	S5	No	No	Native	Common	Tolerant	Coolwater	spring

Notes – please see **Appendix B**.

All fish species identified in Bilberry (and Voyager Creek) were classified as either S4 (Black Crappie, Fallfish and Spotfin Shiner), or S5 (15 remaining species), i.e. common, and demonstrably secure in Ontario. This assemblage was described as fairly tolerant to environmental or anthropogenic stresses. One coldwater species, Burbot, was identified, which may indicate the presence of groundwater upwelling areas within Bilberry Creek. Ten of the documented species spawn during the spring season, three during the summer, three during both spring and summer and one, the Burbot, during the winter.

Four temperature data loggers were set in Bilberry Creek by RVCA in 2009 and it can be classified as a cool water system with potential cold water reaches (RVCA, 2009).

3.2.1.3 Voyageur Creek

Voyageur Creek is a tributary of the Ottawa River that is approximately six kilometers long. It is located in the Orleans neighborhood of Chapel Hill North. Receiving runoff from the surrounding areas, the headwaters of Voyageur Creek begin near Orleans Boulevard. The various branches of the creek flow through forested ravines between housing subdivisions before they come together and cross under St. Joseph Boulevard and Highway 174. From there, Voyageur Creek is piped underground before outletting into the Ottawa River (RVCA 2013).

Stream morphology for Voyager Creek was described as mostly runs with areas of pools and riffles with the substrates consisting of sand, clay, detritus, silt, cobble, gravel, muck and boulders in decreasing order. Erosion values varied from low to high and were observed along most of Voyageur Creek. High levels of erosion were seen in some sections especially approaching St. Joseph Boulevard (RVCA, 2013).

Fish community sampling was completed at three sites along Voyager Creek using a variety of sampling methods (RVCA, 2013 with only two fish species captured.

Three temperature loggers were installed on Voyageur Creek by RVCA (2013) with the analysis of the data collected indicating that Voyageur Creek is classified as a cool water system. The water temperature of this creek is likely heavily influenced by the substantial amount of shading along most of its length as well as the piped sections of the creek (RVCA, 2013).

Table 4. Fish Species in Voyager Creek

Family/Species	Common Name	Scientific Name	SRank	SARA	SARO	Origin*	Abundance*	Tolerance*	Thermal Regime*	Spawning Season*
Cyprinidae	Creek Chub	*Semotilus atromaculatus*	S5	No	No	Native	Common	Tolerant	Coolwater	spring
Gasterosteidae	Brook Stickleback	*Culaea inconstans*	S5	No	No	Native	Common	Intermediate	Coolwater	spring/summer

Notes – please see **Appendix B**.

3.2.1.4 Green's Creek

Green's Creek is located in the east end of the City of Ottawa within the Ottawa Greenbelt. The main branch of Green's Creek is a permanent warmwater system with cool water reaches (RVCA, 2010). Green's Creek has several tributaries including Borthwick Creek, Mud Creek, Black Creek and Ramsay Creek forming its headwaters. The Green's Creek valley from Innes Road to the mouth of the Ottawa River is identified as a Life Science Area of Scientific Interest (ANSI).

During the City Stream Watch assessment completed in 2010, severe erosion was observed south of Innes Road. In addition several stormwater outlets were observed that can increase erosion and can contribute to poor water quality (RVCA, 2010). During the 2010 assessment Green's Creek was surveyed from the mouth of the creek to 13.5 kilometers south which includes the current Study Area. A large portion of the stream was classified as 'not altered'; however 20% of the 13.5 km surveyed reach was classified as 'highly altered' from straightened channel, armoured, little to no buffer, most of which was located near road crossings. The surrounding land use was dominated by forest, meadow and scrubland, while smaller portions of the subwatershed were in industrial/commercial and infrastructure uses. The stream morphology of Green's Creek was described as mostly runs with areas of pools and riffles. Substrates were described as mostly clay, sand, muck, gravel and silt with limited presence of cobble and boulder.

Fish community sampling was conducted during the 2010 assessment at six sites along Green's Creek using a variety of sampling methods with 27 species being captured. The species captured are presented below in Table 5.

Table 5: Fish Species in Green's Creek

Family /Species	Common Name	Scientific Name	SRank	SARA	SARO	Origin*	Abundance*	Tolerance*	Thermal Regime*	Spawning Season*
Centrarchidae	Black Crappie	*Pomoxis nigromaculatus*	S4	No	No	Native /introduced	Common	Tolerant	Coolwater	spring
	Largemouth Bass	*Micropterus salmoides*	S5	No	No	Native/introduced	Common	Tolerant	warmwater	spring
	Pumpkinseed	*Lepomis gibbosus*	S5	No	No	Native	Common	Intermediate	Warmwater	spring/ summer
	Rock Bass	*Ambloplites rupestris*	S5	No	No	Native	Common	Intermediate	Coolwater	spring
	Smallmouth Bass	*Micropterus dolomieu*	S5	No	No	Native /introduced	Common	Intermediate	Warmwater	spring
Cyprinidae	Blacknose Dace	*Rhinichthys atratulus*	S5	No	no	Native	Limited distribution	Intermediate	Coolwater	spring
	Common	*Luxilus cornutus*	S5	No	No	Native	Common	Intermediate	Warmwater	summer

Family /Species	Common Name	Scientific Name	SRank	SARA	SARO	Origin*	Abundance*	Tolerance*	Thermal Regime*	Spawning Season*
	Shiner									
	Creek Chub	*Semotilus atromaculatus*	S5	No	No	Native	Common	Tolerant	Coolwater	spring
	Fathead Minnow	*Pimephales promelas*	S5	No	No	Native	Common	Tolerant	Warmwater	spring/ summer
	Golden Shiner	*Notemigonus crysoleucas*	S5	No	No	Native	Common	Intermediate	Coolwater	summer
	Goldfish	*Carassius auratus*	SNA	No	No	Introduced	Common	Tolerant	Warmwater	spring/ summer
	Longnose Dace	*Rhinichthys cataractae*	S5	No	No	Native	Common	Intermediate	Coolwater	spring/ summer
	Northern Redbelly Dace	*Chrosomus eos*	S5	No	No	Native	Common	Intermediate	Coolwater	spring/ summer
Catostomidae	Quillback	*Carpiodes cyprinus*	S4	No	No	Native	Uncommon	Intermediate	Coolwater	spring
	Shorthead Redhorse	*Moxostoma macrolepidotum*	S5	No	No	Native	Common	Intermediate	Warmwater	spring
	Silver Redhorse	*Moxostoma anisurum*	S4	No	No	Native	Uncommon	Intermediate	Coolwater	spring
	White Sucker	*Catostomus commersonii*	S5	No	No	Native	Common	Tolerant	Coolwater	spring
Lotidae	Burbot	*Lota lota*	S5	No	No	Native	Common	Intermediate	Coldwater	spring
Gasterosteidae	Brook Stickleback	*Culaea inconstans*	S5	No	No	Native	Common	Intermediate	Coolwater	spring/ summer
Ictaluridae	Brown Bullhead	*Ameiurus nebulosus*	S5	No	No	Native	Common	Intermediate	Warmwater	spring
	Channel Catfish	*Ictalurus punctatus*	S4	No	No	Native	Common	Tolerant	Warmwater	spring/ summer
	Yellow Bullhead	*Ameiurus natalis*	S4	No	No	Native	Uncommon	Tolerant	Warmwater	spring
Lepisosteidae	Longnose Gar	*Lepisosteus osseus*	S4	No	No	Native	Common	Tolerant	Warmwater	spring
Percidae	Walleye	*Sander vitreus*	S5	No	No	Native	Common	Intermediate	Coolwater	spring
Percopsidae	Trout-perch	*Percopsis omiscomaycus*	S5	No	No	Native	Common	Intermediate	Coldwater	spring/ summer
Sciaenidae	Freshwater Drum	*Aplodinotus grunniens*	S5	No	No	Native	Common	Tolerant	Warmwater	spring/ summer
Umbridae	Central Mudminnow	*Umbra limi*	S5	No	No	Native	Common	Tolerant	Coolwater	spring

Notes – please see **Appendix B**.

All native fish species identified in Green's Creek were classified as either S4 (Black Crappie, Channel Catfish, Longnose Gar, Quillback, Silver Redhorse and Yellow Bullhead), or S5 (20 remaining species). This indicates that species found in Green's Creek are all common, demonstrably secure in Ontario, and are fairly tolerant to environmental or anthropogenic stresses. Green's Creek provides both coolwater and warmwater habitat based on

the species identified. Two coldwater species were identified (Burbot and Trout-perch), which may indicate the presence of groundwater upwelling areas within Green's Creek. Sixteen species spawn during the spring season, one during the summer, nine during both spring and summer and one during the winter (Burbot).

Five temperature dataloggers were set in Green's Creek in 2010 and recorded temperatures every ten minutes. Based on stream temperature classification and fish community structure, it appears that Green's Creek is a warm water stream with cool water reaches. The presence of burbot and trout-perch indicate there may be cold water reaches.

3.3 Background Terrestrial Conditions

The following terrestrial sections provide a summary of the existing terrestrial natural heritage features previously documented along the proposed Eastern LRT. These descriptions are based upon available background information from various sources as outlined in Section 3.0 of this report.

3.3.1 Ecozone and Ecoregions

In the current Ecological Land Classification System (Lee *et al.*, 1998) used in Ontario, Ecozone and Ecoregions represent the two highest levels of classification. As per the Ministry of Natural Resources Publication "The Ecosystems of Ontario, Part 1: Ecozones and Ecoregions" published in 2009, Ecozones and Ecoregions can be defined as follows:

> ***Ecozone**: A very large area of land and water characterized by a distinctive bedrock domain that differs in origin and chemistry from the bedrock domain immediately adjacent to it. The characteristic bedrock domain, in concert with long-term continental climatic patterns, has a major influence on the ecosystem processes and biota occurring there. This scale in the ecological classification hierarchy is resilient to short-term and medium-term change, and responds to global or continental cycles and processes operating on the order of thousands to millions of years (Crins, W, et al., 2009).*
>
> ***Ecoregion**: A unique area of land and water nested within an ecozone that is defined by a characteristic range and pattern in climatic variables, including* temperature, precipitation, and humidity. The climate within an ecoregion has *a profound influence on the vegetation types, substrate formation, and other ecosystem processes, and associated biota that live there (Crins, W, et al.., 2009).*

The subject lands for the Eastern Light Rail Transit EA fall within the Mixedwood Plains Ecozone and are further divided into the Lake Simcoe-Rideau Ecoregion 6E. They are described as follows:

3.3.1.1 The Mixedwood Plains Ecozone

The Mixedwood Plains ecozone is located on limestone and dolostone formations south of the Precambrian Shield. In Ontario, this ecozone is bounded to the south and west by Lakes Huron, Erie, and Ontario, and the St. Lawrence River and extends into southern regions of Quebec along the St. Lawrence lowlands. It is characterised as a relatively moist eoczone, receiving between 720mm and 1000 mm annually, with one of the mildest climates in Canada, represented by cool winters and somewhat warm summers (Crins, W, *et al.*., 2009).

3.3.1.2 Ecoregion 6E – Lake Simcoe-Rideau

The Lake Simcoe-Rideau Ecoregion encompasses 6.4% (6,312,000 ha) of Ontario. It is bordered by Lake Huron in the west to the Ottawa River in the east, includes most of the Lake Ontario shore and the Ontario portion of the St. Lawrence River Valley as well as Manitoulin, Cockburn, and St. Joseph's Islands in Lake Huron. Land cover within the ecoregion is dominated by cropland, pasture, abandoned fields, forest and water. Vegetation within the Lake Simcoe-Rideau ecoregion is described as diverse divided into hardwood forests, floodplain forests, and peatlands with dominant species being sugar maple, beech, white ash, eastern hemlock, green ash, silver maple, red maple, eastern white cedar, yellow birch, balsam fir, and black ash (Crins, W, *et al*, 2009).

3.3.2 Identified Natural Heritage Features

The following presents a list and description of the existing natural heritage features within the study area, as per the background document review. This includes: the Natural Heritage Information Centre database (NHIC, 2014), data received from the City of Ottawa, and through correspondence with the MNRF for areas located along the Eastern LRT corridor.

3.3.2.1 Evaluated Wetlands

The closest evaluated wetland is Petrie Island Provincially Significant Wetland, which touches the north boundary of the Eastern LRT study area in the vicinity of Trim Road.

3.3.2.2 Unevaluated Wetlands

To help in the identification of wetland patches along the Eastern LRT corridor, aerial photography interpretation was completed and supplemented with wetland data received from the City of Ottawa and Ontario Base Mapping. These identified unevaluated wetland patches can be seen on the **Figure 1** within **Appendix A-2**

3.3.2.3 Areas of Natural and Scientific Interest (ANSIs)

The following ANSIs are identified within or nearby the study area:

- **Francon Quarry Provincially Significant Earth Science ANSI –** Area is a provincially significant earth science site, where dawsonite-rich carbonatite sills have a rather unique mineralogy, not found anywhere else in the region.

- **Green's Creek Provincially Significant Earth Science ANSI –** Green's Creek ANSI contains Late Wisconsinan, Champlain Sea marine clays and clays of a later freshwater phase. Clays contain calcareous clay nodules which reveal the fossilized remains of plants and animals (crustaceans, insects, bones, fish, twigs, leaves, seeds).

- **Green's Creek Provincially Significant Conservation Area ANSI** - The area described here constitutes the core of the Greens Creek Conservation Area, an area that also includes a variety of developed lands of minimal natural significance. The forested area consists of a complex of deciduous and mixed woodland, with young to sub-mature sugar maple, trembling aspen, eastern hemlock, white spruce and white pine on drier slopes. White pine and white cedar are common on the steep, eroding slopes, with deciduous thicket swamps and marshy meadows dominating the banks of the meandering stream. Towards the mouth of Greens Creek relatively extensive and well-developed mature, late successional deciduous swamp forests of silver and red maple are dominant.

- **Blackburn Hamlet Forest Regionally Significant Life Science ANSI –** This regionally significant forest is dominated by species such as sugar maple, American beech and eastern hemlock, with a diverse ground layer containing a relatively large number of regionally uncommon species more typical of dry, sandy hardwoods on the Canadian Shield of western Quebec. It is situated on a highland area of deep sand which drains through small rivulets north and westward to Greens Creek, and is surrounded by industrial and residential/institutional development, but still remains essentially in a natural condition. Sand-based forest sites are vulnerable to urban development and are rarely found in a natural or near-natural state within the site district.

- **Petrie Island Wetland Provincially Significant Life Science ANSI -** This ANSI is dominated by silver maple - black ash - white elm swamps, with basswood, green ash and hackberry (Celtis occidentalis) being dominant on higher slopes. The Hackberry stand here is one of the best groves of this regionally significant species in the site district (cf. Duck Islands). These swamp forests support a variety of regionally significant species including wild-cucumber,moonseed, Canada onion (Allium canadense), dodder (Cuscuta gronovii), and Virginia cut-grass.The associated eutrophic marsh areas are diverse consisting of cattail, great bulrush, flowering rush, woodreed and arrowhead. Frogbit and Carp are non-native elements which are increasing in abundance in the marshes, to the detriment of native flora and fauna.Woodlands

3.3.2.4 Woodlands

To help in the identification of Significant Woodlands found along the Eastern LRT, information was received from the City of Ottawa. According to these files, there are portions of approximately 18 identified significant woodlands within the study area.

3.3.3 Wildlife Conditions

Due to the extensive amount of background information available regarding the variety of wildlife known to occur along the Eastern LRT only general information on species that are common throughout the region has been included.

Mammals that are characteristic of the region include White-tailed Deer, Northern Raccoon, Striped Skunk and Groundhog. Water birds and shorebirds that can be associated with wetland habitats within the region include Wood Duck, Great Blue Heron and Wilson's snipe. Birds that can be associated with open upland habitat include Field Sparrow, Grasshopper Sparrow and Eastern Meadow Lark. Upland forests support species such as the Hairy Woodpecker, Wood Thrush, Scarlet Tanager and Rose-breasted Grosbeak. Reptiles and amphibians found in this ecoregion include American Bullfrog, Northern Leopard Frog, Spring Peeper, Red-spotted Newt, Snapping Turtle, Eastern Gartersnake and Common Watersnake. (William *et al.* 2009).

Additional information on the species that occupy the study area was obtained through the documentation of incidental wildlife observations during the 2014 site visits and, where required, species-specific surveys were recommended. In addition to incidental wildlife observations, surveyors documented and conducted a preliminary evaluation of significant wildlife habitat, as defined in MNRF's Significant Wildlife Habitat Technical Guide.

As a note, field work was limited to areas along the road, and allowed for the collection of the necessary information to identify candidate habitat as described within Section 4.1.3 below. Where construction is to occur within the identified candidate habitats, species-specific surveys to confirm presence/absence may still be required (i.e. breeding bird surveys, snag density calculations, turtle basking surveys etc.).

3.4 Species at Risk

In order to accurately screen for SAR species, all available background sources were used to create a list for the area. Information was gathered from sources such as the Ontario Breeding Bird Atlas, MNRF, DFO, City of Ottawa, Ontario Reptile and Amphibian Atlas, Royal Ontario Museum Species at Risk and RVCA. As the province has not been surveyed comprehensively for the presence of SAR, the absence in the NHIC database in a particular area does not indicate the absence of the species within the study area; therefore this search encompasses all potential SAR within the greater Ottawa area. From this search it was determined that fifty-three (53) Species at Risk species have been reported within the study area. Of these, there are twenty-one (21) species of bird, three (4) species of plant, seven (7) fish, one (1) species of mussel, five (5) species of insect, one (1) species of lichen, nine (9) species of reptile and five (5) species of mammal.

Field surveys were completed in 2014 to determine whether species and/or SAR habitat is present within the study area.

4. Field Investigations

Field investigations were conducted to provide a general understanding of site conditions, especially in areas where data gaps have been identified. Depending on the selection of the preferred location of the Eastern LRT through the Environmental Assessment process, more detailed fieldwork to be carried out during Detailed Design will be recommended as part of the Environmental Study Report.

The following data gaps within the study area were identified through the background review:

- Fish habitat assessments at potential watercourse crossings
- Ecological Land Classification to Ecosite/Vegetation Type
- Up-to-date wetland boundaries utilizing MNRF's wetland evaluation protocols
- Up-to-date woodlands data
- Potential areas for Species at Risk/Significant Wildlife habitat
- Wildlife Movement Corridors within the landscape

Field investigations were undertaken from July 28th to 30th, 2014. Field maps and data sheets were prepared prior to commencing fieldwork. Due to limited site accessibility, field assessments completed were through roadside surveys.

Sections 4.1 to 4.5 below describe the methods used to obtain existing conditions information for the study area.

4.1 Fish Habitat Assessment

A background review of all watercourses and aquatic habitat associated with the proposed Eastern LRT was completed. The locations of these watercourses were identified using GIS layers acquired from the City of Ottawa. Where a watercourse crossed the proposed route, a crossing point was identified. These crossing locations were reviewed by air photo interpretation to determine whether the layers were accurate / whether any watercourses were missing from the received data. Watercourses were then inspected in the field and classified, with respect to discharge characteristics, as either permanent stream, intermittent stream, or ephemeral stream based on observations made at the time of the field visit. Where watercourse crossings were located on private property, the closest upstream and/or downstream road crossing was visited to survey the same reach of the watercourse. Where no access was possible, watercourses were identified through a combination of aerial photographic interpretation. For the purpose of this evaluation, watercourses were defined as waterbodies containing or contributing to fish habitat.

Appendix A-1 presents the aquatic existing conditions maps and **Appendix C** presents the data collected during the fish habitat assessments.

The area of investigation for each of the water crossing assessments consisted of a minimum of 25 meters on either the upstream, downstream or both sides depending on the size and location of the watercourse nearest to the proposed Eastern LRT. However the length of the site was ultimately determined by the proximity of private land. On some occasions the entire 25 meter section wasn't fully accessible (fences, residential properties etc.) and this created restrictions in the evaluation process, characterization of the water crossings and the assessment of effects and appropriate mitigation measures. These sites were assessed from the shoulder of OR 174. At Green's Creek aquatic habitat assessments were undertaken 50m upstream whereas none were undertaken downstream of HWY 174 as access was restricted. At Taylors Creek 50m was assessed both upstream and downstream of the crossing. If access is possible at Green's Creek, a downstream assessment will be undertaken during preliminary design work for this study.

A field work data collection form was completed for each water-crossing investigated and can be found in **Appendix C.**

Channel dimensions, substrate composition, channel morphology and bank stability characteristics were collected in the field. Measurements were taken at more than one location along the water course, as feasible, and mean values calculated in the field were recorded, including:

- Mean wetted depth (MWD) (m) - average depth of the watercourse over the entire assessed area;
- Mean wetted width (MWW) (m) - average width of the watercourse over the entire assessed area;
- Mean bankfull depth (MBD) (m) - the difference in the water level between the bankfull width and the mean wetted width, and averaged over the assessed area;
- Mean bankfull width (MBW) (m) - a measure of high flow conditions while wetted width is a measurement of flow conditions at the time of sampling, usually low flow.

Stream morphology was assessed during the field assessments to describe potential areas of habitat, including:

- Runs - typically deep, fast moving water with little to no turbulence of water
- Riffles - shallow, fast moving water typically running over rocks where the surface turbulence aerates the water
- Flats - slow flowing water with a smooth un-agitated surface
- Pools - deep pockets of slow moving water.

Substrate composition (characterized by particle size distribution was recorded in descending order of dominance (Stanfield 2010).

1. Bedrock – continuous rock that may be only partly exposed
2. Boulders – separate, often embedded, over 250 mm diameter
3. Large cobbles – 120-250 mm diameter
4. Small cobbles – 65-120 mm diameter
5. Gravels – 2-65 mm diameter
6. Sand – 0.06-2 mm, gritty
7. Silt – < 0.06 mm, floury
8. Mud/clay

Visual observations of water clarity, water colour, presence/distribution and type of macrophytes and algal growth, evidence of surface runoff, and surrounding land use, were recorded as indicators for water quality. Basic field parameters of water chemistry (pH, conductivity, dissolved oxygen and temperature) were measured and recorded. Bank height measurements and presence of mature riparian vegetation, exposed root structures, and slumping or scouring were used to determine bank stability.

In-stream cover was documented based on the presence and distribution of cover provided by woody debris, boulders, cobble, gravel, aquatic vegetation and undercut banks. Availability of in-stream cover was classified as high where available cover ranged between 76-100% of stream surface area; moderate 31-75%; and low 0-30%. Overhead canopy cover, comprising herbaceous and woody riparian vegetation, was estimated and classified: high 61-100%; moderate cover 31-60%; and low cover 0-30%. Obstructions to fish passage were also noted within the area of site investigation, including possible low-flow barriers.

Adjacent land uses were noted for potential influences or impacts to aquatic habitat function. This included observations of residential properties, agricultural use (crops and livestock), meadows, forests and wetland features.

Farming practices were noted as well as the type of crops or livestock located within adjacent fields. Pollution sources were recorded, such as tile drain discharges, other piped discharges, and road runoff and any other surface runoff features causing potential nutrient or sediment loading.

During site investigations, groundwater seepage areas were identified using the following indicators, as outlined in the Technical Guide to Renewable Energy Approvals (MOE, 2011):

- Occurrence of watercress (*Nasturtium officinale*) or water speedwell (*Veronica anagallis-aquatica*)
- Presence of iron staining as indicated through red rust coloured soils along banks and stream beds;
- Bank seepage; or,
- Air bubbles in the stream bed.

A representative photo-log and site sketches were included to detail the general site layout as well as the layout of each water crossing.

Sensitivity Classification

Along with background data, including thermal regime and species occurrence records, an assessment of the likelihood of fish presence was presented. These parameters include the availability and quality of habitat features such as in-stream and riparian cover, as well as morphological conditions and connectivity of the water bodies to allow fish passage. Fish habitat was defined according to the federal Fisheries Act, 'spawning grounds and nursery, rearing, food supply, migration, and any other areas on which fish depend directly or indirectly in order to carry out their life processes'.

To aid in the assessment of each water body and to inform the potential environmental effects and mitigation measures, a sensitivity classification was designed and applied to each feature within the area of investigation. The overall objective was to assess the resiliency of the aquatic ecosystem – *i.e.* the ability of the system to recover from changes in the environmental conditions. Each water body feature was classified as high, moderate or low sensitivity based on the parameters identified in Table 6. This system provided objectivity to the assessment process and incorporated attributes of DFO's Risk Management Framework (species sensitivity; habitat resiliency; species dependence on habitat; rarity) that is used to analyze fish and fish habitat sensitivity. Not all indicators had to be present at one water crossing for an assignment into a particular classification, and water crossings were assigned based on where the majority of indicators occurred. For example, a water crossing with a cold water regime could be classified as moderate sensitivity if it was a channelized channel, with unstable banks, with intermittent flow. Where there were an equal number of indicators, professional opinion and consideration of the overall site was used to assign the water body to one classification.

Table 6. Sensitivity Classification Indicators

High Sensitivity	Moderate Sensitivity	Low Sensitivity
• Cool/cold water thermal regime • Headwater area • Permanent flow • Natural channel • Natural stream process observed (e.g., riffle/run/pool sequence and meanders) • Located in natural area (e.g., woodland, wetland) • Groundwater seepage indicators present • High quality and quantity fish habitat • No fish barriers • Water quality appears good (e.g., clear, no obvious agricultural runoff, no algae)	• Cool/warm water thermal regime • Permanent or intermittent flow • Natural or channelized channel • Natural stream process observed (e.g., riffle/run/pool sequence and meanders) • In natural or impacted areas • Groundwater seepage indicators present • Overall moderate quality and quantity fish habitat • No fish barriers • Some concern for water quality (e.g., suspended solids or algae growth)	• Warm water thermal regime • Permanent or intermittent flow • Channelized channel • Uncontrolled stream processes (e.g., erosion, unstable banks) • Within highly impacted areas • No groundwater indicators present • Low quality and quantity fish habitat • Fish barriers • Concern for water quality (e.g., turbid water, high suspended solids or uncontrolled algae growth)
System is generally considered not to be resilient to environmental perturbations and cannot easily buffer change.	System is somewhat stable and should be resilient to change and perturbation	System is quite stable and resilient to change and perturbation.

Further background review will be undertaken during preliminary design to determine if Northern Pike, Muskellunge, Sauger, Walleye, various suckers species, etc are present within any of the watercourses in the study area. If so spring spawning surveys will be undertaken.

4.2 Vegetation Community Delineation and Plant Inventory

Vegetation communities along the proposed route were delineated and defined into Ecological Land Classification (ELC) Units (Lee *et al*., 1998) via roadside investigations. Where possible, vegetation units were classified to Vegetation Type; however, in areas where insufficient data was available, vegetation units were classified to Ecosite.

This classification follows the provincially-accepted standard protocol for the description of vegetation communities in southern Ontario and provides a method for identifying and mapping areas in a manner that is useful for land-use planning. ELC distinguishes existing vegetation communities based on a combination of stand structure and composition. This includes the collection of a floral species list recording dominant plant species within each vegetation layer followed by the delineation of vegetation communities into ELC units.

4.3 Wetlands

Provincially Significant Wetlands (PSW) and potential PSW were determined through collection of wetlands mapping from Land Information Ontario (an online database run by MNRF, the City, roadside field verification, and aerial photographic interpretation. Existing wetland mapping indicated the presence of PSW and unevaluated wetland. A PSW is a wetland that scores a certain number of points through MNR's Wetland Evaluation Score System. This system has four components; Biological, Hydrological, Social and Special Features, all of which can receive up to 250 points. To be provincially significant, a wetland must score at least 600 points overall or over 200 or more points in either the Biological component or Special Features component. An unevaluated wetland is one that has not been assessed according to MNRF's Wetland Evaluation System, but has been identified through aerial photographic interpretation as having wetland components. Wetland is a layer that was obtained from Ontario Base Mapping and that has been historically interpreted through aerial photographs. Field studies used this mapping to confirm/revise wetland boundaries along the roadside.

4.4 Woodlands

Woodlands are defined in the PPS (2014) as "Treed areas that provide environmental and economic benefits to both the private landowner and the general public, such as erosion prevention, hydrological and nutrient cycling, provision of clean air and the long-term storage of carbon, provision of wildlife habitat, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products. Woodlands include treed areas, woodlots or forested areas and vary in their level of significance at the local, regional and provincial levels."
A 'significant woodland' is an "area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history.

Significant Woodlands were identified by the City of Ottawa. Field studies used this mapping to confirm/revise woodland boundaries along the roadside.

4.5 Significant Wildlife Habitat

Potential Significant Wildlife habitat was assessed through the application of the various criteria found within the Significant Wildlife Habitat Ecoregion Criteria Schedule for Ecoregion 6E. This guidance document was created as an addendum to the Significant Wildlife Habitat Technical Guide (2000) and details specific criteria to assist in identifying each significant wildlife habitat listed in the guide. This review was completed through a combination of roadside investigations and aerial photography interpretation. These criterion should be applied again during Detailed Design to confirm the presence or absence of SWH.

Significant wildlife habitat is divided into the following four sections: seasonal concentrations of animals, rare vegetation communities or specialized habitats for wildlife, habitats of species of conservation concern; and wildlife movement corridors.

4.5.1 Seasonal Concentration Areas of Animals

Seasonal Concentration Areas are areas where wildlife species occur annually in aggregations at certain times of the year. Such areas are sometimes highly concentrated with members of a given species, or several species, within relatively small areas. In spring and autumn, migratory wildlife species will concentrate where they can rest and feed. Other wildlife species require habitats where they can survive winter. Examples of Seasonal Concentration Areas include deer wintering areas, breeding bird colonies and hibernation sites for reptiles, amphibians and some mammals (MNR, 2012). Categories of wildlife habitat that are considered Significant Wildlife habitat include:

- Waterfowl Stopover and Staging Areas (Terrestrial)
- Waterfowl Stopover and Staging Areas (Aquatic)
- Shorebird Migratory Stopover Area
- Raptor Wintering Area
- Bat Hibernacula
- Bat Maternity Colonies
- Bat Migratory Stopover Area
- Turtle Wintering Areas
- Reptile Hibernaculum
- Colonially -Nesting Bird Breeding Habitat (Bank and Cliff)
- Colonially -Nesting Bird Breeding Habitat (Tree/Shrubs)
- Colonially -Nesting Bird Breeding Habitat (Ground)

- Migratory Butterfly Stopover Areas
- Landbird Migratory Stopover Areas
- Deer Yarding Areas
- Deer Winter Congregation Areas

4.5.2 Rare Vegetation Communities or Specialized Habitat for Wildlife

Rare Vegetation Communities

Rare vegetation communities often contain rare species, particularly plants and small invertebrates, which depend on such habitats for their survival and cannot readily move to or find alternative habitats. When assessing rare vegetation communities, one of the most important criteria is the current representation of the community in the planning area based on its area relative to the total landscape or the number of examples within the planning area. There are several criteria used to define rare vegetation communities; however the NHIC uses a system that considers the provincial rank of a species or community type as a tool to prioritize protection efforts. These ranks are not legal designations but have been assigned using the best available scientific information, and follow a systematic ranking procedure developed by The Nature Conservancy (U.S.). The ranks are based on three factors: estimated number of occurrences, estimated community aerial extent, and estimated range of the community within the province:

S1 Extremely rare - usually 5 or fewer occurrences in the province, or very few remaining hectares.
S2 Very rare - usually between 5 and 20 occurrences in the province, or few remaining hectares
S3 Rare to uncommon - usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with some extensive examples remaining.

The setting of criteria for significant wildlife habitat (SWH) has incorporated this ranking system into its process of determining rare vegetation communities and as such, a rare vegetation community is defined to include areas that contain a provincially rare vegetation community and/or areas that contain a vegetation community that is rare within the planning area. The following presents the rare vegetation communities that are considered SWH for the planning area contained within Ecoregion 6E:

- Cliffs and Talus Slopes
- Sand Barren
- Alvar
- Old Growth Forest
- Savannah
- Tallgrass Prairie
- Other Rare Vegetation Communities

Specialized Habitat for Wildlife

Some wildlife species require large areas of suitable habitat for their long-term survival. Many wildlife species require substantial areas of suitable habitat for successful breeding. Their populations decline when habitat becomes fragmented and reduced in size. Specialized habitat for wildlife is a community or diversity-based category, therefore, the more wildlife species a habitat contains, the more significant the habitat becomes to the planning area. The largest and least fragmented habitats within a planning area will support the most significant populations of wildlife. The following presents the specialized habitats for wildlife that is considered as SWH.

- Waterfowl Nesting Area
- Bald Eagle and Osprey Nesting, Foraging and Perching Habitat
- Woodland Raptor Nesting Habitat
- Turtle Nesting Areas
- Seeps and Springs
- Amphibian Breeding
- Habitat (Woodland)
- Amphibian Breeding Habitat (Wetlands)

4.5.3 Habitat for Species of Conservation Concern (Not including Endangered or Threatened Species)

Habitats of Species of Conservation Concern include wildlife species that are listed as Special Concern or rare, that are declining, or are featured species. Habitats of Species of Conservation Concern do not include habitats of Endangered or Threatened species as identified by the Endangered Species Act 2007.

- Marsh Breeding Bird Habitat
- Woodland Area-Sensitive Bird Breeding Habitat
- Open Country Bird Breeding Habitat
- Shrub/Early Successional Bird Breeding Habitat
- Terrestrial Crayfish
- Special Concern and Rare Wildlife Species

4.5.4 Animal Movement Corridors

Animal Movement Corridors are elongated areas used by wildlife to move from one habitat to another. They are important to ensure genetic diversity in populations, to allow seasonal migration of animals (e.g. deer moving from summer to winter range) and to allow animals to move throughout their home range from feeding areas to cover areas. Animal movement corridors function at different scales often related to the size and home range of the animal. For example, short, narrow areas of natural habitat may function as a corridor between amphibian breeding areas and their summer range, while wider, longer corridors are needed to allow deer to travel from their winter habitat to their summer habitat.

Identifying the most important corridors that provide connectivity across the landscape is challenging because of a lack of specific information on animal movements. There is also uncertainty about the optimum width and mortality risks of corridors. Furthermore, a corridor may be beneficial for some species but detrimental to others. For example, narrow linear corridors may allow increased access for racoons, cats, and other predators. Also, narrow corridors dominated by edge habitat may encourage invasion by weedy generalist plants and opportunistic species of birds and mammals. Corridors often consist of naturally vegetated areas that run through more open or developed landscapes. However, sparsely vegetated areas can also function as corridors. For example, many species move freely through agricultural land to reach natural areas. Despite the difficulty of identifying exact movement corridors for all species, these landscape features are important to the long-term viability of certain wildlife populations (MNR 2012).

Animal Movement Corridors should only be identified as SWH where:

> A Confirmed or Candidate SWH has been identified by MNRF or the planning authority based on documented evidence of a habitat identified within these Criterion Schedules or the Significant Wildlife Habitat Technical Guide. The identified wildlife habitats listed below will have distinct passageways or rely on well-defined natural features for movements between habitats required by the species to complete its life cycle (MNR 2012).

- Amphibian Movement Corridors
- Deer Movement Corridors

4.6 Incidental Wildlife

Incidental wildlife data was collected in conjunction with the completion of the ELC and aquatic assessments and recorded on field sheets.

4.7 Species at Risk

A Species at Risk Habitat Screening was conducted for the proposed Eastern LRT Route. This included the use of several available data sources to help identify potential species at risk within the study area. Data obtained through the MNRF Species at Risk website: http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_WHTS_RSK_MY_AREA_EN.html, was used and supplemented with records obtained from correspondence with MNRF, DFO SAR mapping, the Atlas of Breeding Birds of Ontario, and the City of Ottawa. Once the list of potential species was finalized, preferred habitat characteristics for each species was recorded using the MNRF's SAR website, significant wildlife habitat technical guide, Species at Risk registry, Royal Ontario Museum, and individual COSEWIC reports. The list of potential species was then screened for available preferred habitat within the study area through the confirmation of existing conditions completed during field investigations. The final list of potential species is based on habitat found along the entire route. Once the location of the LRT route has been selected, the list of potential species should be revisited to reassess habitat conditions and provide recommendations.

4.8 Linkages and Corridors

Animal Movement Corridors are elongated areas used by wildlife to move from one habitat to another. They are important to ensure genetic diversity in populations, to allow seasonal migration of animals (e.g. deer moving from summer to winter range) and to allow animals to move throughout their home range from feeding areas to cover areas. Animal movement corridors function at different scales often related to the size and home range of the animal. For example, short, narrow areas of natural habitat may function as a corridor between amphibian breeding areas and their summer range, while wider, longer corridors are needed to allow deer to travel from their winter habitat to their summer habitat.

Identifying the most important corridors that provide connectivity across the landscape is challenging because of a lack of specific information on animal movements. There is also some uncertainty about the optimum width and mortality risks of corridors. Furthermore, a corridor may be beneficial for some species but detrimental to others. For example, narrow linear corridors may allow increased access for raccoons, cats, and other predators. Also, narrow corridors dominated by edge habitat may encourage invasion by weedy generalist plants and opportunistic species of birds and mammals. Corridors often consist of naturally vegetated areas that run through more open or developed landscapes. However, sparsely vegetated areas can also function as corridors. For example, many species move freely through agricultural land to reach natural areas. Despite the difficulty of identifying exact movement corridors for all species, these landscape features are important to the long-term viability of certain wildlife populations (MNR 2012).

Considering that the Eastern LRT will be along an existing road system, the potential for the project to affect linkages/corridors is considered minimal, however, their potential for within the study area was still assessed, especially along watercourse crossing areas.

5. Natural Heritage Existing Conditions

The following section provides the existing natural heritage conditions considering the background review and supplemental fieldwork.

5.1 Subwatershed

Four subwatersheds were found to cross OR 174 between Blair Station and Trim Road with Taylor and Green's Creeks being the two largest within the surveyed area.

Overall conditions along this route ranged from natural and healthy creeks to highly degraded drainage ditches. Numerous watercourses were buried under the Highway 174 with others having modifications made to potentially deal with flash flooding issues. These modifications are likely to inhibit upstream and downstream migration for some of the 33 fish species (**See Appendix B**) using these systems. Opportunities were identified for habitat enhancements by removal/modification of these highly impacted areas, which would improve the general health of these watercourses.

5.2 Fish Habitat

Along OR 174, 13 existing crossings were observed and 26 assessments made upstream and downstream of each crossing. Of these; seven were permanent, nine were intermittent, four were ephemeral and six were unknown based on the watercourse being buried or not located (further investigations will be done during subsequent study phases to gather further details about the watercourses that could not be located). Of these 26 assessments, three were considered to be "High" sensitivity fish habitat, two were assessed as "Moderate" and 21 were considered as "Low" habitat sensitivity (See Table 4.1). Representative aquatic photographs of the watercourses can be found in **Appendix D.**

The "high" sensitivity assessment refers to the larger water bodies that cross the OR 174 such as Taylors and Green's Creeks, which are permanent and are likely to provide habitat to numerous fish species.

The "moderate" sensitivity assessment refers to cool/warm water habitats with mostly natural features with slight alterations made to the watercourse or in the surrounding area that may affect fish or fish habitat.

The "low" habitat sensitivity rating relates to drainage ditches and culvert crossings under and along the proposed route (See Table 4.1) that are of a low quality and quantity of fish habitat and that are associated with water quality concerns such as high temperatures and high suspended solids. One of the main factors affecting these watercourses' sensitivity rating is that there have already been numerous modifications made to them such as the burying or installation of gabion baskets throughout the watercourse. These modifications have impacts such as slowing down of the flow of water allowing for sedimentation, warming up the water as well as creating connectivity issues for migrating fish species such as the American eel (*Anguilla rostrata*). The combination of these factors gives these water bodies a "low" sensitivity rating.

5.3 Fish Community

Thirty-three (33) fish species were identified throughout the subwatersheds within the surveyed area of OR 174, with the majority being classed as either S4 or S5, which means common, fairly tolerant to environmental or anthropogenic stresses and are demonstrably secure in Ontario. Trout-perch was the only coldwater species

identified throughout the study area and was found within Green's Creek. This suggests the presence of groundwater upwelling in this area though no groundwater indicators were located during the assessment.

Two coldwater species was identified from the Records Review – burbot and trout-perch in Green's Creek, and burbot in Bilberry Creek. Based on field investigations, the habitat at both creeks has the potential to support these species, however; no groundwater indicators were observed during the assessment of either creek along OR 174. According to DFO SAR mapping, the Channel Darter (*Percina copelandi*) was the only fish SAR identified along this route (DFO 2014). Through the completion of our Species at Risk screening; American Eel (*Anguilla rostrata*), Lake Surgeon (*Acipenser fulvescens*), Silver Lamprey (*Ichthyomyzon unicuspis*), River Redhorse (Moxostoma carinatum), Brindle Shiner (Notropis bifrenatus) and Northern Brook Lamprey (Ichtyomyzon fossor) were also identified as species that could also be potentially found within the area. Suitable habitat was identified for the American Eel within Green's and Taylor Creeks with no suitable habitat identified for the remaining species.

The federal Fisheries Act was amended on June 29 2012 to focus on protecting the productivity of recreational, commercial and Aboriginal fisheries. On November 25, 2013, the new fisheries protection program provisions came into force. The Fisheries Protection Program contains a new prohibition that combines the previous section 32 (killing of fish by means other than fishing) and section 35 (harmful alteration, disruption or destruction of fish habitat). The new prohibition is focused on protecting 'serious harm to fish', which is the death of fish or any permanent alteration to, or destruction of, fish habitat.

As part of the changes and streamlining the approvals process, a project screening is required to be conducted by a qualified environmental professional to determine whether the works require DFO review. Measures to avoid serious harm to fish will be outlined to ensure compliance with the Act. If project activities do not meet the associated criteria, Project Review by DFO will determine whether or not the works can avoid serious harm to fish that are part of or that support a commercial, recreational or Aboriginal fishery. DFO may issue a letter that outlines the implementation of mitigation measures to avoid and mitigate serious harm to fish; or request an Authorization under Paragraph 35(2)(b) of the Fisheries Act.

Appendix E presents the aquatic existing conditions as discussed within the section above.

5.4 Vegetation Communities

A total of 166 ELC polygons were delineated along the Eastern LRT Route falling within 16 different Ecosite classifications. Field investigations were completed on two separate field visits, one in 2012 and another in 2014. The table presented in **Appendix E** presents the existing conditions table for data collected during the 2014 field season and the table within **Appendix F** presents the data collected in 2012.

A total of 194 hectares (ha) of vegetation is found within the study area boundary. Of this, 66 ha or 34%, are classified as upland forest communities (FOC, FOM, FOD), 106 ha or 55% are classified as cultural communities (CUM, CUT, CUP, CUW), and 22 ha or 11% are classified as wetland communities (MAM, SWD, OAO). Details regarding the composition of each vegetation community can be found in the Aquatic and Terrestrial existing Conditions table presented in **Appendix E**. The locations of each of the features mentioned below as well as the location of the ELC communities can be found on Terrestrial Figures within **Appendix A-2** with representative photos within **Appendix G.** Listed below, are the identified significant woodlands and wetlands, as identified by the City of Ottawa, falling within the study area. A plant species list can be found in **Appendix H**.

5.5 Wetlands

No Provincially Significant Wetlands fall within the study area boundary. The closest wetland to the study area is Petrie Island Provincially Significant Wetland which occurs along the northern boundary of the study area. None of its communities are present within the study area. A portion of seven identified wetland patches are found within the study area as identified through data received from the City of Ottawa and The Land Information Ontario database. The following table presents a summary of the composition of those wetlands based on our roadside ELC surveys. As it is difficult to determine a wetland versus an upland forest community based on roadside investigations without conducting soils analysis or detailed vegetation surveys, the communities presented below may not be representative of wetland communities. Also of note, information received from such databases, used to obtain the location of these wetland patches, can be inaccurate based on aerial photography interpretation and not site specific field work. These communities should be confirmed once the location of the Eastern LRT has been selected.

Table 7: Identified Unevaluated Wetland Communities

Feature #	Associated ELC ID	Associated ELC Community
P1	P18	FOD8-1: Fresh-Moist Poplar Deciduous Forest Type
P2	P26, P28, P32, P33	FOD5a Dry Fresh Red Maple Deciduous Forest Type CUT1 Mineral Cultural Thicket Ecosite CUM1-1 Dry-Moist Old Field Meadow Type CUT1 Mineral Cultural Thicket Ecosite
P4, P5, P6	P52, P53, P54, P111	FOM Mixed Forest MAM2 Mineral Meadow Marsh Ecosite FOD9-3 Fresh-Moist Bur Oak Deciduous Forest Type
P9	P94	FOM5-2 Dry Fresh Poplar Mixed Forest Type
P10	P122, P125	MAM2 Mineral Meadow Marsh Ecosite FOD6-5 Fresh Moist Sugar Maple Hardwood Deciduous Forest Type

5.6 Woodlands

In total, there are portions of approximately 18 significant woodlands identified by the City of Ottawa within the study area boundary. These significant woodlands are described below as observed through roadside field investigations. Not all of the identified patches have associated ELC data as they could not be seen through roadside investigations. Once the location of the Eastern LRT has been determined, the amount of potential disturbance associated with individual significant woodlands can be calculated and the need for additional data collection can be determined.

Table 8: Identified Significant Woodlands

Woodland #	Associated Woodland ID	Associated ELC ID	ELC Community
1	P1, P2, P3, P4, 13	P17, P18, P19, P20, P21, P23, P24, P25, P26, P28, P31, P32, P33, P37, P169, P173, P174	MAM2 Mineral Meadow Marsh Ecosite CUM1-1 Dry-Moist Old Field Meadow Type CUW1 Mineral Cultural Woodland Ecosite FOD8-1 Dry Fresh Poplar Mixed Forest Type FOD Deciduous Forest CUT1 Mineral Cultural Thicket Ecosite FOM5-2 Dry Fresh Poplar Mixed Forest Type FOD5a Dry Fresh Red Maple Deciduous Forest Type

Woodland #	Associated Woodland ID	Associated ELC ID	ELC Community
			CUP3-1 Red Pine Plantation
2	P14, P15, P16	P27, P170	FOM7FreshMoistWhiteCedarHardwoodMixedForest FOD8-1 Dry Fresh Poplar Mixed Forest Type
3	P9, P11, P12	P43, P44, P45, P46, P47, P142, P143, P145, P171, P141, P167, P171, P171	FOD7-2 Dry Fresh White Ash Deciduous Forest Type CUP3 Coniferous Plantations CUM1-1 Dry-Moist Old Field Meadow Type MAM2-2 Reed-canary Grass Mineral Meadow Marsh Type
4	P27, P28 P33	P57, P58, P59, P61	CUM1-1 Dry-Moist Old Field Meadow Type FOD7-2 Fresh Moist Lowland Deciduous Forest Type FOM4 Dry Fresh White Cedar Mixed Forest Type MAS2-1 Cattail Mineral Shallow Marsh Type
5	P7, P8	P50, P51, P52, P53, P54, P55, P56, P111, P172	FOD9-3 Fresh-Moist Bur Oak Deciduous Forest Type CUP3 Coniferous Plantations MAM2 Mineral Meadow Marsh Ecosite CUM1-1 Dry-Moist Old Field Meadow Type CUW1 Mineral Cultural Woodland Ecosite FOM Mixed Forest
6	P40	P151, P152, P153	MAM2 Mineral Meadow Marsh Ecosite FOD7 Fresh Moist Lowland Deciduous Forest Ecosite
7	P29	P79	CUM1-1 Dry-Moist Old Field Meadow Type
8	P44	P79	CUM1-1 Dry-Moist Old Field Meadow Type
9	P43	P80	CUM1-1 Dry-Moist Old Field Meadow Type
10	P35	P96, P97	CUM1-1 Dry-Moist Old Field Meadow Type FOM2-2 Dry Fresh White Pine-Sugar Mixed Maple Mixed Forest Type
11	P20	P94	FOM5-2 Dry Fresh Poplar Mixed Forest Type
12	P19	P122, P123, P124	MAM2 Mineral Meadow Marsh Ecosite FOD8-1 Dry Fresh Poplar Deciduous Forest Type FOD7: Fresh-Moist Lowland Deciduous Forest Ecosite
13	P30	P101, P121, P126, P127, P128, P129, P166	CUM1-1 Dry-Moist Old Field Meadow Type FOD9-3 Fresh Moist Bur Oak Deciduous Forest Type MAM2 Mineral Meadow Marsh Ecosite
14	P31	P101, P102, P163, P164, P165	CUM1-1 Dry-Moist Old Field Meadow Type FOD6-5 Fresh Moist Sugar Maple Hardwood Deciduous Forest MAM2 Mineral Meadow Marsh Ecosite
15	P42	P98, P100, P130, P131	CUM1-1 Dry-Moist Old Field Meadow Type FOD8-1 Dry Fresh Poplar Deciduous Forest Type MAM2 Mineral Meadow Marsh Ecosite FOD6-5 Fresh Moist Sugar Maple Hardwood Deciduous Forest

5.7 Wildlife

The following presents a summary of the preliminary Significant Wildlife Habitat (SWH) assessment and Species at Risk habitat Screening completed for the study area.

5.7.1 Significant Wildlife Habitat

The following wildlife habitats are potentially located within the study area and further studies are recommended during detailed design to determine the extent of potential Significant Wildlife Habitat affected by the project. The complete SWH screening is presented in **Appendix I.**

Table 9: Potential Significant Wildlife Habitat along OR 174-17

Significant Wildlife Habitat	Candidate Habitat	Recommendations
Seasonal Concentration Areas of Animals		
Waterfowl Stopover and Staging Areas (Terrestrial)	Candidate habitat may be present agricultural lands east of Rockcliffe Parkway	Field Investigations were not completed during the spring melt, therefore should the location of the LRT Route run along the north side within this location **spring surveys/ Stopover/Migratory Surveys** should be conducted.
Waterfowl Stopover and Staging Areas (Aquatic)	Candidate habitat may be present along vegetation communities along Green's Creek	Where vegetation removal is to occur within Candidate habitat **Stopover/Migratory Surveys** should be conducted in the area of Green's Creek.
Shorebird Migratory Stopover Area	Candidate habitat may be present along vegetation communities along Green's Creek	Where vegetation removal is to occur within Candidate habitat **Stopover/Migratory Surveys** should be conducted in the area of Green's Creek
Raptor Wintering Area	Candidate habitat may be present along vegetation communities along Green's Creek.	Where vegetation removal is to occur within Candidate habitat **Raptor Point counts** should be conducted within this area to confirm SWH.
Bat Hibernacula	No Suitable habitat	No further studies required
Bat Maternity Colonies	Candidate habitat may be present within all FOD, FOM, FOC, SWD, SWM, and SWC vegetation communities	Should tree removal occur within candidate habitat **snag density calculations** will need to take place in order to determine suitability at each location.
Bat Migratory Stopover Area	Unknown – Criteria to determine significance are still being determined	Contact local agencies to ensure no known migration routes occur within the study area.
Turtle Wintering Areas	Candidate habitat may be present within vegetation communities associated with Green's Creek, Taylor Creek and Bilberry Creek	Where in water works are to occur within Candidate habitat**, Basking turtle surveys** should be conducted on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May)
Reptile Hibernaculum	Candidate habitat may be present along Green's Creek. A confirmed Milksnake was observed in this location	Should vegetation removal or construction occur within Candidate habitat **hibernacula surveys** should be undertaken. As inventories were limited to roadside investigations where construction is to occur the areas immediately within the construction disturbance area should be cleared for the presence of hibernacula.
Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)	No suitable habitat present	No further studies required.
Colonially-Nesting Bird	Candidate habitat may be present within the	Should vegetation removal occur within

Significant Wildlife Habitat	Candidate Habitat	Recommendations
Breeding Habitat (Trees and Shrubs)	identified Swamp communities along Green's Creek	Candidate habitat **point count surveys during the nesting season (April to August)** should be conducted.
Colonially-Nesting Bird Breeding Habitat (Ground)	Candidate habitat for Brewers Blackbird may be present within the areas along Green's Creek.	Should vegetation clearing occur within Candidate habitat **point count surveys** should be conducted within the months of **May and June.**
Migratory Butterfly Stopover Areas	No suitable habitat is present	No further studies required
Landbird Migratory Stopover Areas	No suitable habitat is present	No further studies required
Deer Yarding Areas	Candidate habitat may be present within vegetation communities along Green's Creek	Contact the MNRF for information regarding this area. MNRF are responsible for the classification of Deer Yards.
Deer Winter Congregation Areas	**Candidate** habitat may be present within the areas along Green's Creek. This woodland is over 100 hectares in size.	Should vegetation removal occur within Candidate habitat surveys to confirm deer movement may need to be considered through consultation with the MNRF.
Rare Vegetation Communities or Specialized Habitat for Wildlife		
Rare Vegetation Communities		
Cliffs and Talus Slopes	No Cliffs and Talus Slope communities were observed.	No further studies required.
Sand Barren	No Sand Barren vegetation communities were observed during field investigations.	No further studies required.
Alvar	No Alvar vegetation communities were observed during field investigations.	No further studies required.
Old Growth Forest	No Old Growth Forest communities were observed during field investigations.	No further studies required.
Savannah	No Savannah vegetation communities were observed during field investigations.	No further studies required.
Tallgrass Prairie	No Tallgrass prairie vegetation communities were observed during field investigations.	No further studies required.
Other Rare Vegetation Communities	No other rare vegetation communities were observed during field investigations.	No further studies required.
Specialized Habitat for Wildlife		
Waterfowl Nesting Area	No suitable habitat is present	No further studies required.
Bald Eagle and Osprey Nesting Foraging and Perching Habitat	Candidate habitat may be present within the study area given its proximity to the Ottawa River. Species can be found nesting several kilometers away from the river.	Should tree removal occur within Candidate habitat, **bird observational studies** should be conducted to determine nest site use, perching sites and foraging areas (mid-March to mid-August).
Woodland Raptor Nesting Habitat	No suitable habitat is present	No further studies required
Turtle Nesting Areas	Candidate habitat may present along vegetation communities found along Green's Creek, Taylor Creek and Bilberry Creek.	Should vegetation removal or in-water works occur within Candidate habitat **turtle nesting surveys** should be conducted during nesting season (late spring to early summer).
Seeps and Springs	No suitable habitat is present. Study area is too close to the Ottawa River.	No further studies required.

Significant Wildlife Habitat	Candidate Habitat	Recommendations
Amphibian Breeding Habitat (Woodland)	Candidate habitat may be present within the vegetation communities found along Green's Creek, Taylor Creek and Bilberry Creek.	Should vegetation removal occur within candidate habitat **Amphibian surveys** following marsh monitoring protocol should be completed.
Amphibian Breeding Habitat (Wetlands)	Candidate habitat may be present within the vegetation communities found along Green's Creek, Taylor Creek and Bilberry Creek.	Should vegetation removal occur within candidate habitat **Amphibian surveys** following marsh monitoring protocol should be completed.
Habitats for Species of Conservation Concern (Not Including END, THR)		
Marsh Breeding Bird Habitat	Candidate habitat may be present within the wetlands communities associated with Green's Creek, Taylor Creek and Bilberry Creek.	Should vegetation removal occur within Candidate habitat **breeding bird surveys** should occur during nesting season (May/June).
Woodland Area-Sensitive Bird Breeding Habitat	No suitable habitat is present	No further studies required
Open Country Bird Breeding Habitat	No suitable habitat is present	No further studies required
Shrub/Early Successional Bird Breeding Habitat	No suitable habitat is present	No further studies required
Terrestrial Crayfish	Candidate habitat may be present within the wetland communities found along the LRT Route. Field investigations were limited to the areas confined to the watercourses as well as roadside investigations. Wetland communities were not search for the presence of chimneys or crayfish.	Should vegetation removal occur within candidate habitat **surveys should be completed to identify the presence or absence of crayfish or chimneys** during the breeding season (April to late June and in late summer-early August)
Special Concern and Rare Wildlife Species	Confirmed – A Milksnake was observed along the edge of the road near Green's Creek	Milksnake is a species of Special Concern. Construction mitigation is recommended to avoid disruption of this species.
Animal Movement Corridors		
Amphibian Movement Corridors	Candidate habitat may exist along Green's Creek, Taylor Creek and Bilberry Creek. This can only be determined once we have determined the significance of Amphibian Breeding Habitat Wetland (Section 1.2.2)	TBD
Deer Movement Corridors	Candidate habitat to be confirmed once Deer Wintering Habitat has been confirmed.	TBD

5.8 Species at Risk Habitat Screening

Based on background information compiled a total of 53 SAR were determined to potentially occur within the study area. Following the aquatic and terrestrial characterization of the study area through background review and field investigations, a habitat assessment was completed for these species to assess whether suitable habitat is present in the study area. It was determined that 45 species had suitable habitat present along the proposed Eastern LRT area. Sixteen (16) are listed as Endangered, twelve (12) are listed as Threatened and seventeen (17) are listed as Special Concern. The complete Species at Risk screening is presented in **Appendix J**.

Although some of the species are listed as Special Concern and not protected under the *Endangered Species Act*; it is still important to identify and provide appropriate mitigation measures for these species as to avoid future complications should the species be listed. The following describes the species which could potentially be found along the proposed Eastern LRT:

1. American chestnut (*Castanea dentata*), END: The American Chestnut prefers dryer upland deciduous forests with sandy, acidic to neutral soils. In Ontario, it is only found in the Carolinian Zone between Lake Erie and Lake Huron. The species grows alongside Red Oak, Black Cherry, Sugar Maple, American Beech and other deciduous tree species. This species can be associated with the following ELC communities: FOD with dry sandy soil.
2. American Eel (*Anguilla rostrata*), END: Over the course of its life, the American Eel can be found in both salt and fresh water. In fact, some scientists consider the American Eel to have the broadest diversity of habitats of any fish species in the world.

3. American Ginseng (*Panax quinquefolius*), END: In Ontario, American Ginseng typically grows in rich, moist, but well-drained, and relatively mature, deciduous woods dominated by Sugar Maple (Acer saccharum), White Ash (Fraxinus americana) and American Basswood (Tilia americana). It usually grows in deep, nutrient rich soil over limestone or marble bedrock. Species can be associated with the following ELC codes: FOD5, FOD6.

4. Butternut (*Juglans cinerea*), END: In Ontario, Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges. This species can be associated with the following ELC communities: FOD and mature hedgerows; Soil: dry rocky or moist (4, 5, 6) to fresh (2, 3).

5. Eastern Prairie Fringed-Orchid (*Platanthera leucophaea*), END: The Eastern Prairie Fringed-orchid grows in wetlands, fens, swamps and tallgrass prairie. It has been found in ditches and railroad rights of way.This specie can be associated with the following ELC communities: MAM, FEO, FES, FET, SWC, SWM, SWD, TPO, TPS and TPW.

6. Golden Eagle (*Aquila chrysaetos*), END: Golden Eagles nest in remote, undisturbed areas, usually building their nests on ledges on a steep cliff or riverbank, but they will also use large trees if needed. Most hunting is done near open areas such as large bogs or tundra. During migration they could be encountered anywhere, but are most frequently seen migrating west along the shores of Lake Ontario and Erie in November. Small numbers also winter in the southern half of Ontario, most often near large deer wintering areas where carcasses might be found. This species can be associated with the following ELC communities: FOD.

7. Henslow's Sparrow (*Ammodramus henslowii*), END: In Ontario, the Henslow's Sparrow lives in open fields with tall grasses, flowering plants, and a few scattered shrubs. It has also been found in abandoned farm fields, pastures, and wet meadows. It tends to avoid fields that have been grazed or are crowded with trees and shrubs. It prefers extensive, dense, tall grasslands where it can more easily conceal its small ground nest. This species can be associated with the following ELC communities: TPO, CUM, and MAM.

8. Hickorynut (*Obovaria olivaria*), END: Hickorynuts live on the sandy beds in large, wide, deep rivers – usually more than two or three metres deep – with a moderate to strong current. Mussels filter water to find food, such as bacteria and algae. Mussel larvae must attach to a fish, called a host, where they consume nutrients from the fish body until they transform into juvenile mussels and then drop off. In Canada, the fish host of the Hickorynut is the Lake Sturgeon. Presence of the fish host is one of the key features determining whether a body of water can support a healthy Hickorynut population.

9. Little Brown Myotis (*Myotis lucifugus*), END: Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access

many roosting areas. Little brown bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing. This species can be associated with the following ELC codes: FOD, CUW.

10. Loggerhead Shrike (*Lanius ludovicianus*), END: In Ontario, the Loggerhead Shrike prefers pasture or other grasslands with scattered low trees and shrubs. It lives in fields or alvars (areas of exposed bedrock) with short grass, which makes it easier to spot prey. It builds its nest in small trees or shrubs and hunts by waiting patiently in tree branches until it swoops down and attacks its unsuspecting prey – usually large insects, such as grasshoppers. Loggerhead Shrikes also require spiny, multi-branched shrubs where they can impale prey before eating it. Barbed wired fencing can also be used for this. Can be associated with the following ELC communities: SWT, CUM, CUT, ALO and ALS.

11. Mountain Lion (*Puma concolor*), END: The Cougar lives in large, undisturbed forests or other natural areas where there is little human activity. The forest must support plenty of white-tailed deer, which is an important food source for the Cougar.

12. Northern Myotis (*Myotis septentrionalis*), END: The Northern Long-eared Bat uses hibernation sites such as caves and mines in the winter and roosting and nursery colonies in tree cavities and manmade structures in the summer. This species can be associated with the following ELC codes: CUW, FOD, and SWD.

13. Rapids Clubtail (*Gomphus quadricolor*), END: The Rapids Clubtail is typically found in clear, cool medium-to-large rivers with gravel shallows and muddy pools. Larvae occupy quiet muddy pools. Adult males perch on exposed rocks and other projections in the rapids. Males are quite territorial and make short flights over the water, repeatedly returning to the same perch. Adult females typically inhabit forests along riverbanks, and only visit shallows and pools when they are ready to mate and lay eggs. This species can be associated with the following ELC codes: OAO.

14. Rusty-patched Bumble Bee (*Bombus affinis*), END: "This species, like other bumble bees, can be found in open habitat such as mixed farmland, urban settings, savannah, open woods and sand dunes. The most recent sightings have been in oak savannah, which contains both woodland and grassland flora and fauna. This species can be associated with the following ELC codes: TPS1, TPS2, SD, CUS, CUM, CUW.

15. Spotted Turtle (*Clemmys guttata*), END: The Spotted Turtle is semi-aquatic and prefers ponds, marshes, bogs and even ditches with slow-moving, unpolluted water and an abundant supply of aquatic vegetation. They are found in different types of wetlands throughout the province, depending on the types of habitats that are available. Females dig their nests in sunny locations where there is not a lot of woody vegetation. This species usually hibernates in wetlands or seasonally wet areas associated with structures including overhanging banks, hummocks, tree roots, or aquatic animal burrows. This species can be associated with the following ELC codes: MAM, OAO.

16. Wood Turtle (*Glyptemys insculpta*), END: The Wood Turtle prefers clear rivers, streams or creeks with a slight current and sandy or gravelly bottom. It spends more time on land and the shores of water- courses than other native Ontario turtles. Wooded areas are essential habitat for the Wood Turtle, but they are found in other habitats, such as wet meadows, swamps and fields. Wood Turtles overwinter on stream bottoms. This species can be associated with the following ELC Codes: MAM, SWD, and OAO.

17. Barn Swallow (*Hirundo rustica*), THR: Nearly all nests are made on man-made structures such as barns, garages, sheds, boat houses, bridges, road culverts, eaves and wharfs, typically infarmlands or rural areaswhere the swallow forages over open country especially near bodies of water. Foraging habitat for this

species can be associated with the following ELC codes: TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1; containing or adjacent structures that are suitable for nesting.

18. Blanding's Turtle (*Emydoidea blandingii*), THR: Freshwater lakes, permanent or temporary pools, slow-flowing streams, marshes, swamps; prefers shallow water, organic soil & dense vegetation; nest in loose substrates, including sand, organic soil, gravel, cobblestone; overwinter in permanent pools that average about 1 m in depth, or in slow-flowing streams or in bogs; basks on logs, stumps, or banks. This species can be associated with the following ELC communities: SWT2, SWT3, SWD, SWM, MAS2, SAS1, SAM1, where open water is present.

19. Bobolink (*Dolichonyx oryzivorus*), THR: Nests primarily in forage crops, particularly hayfields and pastures, dominated by a variety of species such as clover, tall grasses and broadleaved plants; also occurs in wet prairie, graminoid, peatlands and abandoned fields; generally requires tracts of grassland >5 ha. Also nests in lightly grazed pastures, fallow and abandoned fields and shallow grassy marshes. This species can be associated with the following ELC communities: TPO, TPS, CUM1 and MAM2.

20. Cerulean Warbler (*Dendroica cerulean*), THR: Species breeding habitat consists of large tracts of mature deciduous forests with tall trees and an open understory. This species can be found in both wet bottomland forests and upland areas. This species can be associated with the following ELC codes: FOD and SWD. Mature forests with an open understory are also required.

21. Channel Darter (*Percina copelandi*), THR: In Ontario, the Channel Darter lives in clean streams and lakes with sandy or gravel bottoms. During the breeding season in late spring, it prefers riffle areas with fairly fast moving water but spends the winter in deeper, calmer water. It eats mostly aquatic insect larvae from the bottom of the stream. This species can be associated with the following ELC communities: OAO.

22. Chimney Swift (*Chaetura pelagica*), THR: Formerly nested in the trunks of large, hollow trees. Today, mainly use chimneys or abandoned buildings as nesting sites. May forage over wide variety of habitats. It requires dead trees >30 cm for roosting and possibly nesting. Where swifts observed foraging only, is not Significant habitat. Foraging habitat for this species can be associated with the following ELC codes: TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1 containing or adjacent structures with suitable nesitng habitat (i.e. chimneys).

23. Eastern Meadowlark (*Sturnella magna*), THR: Eastern Meadowlarks breed primarily in moderately tall grasslands, such as pastures and hayfields, but are also found in alfalfa fields, weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown fields, or other open areas. Small trees, shrubs or fence posts are used as elevated song perches.Minimum area of grassland required is about 5 ha. This species can be associated with the following ELC codes: TPO, TPS, CUM1, MAM2 and MAS2.

24. Eastern Musk Turtle (*Sternotherus odoratus*), THR: Eastern Musk Turtles are found in ponds, lakes, marshes and rivers that are generally slow-moving have abundant emergent vegetation and muddy bottoms that they burrow into for winter hibernation. Nesting habitat is variable, but it must be close to the water and exposed to direct sunlight. Nesting females dig shallow excavations in soil, decaying vegetation and rotting wood or lay eggs in muskrat lodges, on the open ground or in rock crevices. This species can be associated with the following ELC communities: MAS, OAO, SAS, SAM and SAF. Nesting habitat can be any upland areas adjacent these area that are exposed to direct sunlight.

25. Eastern Whip-poor-will (*Caprimulgus vociferous*), THR: The Eastern Whip-poor-will is usually found in areas with a mix of open and forested areas, such as savannahs, open woodlands or openings in more mature, deciduous, coniferous and mixed forests. It forages in these open areas and uses forested areas for roosting (resting and

sleeping) and nesting. It lays its eggs directly on the forest floor, where its colouring means it will easily remain undetected by visual predators. This species can be associated with the following ELC communities: CUS, CUW, FOD, FOM, and FOC.

26. Flooded Jellyskin (*Leptogium rivulare*), THR: Flooded Jellyskin is mainly found growing on the bark at the base of trees that are periodically flooded, typically during the spring. The trees are species that can withstand substantial flooding such as: Black Ash, Red Maple, American Elm and more rarely, Balsam Poplar. It can also be found growing on rocks that are subject to similar periodic flooding. Species can be associated with the following ELC codes: SWD.

27. Grey Fox (*Urocyon cinereoargenteus*), THR: In Ontario, the Grey Fox lives in deciduous forests and marshes. Grey Fox dens are usually found in dense shrubs close to a water source but they will also use rocky areas, hollow trees, and underground burrows dug by other animals. This species will live in many types of habitat provided there is sufficient shelter and prey availability. Species can be associated with the following ELC codes: SWD, MAM.

28. Least Bittern (*Ixobrychus exilis*), THR: In Ontario, the Least Bittern is found in a variety of wetland habitats, but strongly prefers cattail marshes with a mix of open pools and channels. This bird builds its nest above the marsh water in stands of dense vegetation, hidden among the cattails. The nests are almost always built near open water, which is needed for foraging. This species eats mostly frogs, small fish, and aquatic insects. This species can be associated with the following ELC communities: MAS2-1, MAS3-1, SA, and OAO.

29. Bald Eagle (*Haliaeetus leucocephalus*), SC: Bald Eagles nest in a variety of habitats and forest types, almost always near a major lake or river where they do most of their hunting. While fish are their main source of food, Bald Eagles can easily catch prey up to the size of ducks, and frequently feed on dead animals, including White-tailed Deer. They usually nest in large trees such as pine and poplar. During the winter, Bald Eagles sometimes congregate near open water such as the St. Lawrence River, or in places with a high deer population where carcasses might be found. This species can be associated with the following ELC communities: FOC, FOM, FOD, SWC, SWM and SWD. Nests typically located near major bodies of water.

30. Black Tern (*Chlidonias niger*), SC: They build floating nests in loose colonies in shallow marshes, especially in cattails. In winter they migrate to the coast of northern South America. Nesting habitat for this species can be associated with the following ELC codes: MAS2-1 and OAO. These two communities must be present immediatly adjacent each other and with sufficient water to provide suitable habitat.

31. Bridle Shiner (*Notropis bifrenatus*), SC: Bridle Shiners prefer clear, unpolluted streams, rivers and lakes which have an abundance of aquatic vegetation. These vegetated areas provide suitable spawning habitat and places to feed and hide from predators. Bridle Shiners prefer warm water habitats where the bottom is sand, silt or organic debris, which is necessary for the establishment of aquatic vegetation.

32. Canada Warbler (*Wilsonia canadensis*), SC: The Canada Warbler breeds in a variety of wet deciduous and coniferous forests that have a dense, well developed, shrub layer. This species can be associated with the following ELC communities: FOC3, FOC4, FOM6, FOM7, FOM8, FOD6, FOD7, FOD8, FOD9, SWC, SWM and SWD. A well-developed shrub layer within these communities is required.

33. Common Nighthawk (*Chordeiles minor*), SC: The Common Nighthawk nests in a wide range of open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This

species also inhabits mixed and coniferous forests. This species can be associated with the following ELC codes: SD, BB, RB, CUM, MAM, FOM, and FOC.

34. Eastern Ribbonsnake (*Thamnophis sauritus*), SC: The Eastern Ribbonsnake is semi-aquatic species that is almost always associated with water. The wetland and shoreline habitats that this species inhabits are generally near upland forests where their overwintering and birthing sites. This species can be associated with the following ELC communities: FOC, FOM, FOD, SWC, SWM, SWD, MAS, OAO, SAS, SAM and SAF. Both upland forested areas and areas with year round standing or flowing water required.

35. Golden-winged Warbler (*Vermivora chrysoptera*), SC: Golden-winged Warblers prefer to nest in areas with young shrubs surrounded by mature forest – locations that have recently been disturbed, such as field edges, hydro or utility right-of-ways, or logged areas. This species can be associated with the following ELC codes: CUT, CUM.

36. Milksnake (*Lampropeltis triangulum*), SC: The Milksnake can be found in a range of habitats including rocky outcrops, fields and forest edges. In southern Ontario, it is often found in old farm fields and farm buildings where there is an abundance of mice. The Milksnake hibernates underground, in rotting logs or in the foundations of old buildings. This species can be associated with the following ELC communities: CUM, FOD and FOC.

37. Monarch (*Danaus plexippus*), SC: Throughout their life cycle, Monarchs use three different types of habitat. Only the caterpillars feed on milkweed plants and are confined to meadows and open areas where milkweed grows. Adult butterflies can be found in more diverse habitats where they feed on nectar from a variety of wildflowers. Monarchs spend the winter in Oyamel Fir forests found in central Mexico. This species can be associated with the following ELC codes: CUM, FOD.

38. Northern Brook Lamprey (*Ichthyomyzon fossor*), SC: The Northern Brook Lamprey inhabits clear, coolwater streams. The larval stage requires soft substrates such as silt and sand for burrowing which are often found in the slow-moving portions of a stream. Adults are found in areas associated with spawning, including fast flowing riffles comprised of rock or gravel. Spawning occurs in May and June. The males construct small, often inconspicuous, nests by picking up pebbles with their mouths and moving them to form the rims of shallow depressions. The sticky eggs are deposited in the nest and adhere to the substrate.

39. Olive-sided Flycatcher (*Contopus cooperi*), SC: The Olive-sided Flycatcher is most often found along natural forest edges and openings. It will use forests that have been logged or burned, if there are ample tall snags and trees to use for foraging perches. Olive-sided Flycatchers' breeding habitat usually consists of coniferous or mixed forest adjacent to rivers or wetlands. In Ontario, Olive-sided Flycatchers commonly nest in conifers such as White and Black Spruce, Jack Pine and Balsam Fir. This species can be associated with the following ELC codes: FOC, FOM.

40. Peregrine Falcon (*Falco peregrinus*), SC: The Peregrine Falcon typically nests on tall steep cliff ledges that are close to large bodies of water. This species can also be located in urban areas with tall buildings where they will nest on the ledges of tall buildings. This species can be associated with the following ELC communities: CLO.

41. Red-headed Woodpecker (*Melanerpes erythrocephalus*), SC: The Red-headed Woodpecker is found in a wide variety of habitats, including open oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, as well as along beaver ponds and brooks. The open areas favoured by this species usually contain a high density of dead or unhealthy trees for roosting, and where

holes can easily be made for nesting. This species can be associated with the following ELC codes: TPO, TPS, CUW, FOD1, FOD2, FOD4-1, FOD6, FOD7, and FOD9.

42. Short-eared Owl (*Asio flammeus*), SC: The Short-eared Owl lives in open areas such as grasslands, marshes and tundra where it nests on the ground and hunts for small mammals, especially voles. This species can be associated with the following ELC communities: TPO, CUM, MAM.

43. Snapping Turtle (*Chelydra serpentina*), SC: Snapping Turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. This species can be associated with the following ELC communities: OAO.

44. West Virginia White (*Pieris virginiensis*), SC: The West Virginia White lives in moist, deciduous woodlots. This butterfly requires a supply of toothwort, a member of the mustard family, since it is the only food source for larvae. This species can be associated with the following ELC codes: FOD.

45. Yellow Rail (*Coturnicops noveboracensis*), SC: The Yellow Rail can typically be found in marshes dominated by sedges, grasses, and rushes with little or no standing water (generally 0-12 cm water depth), and where the substrate remains saturated throughout the summer. They can also be found in damp fields and meadows, on the floodplains of rivers and streams, in the herbaceous vegetation of bogs, and at the upper levels (drier margins) of estuarine and salt marshes. Nesting habitats typically have a dry mat of dead vegetation from previous growing seasons. A greater diversity of habitat types is used during migration and winter than during the breeding season. In winter, the rails are known to use coastal wetlands and rice fields. The Yellow Rail can be associated with the following ELC codes: MAM, MAS, CUM, SWD and FOD7.

5.9 Summary

The following presents a summary of existing Natural Heritage conditions in the Eastern LRT study area:

Fish Habitat and Fish Communities

- 13 existing watercourse crossings were observed and 26 assessments made. Seven were permanent, nine were intermittent, four were ephemeral and six were unknown based on the watercourse being buried or not located. Further investigations will be done during subsequent study phases to gather further details about the watercourses that could not be located.
- Three crossings were considered to be "High" sensitivity fish habitat, two were assessed as "Moderate" and 21 were considered as "Low" habitat sensitivity.
- Thirty-three (33) fish species were identified in the subwatersheds within the surveyed area.
- The overall fish communities can be defined as commonly occurring S4 and S5 species, which means common, fairly tolerant to environmental or anthropogenic stresses and demonstrably secure in Ontario.
- Trout-perch and Burbot were the only coldwater species identified. Trout-perch was found within Green's Creek, whereas Burbot was found in both Green's and Bilberry Creeks. This may indicate the presence of groundwater upwelling in these areas; however, no groundwater indicators were observed in this reach during the site investigation.
- The following SAR were identified during background review: Channel Darter (*Percina copelandi*) American Eel (*Anguilla rostrata*), Lake Surgeon (*Acipenser fulvescens*), Silver Lamprey (*Ichthyomyzon unicuspis*), River Redhorse (Moxostoma carinatum), Brindle Shiner (Notropis bifrenatus) and Northern Brook Lamprey (Ichtyomyzon fossor).

- Suitable habitat was identified for the American Eel within Green's and Taylor Creeks with no suitable habitat identified for the remaining species The timing window for all watercourses within the study area is between March 15th to June 30th where no in-water works are permitted.
- Once the location of the proposed Eastern LRT has been determined, Fisheries Act "Self-assessments" may be required if in-water work is to be undertaken.

Vegetation Communities

- There were 15 different Ecosite classifications divided into cultural, forest and wetland communities.
- 194 hectares (ha) of vegetation cover is found within the study area; 66 ha are classified as upland forested communities (FOC, FOM, FOD); 106 ha are classified as cultural communities (CUM, CUT, CUP, CUW); 22 ha are classified as wetland communities (MAM, SWD, OAO). ELC communities should be further refined once the location of the proposed LRT has been determined.

Wetlands

- No Provincially Significant Wetlands fall within the study area boundary. The closest wetland to the study area is Petrie Island PSW.
- Portions of 7 identified wetland communities that have not been evaluated according to MNRF's Ontario Wetland Evaluation system fall within the study area.

Woodlands

- Portions of eighteen identified significant woodlands fall within the study area.

Species at Risk

- 45 species have suitable habitat present along the proposed route along. Sixteen (16) are listed as Endangered, twelve (12) are listed as Threatened and seventeen (17) are listed as Special Concern. The presence or absence of SAR should be confirmed once the preferred alignment has been determined.

Significant Wildlife Habitat

- SWH potentially located along this route includes:
  - Waterfowl Stopover and Staging Areas (Terrestrial)
  - Waterfowl Stopover and Staging Areas (Aquatic)
  - Shorebird Migratory Stopover Area
  - Raptor Wintering Area
  - Bat Maternity Colonies
  - Turtle Wintering Areas
  - Reptile Hibernaculum
  - Colonially-Nesting Bird Breeding Habitat (trees/ shrubs)
  - Colonially-Nesting Bird Breeding Habitat (Ground)
  - Deer Wintering Congregation Areas
  - Bald Eagle and Osprey Nesting Foraging and Perching Habitat
  - Turtle Nesting Areas
  - Amphibian Breeding Habitat (Woodland)
  - Amphibian Breeding Habitat (Wetlands)
  - Marsh Breeding Bird Habitat
  - Terrestrial Crayfish

  - Special Concern and Rare Wildlife Species
  - Amphibian Movement Corridors
  - Deer Movement Corridors
- One Confirmed Significant Wildlife Habitat area was found along the LRT Route. Significant Wildlife Habitat for Special Concern and Rare Wildlife Species (Milksnake) was confirmed within the vegetation communities found along Green's Creek. All of the identified potential SWH should be further studied once the location of the LRT route has been selected and the area of disturbance has been determined.

6. References

Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier (eds.). 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706 pp.

COSEWIC. 2010. COSEWIC Assessment and Status report on the Jefferson Salamander *Ambystoma jeffersonianum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Xi + 38pp. (www.sararegistry.gc.ca/status/status_e.cfm).

COSEWIC. 2003. COSEWIC assessment and status report on the butternut *Juglans cinerea* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vii + 32pp. (www.sararegistry.gc.ca/status/status_e.cfm).

COSEWIC 2004. COSEWIC assessment and status report on the American chestnut *Castanea dentata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 19 pp. (www.sararegistry.gc.ca/status/status_e.cfm)

COSEWIC 2000. COSEWIC assessment and update status report on the American ginseng *Panax quinquefolius* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.vii + 17 pp.

Gradish, A. and M. Tonge. 2011. Recovery Strategy for the Bogbean Buckmoth (*Hemileuca* sp.) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. vi + 19 pp.

Eastern Prairie Fringed-orchid Recovery Team. 2010. Recovery strategy for the Eastern Prairie Fringed-orchid (*Platanthera leucophaea*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. vi + 30 pp.

COSEWIC 2011. COSEWIC assessment and status report on the Henslow's Sparrow *Ammodramus henslowii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. X + 37 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

COSEWIC 2011. COSEWIC assessment and status report on the Hickorynut *Obovario olivaria* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. X + 46 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Colla, S.R. and A. Taylor-Pindar. 2011. Recovery Strategy for the Rusty-patched Bumble Bee (*Bombus affinis*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. vi + 21 pp.

COSEWIC. 2010. COSEWIC assessment and status report on the Skillet Clubtail *Gomphus ventricosus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 32 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Ontario Wood Turtle Recovery Team. 2010. Recovery strategy for the Wood Turtle (*Glyptemys insculpta*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources. vi + 25 pp.

COSEWIC. 2008. COSEWIC assessment and status report on the Canada Warbler *Wilsonia Canadensis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 35 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

COSEWIC. 2010. COSEWIC assessment and status report on the Cerulean Warbler *Dendroica cerulean* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 40 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

DFO. 2010. Recovery Potential Assessment of Channel Darter (Percina copelandi) in Canada. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/058.

COSEWIC 2002. COSEWIC assessment and status report the stinkpot *Sternotherus odoratus* Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 18 pp.

COSEWIC 2004. COSEWIC assessment and status report on the flooded jellyskin *Leptogium rivulare* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 30 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

COSEWIC 2006. COSEWIC assessment and status report on the Golden-winged Warbler *Vermivora chrysoptera* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 30 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

COSEWIC 2002. COSEWIC assessment and update status report on the grey fox *Urocyon cinereoargenteus* interior in Canada. Committee on the Status of Endangered Wildlife in Canada.Ottawa. vi + 32 pp.

COSEWIC 2007. COSEWIC assessment and update status report on the Red-headed Woodpecker *Melanerpes erythrocephalus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vi + 27 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

COSEWIC 2002. COSEWIC assessment and update status report on the spiny softshell turtle Apalone spinifera in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 17 pp.

COSEWIC. 2008. COSEWIC assessment and update status report on the Western Chorus Frog *Pseudacris triseriata* Carolinian population and Great Lakes/St. Lawrence – Canadian Shield population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 47 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

COSEWIC 2002. COSEWIC assessment and status report on the eastern ribbonsnake *Thamnophis sauritus* Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 24 pp.

COSEWIC. 2008. COSEWIC assessment and update status report on the Short-eared Owl *Asio flammeus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 24 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

COSEWIC 2006. COSEWIC assessment and update status report on the southern flying squirrel *Glaucomys volans* (Atlantic (Nova Scotia) population and Great Lakes Plains population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 33 pp.

COSEWIC. 2008. COSEWIC assessment and update status report on the Western Chorus Frog *Pseudacris triseriata* Carolinian population and Great Lakes/St. Lawrence – Canadian Shield population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 47 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Crins, William J., Paul A. Gray, Peter W.C. Uhlig and Monique C. Wester. 2009. The Ecosystems of Ontario, Part 1: Ecozones and Ecoregions. Ontario Ministry of Natural Resources, Peterborough Ontario, Inventory, Monitoring and Assessment, SIB TER IMA TR-01, 71pp.

Eder, T. 2002. Mammals of Ontario. Lone Pine Publishing.

Government of Canada Migratory Birds Convention Act, 1994.

Government of Canada. *Federal Fish and Wildlife Conservation Act. 1997.*

Ministry of Natural Resources. 2012. Endangered Species Act Submission Standards for Activity Review and 17(2)(c) Overall Benefit Permits. 14 pp.

Newmaster, S. G, Harris, A.G., Kershaw, L. J., 1997. Wetland Plants of Ontario. Lone Pine Publishing.

Ontario Breeding Bird Atlas summary for square 17LG99 & 17MG09 – http://www.bsc-eoc.org/conservation/priorlists.html.

Ontario Ministry of Natural Resources. Natural Heritage Information Centre (NHIC), 2001. *Rare Species Database*. OMNR.

Ontario Ministry of Natural Resources, 2000. Significant Wildlife Habitat Technical Guide. Ontario Ministry of Natural Resources Fish and Wildlife Branch, Wildlife Section, Southcentral Science Section.

Ontario Ministry of Natural Resources. October 2000. Significant Wildlife Habitat Technical Guide. 151p.

Ontario Ministry of Transportation. June 2009. Environmental Reference for Highway Design.

Peterson, R.T., McKenny, M. (1996). Peterson Field Guides: Wildflowers – Northeastern/North-central North American. Houghton Mifflin Company.

The Ontario Freshwater Fish Life History Database. Accessed October 2014. Available at: http://www.fishdb.ca/home.htm.

The Species at Risk Public Registry. Accessed October 2014. Available at: http://www.sararegistry.gc.ca.

A.J. Robinson & Associates INC. January 1990. Green's Creek Watershed Study Summary Report. Report No. 8520 to National Capital Commision.

Bird Studies Canada. 2012. Conservation Priorities List. City of Ottawa. http://www.bsc-eoc.org/conservation/priorlists.html. Accessed August 2012.

Characterization of Ottawa's Watersheds: An Environmental Foundation Document with Supporting Information Base. March 2011.

City of Ottawa. 2012. Official Plan – Schedule L1. Available at: http://webcast.ottawa.ca/plan/All_Image%20Referencing_OP%20Amendment%20Application_Image%20Reference_D01-01-12-0001%20-%20Schedule%20L1%20East%20Landscape.PDF

City of Ottawa. 2003. Official Plan: Volume 1. Available at: http://www.ottawa.ca/en/city_hall/planningprojectsreports/ottawa2020/official_plan/vol_1/index.html

City of Ottawa. June 2011. Cumberland Village Visioning Report.

Conservation Ontario. Rideau Valley Conservation Authority – Distribution of Fish and Mussel Species at Risk Mapping. Available at: http://www.conservation-ontario.on.ca/projects/DFO.html

Cumming Cockburn Limited. August 2000. Supplementary Report to the Master Drainage Plan "and Environmental Study Report". Project No. 3076-LD to the City of Cumberland.

Daniel Brunton Consulting Services. February 1983. An Ecological Inventory of the Green's Creek Sector, National Capital Commission Greenbelt, Gloucester, Ontario. Contract No. 82-195 to National Capital Commission.

Delcan Corporation. May 1993. Drainage Report for Culverts/Design Brisbois and Taylor Creeks Upgrading of Hwy. 17 From Champlain St. Easterly 3.0 km to Reg. Rd. 57 Plus Service Rd. From Jeanne D'Arc Blvd. Easterly 2.4 km, to Reg. Rd. 57, Township of Cumberland, Ontario. Contract No. 93-62 to the Ontario Ministry of Transportation.
Genivar. February 2012. Highway 174 Culvert Over Taylor Creek: Detailed Condition Survey and Renewal Options Analysis. Report No. SN 894050 to City of Ottawa.

Genivar. February 2012. OR174B Culvert Over Cardinal Creek: Detailed Bridge Condition Survey. Report No. SN 897240 to City of Ottawa.

Golder Associates Ltd. November 2005. Geotechnical Considerations Proposed Orleans Town Centre Development Ottawa, Ontario. Submitted to City of Ottawa.

Golder Associates Ltd. August 2006. Geotechnical Considerations Proposed CHS Lands Development Ottawa, Ontario. Submitted to Stantec Consulting Ltd.

IBI Group. January 1993. Highway 417/17 Preliminary Design Report: Hurdman Bridge to Champlain Street. Submitted to the Ontario Ministry of Transportation.

Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurry. 1998. Ecological Land Classification for Southern Ontario: First Approximation and its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.

McCormick Rankin Corporation. November 2011. East Transitway Extension Place d'Orleans Station to Trim Road Feasibility Study. Submitted to the City of Ottawa.

Ontario Ministry of Natural Resources. June 1999. Natural Heritage Reference Manual: For Policy 2.3 of the Provincial Policy Statement.

Ontario Breeding Bird Atlas summary for squares 18WR04, 18VR94, 18VR84, 18VR74, 18VR64, 18VR53, 18VR52, 18VR63, 18VR73, 18VR83, 18VR93, and 18WR03 – http://www.birdsontario.org/atlas/datasummaries.jsp?lang=en

Ontario Ministry of Natural Resources. 2014. Biodiversity Explorer. Available at: http://www.giscoeapp.lrc.gov.on.ca/web/MNR/NHLUPS/NaturalHeritage/Viewer/Viewer.html?__utma=1.1983443997.1401282571.1415636448.1415798785.20&__utmb=1.6.10.1415798785&__utmc=1&__utmx=-&__utmz=1.1415191428.16.10.utmcsr=google|utmccn=(organic)|utmcmd=organic|utmctr=(not%20provided)&__utmv=1.mnr|1=tag_visitor_type=external=1&__utmk=13859639

Ontario Ministry of Natural Resources. 2002. Distribution Maps of Herpetofaunal Species. Available at: http://nhic.mnr.gov.on.ca/MNR/nhic/herps/range_maps.html

Ontario Ministry of Natural Resources. 2000. Significant Wildlife Habitat Technical Guide. Appendix G.
Ontario Ministry of Natural Resources. 2014. Species at Risk in Ontario List. Available at: http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276722.html

Paterson Group Inc. August 2006. Geotechnical Investigation: Proposed Pipe Crossing Regional Road 174 at Green's Creek Ottawa, Ontario. Report No. PG0844-1 to R.V. Anderson Associates Limited.

R.V. Anderson Associates Limited. March 2007. Conceptual Study for the Realignment of Brisebois Creek from Place d'Orleans Dr. to Tenth Line Rd. Final Report. Report No. RVA 071326 to the City of Ottawa.

SS Wilson Associates Consulting Egineers. March 2011. Noise Barrier Retrofit Feasibility Study of the City of Ottawa Road 174 Along Shefford Road and East Acres Road Areas (West of Montreal Road), City of Ottawa. Report No. WA08-083-2 to the Public Works and Services, City of Ottawa.

Stanfield L., (Editor). 2010. Ontario Stream Assessment Protocol (Version 8). Fish and Wildlife Branch. Ontario Ministry of Natural Resources. Peterborough, Ontario. 256 pages)

Stantec Consulting Ltd. April 2000. Brisbois Creek Stormwater Management Pond City of Cumberland. File No. 634-45940 to the City of Cumberland.

Stantec Consulting Ltd. September 2006. CHS Lands Municipal Servicing Study. Submitted to the City of Ottawa.

Stantec Consulting Ltd. June 2007. Phases 1 & 2 Class EA Report Taylor Creek Erosion Control. Report No. 1634-00727 to the City of Ottawa.

The Ontario Freshwater Fish Life History Database. Accessed October 2014. Available at: http://www.fishdb.ca/home.html

The Species at Risk Public Registry. Accessed October 2014. Available at: http://www.registrelep-sararegistry.gc.ca/species/default_e.cfm

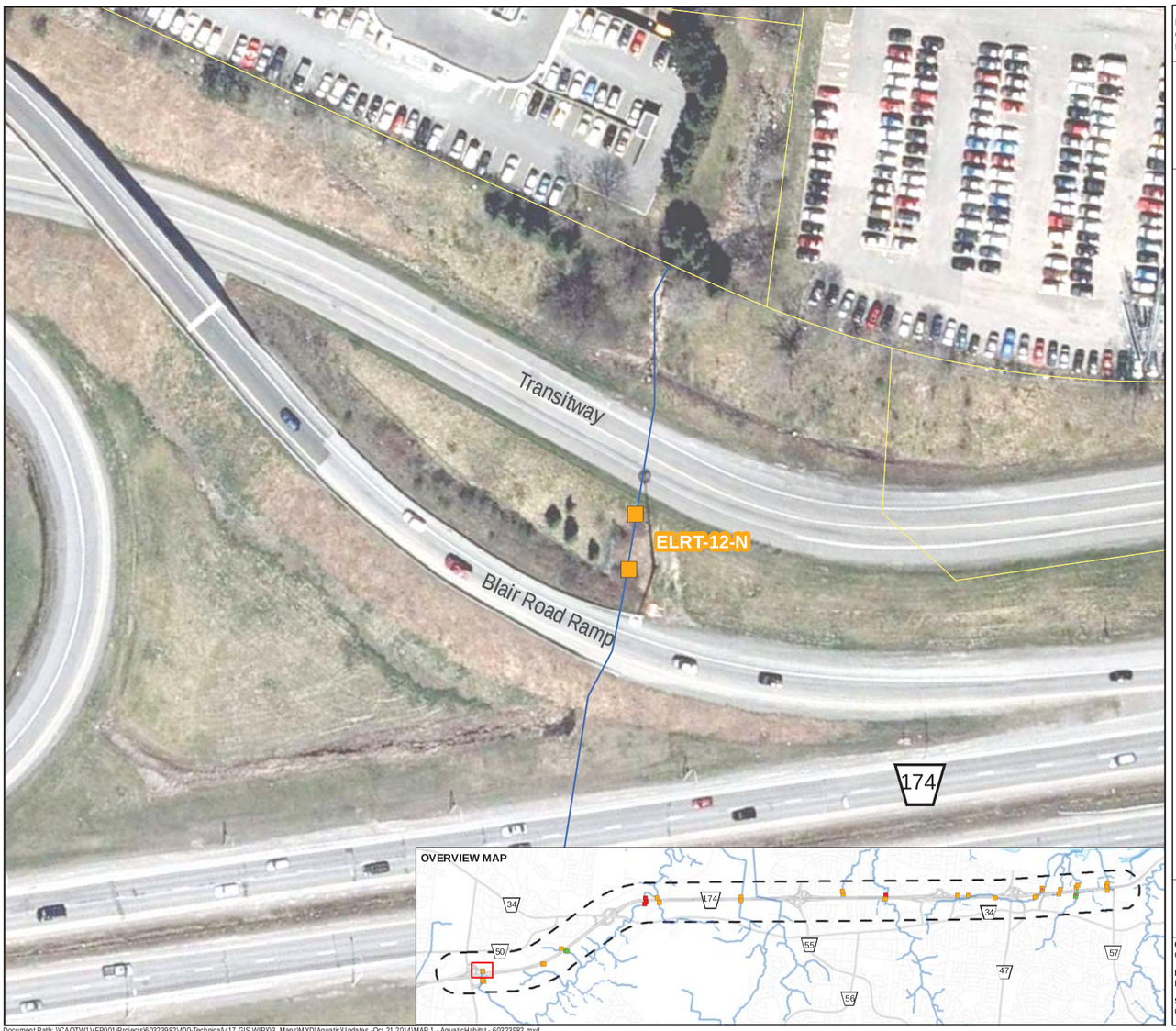
UMA Engineering Ltd. June 1992. Highway 17 Widening Study. Report No. W.P. 911-73-00 to the Ontario Ministry of Transportation.

Appendix A

Figures

Appendix A-1

Aquatic Existing Conditions Maps



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metres
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AQUATIC SENSITIVITY
- Potential Fish Barrier
- High
- Moderate
- Low

BACKGROUND INFORMATION
- Parcel Fabric \Propriété
- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Intermittent \ Intermittent
- Permanent \ Permanent

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Figure
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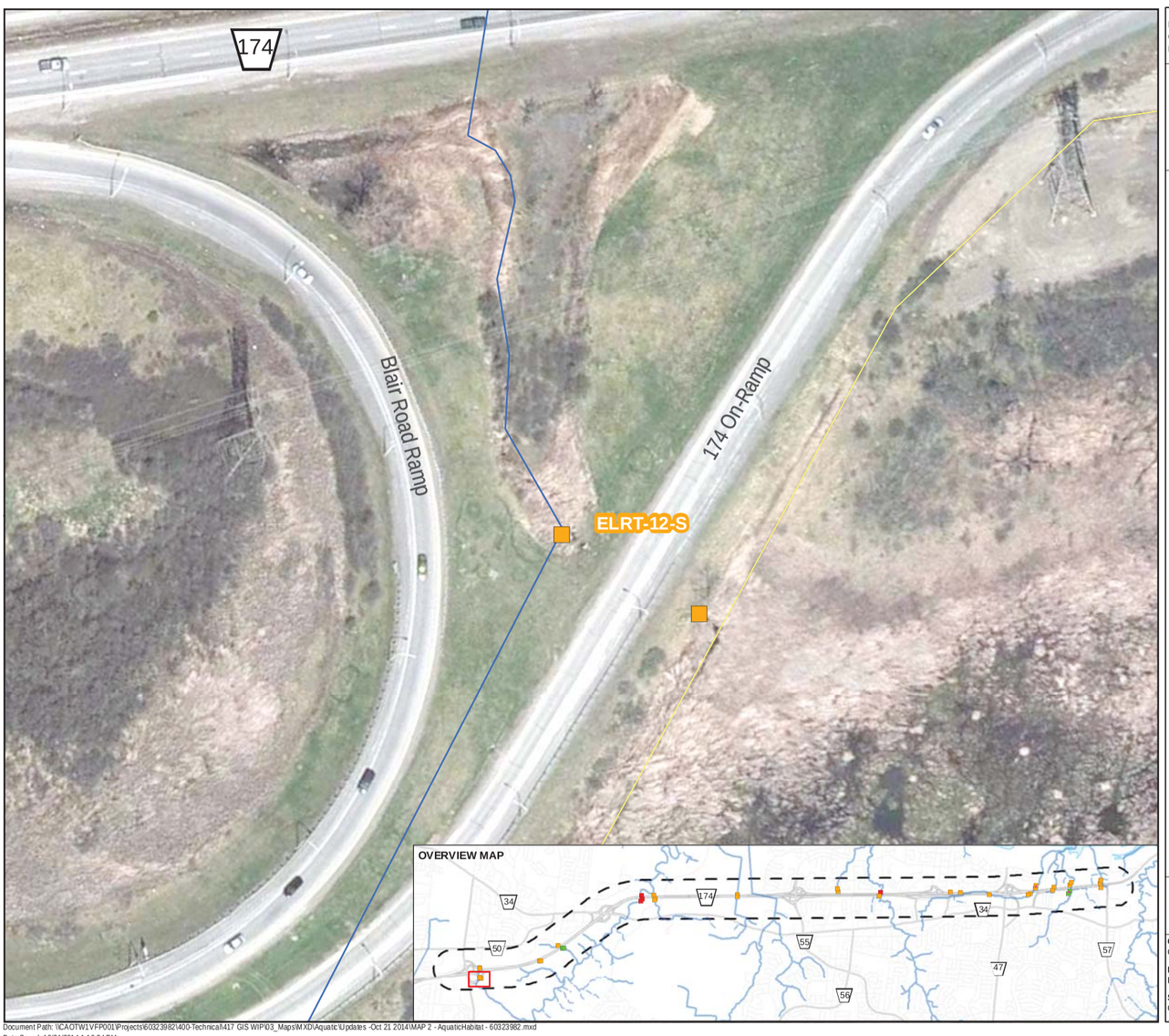

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Figure
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AQUATIC SENSITIVITY

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Figure
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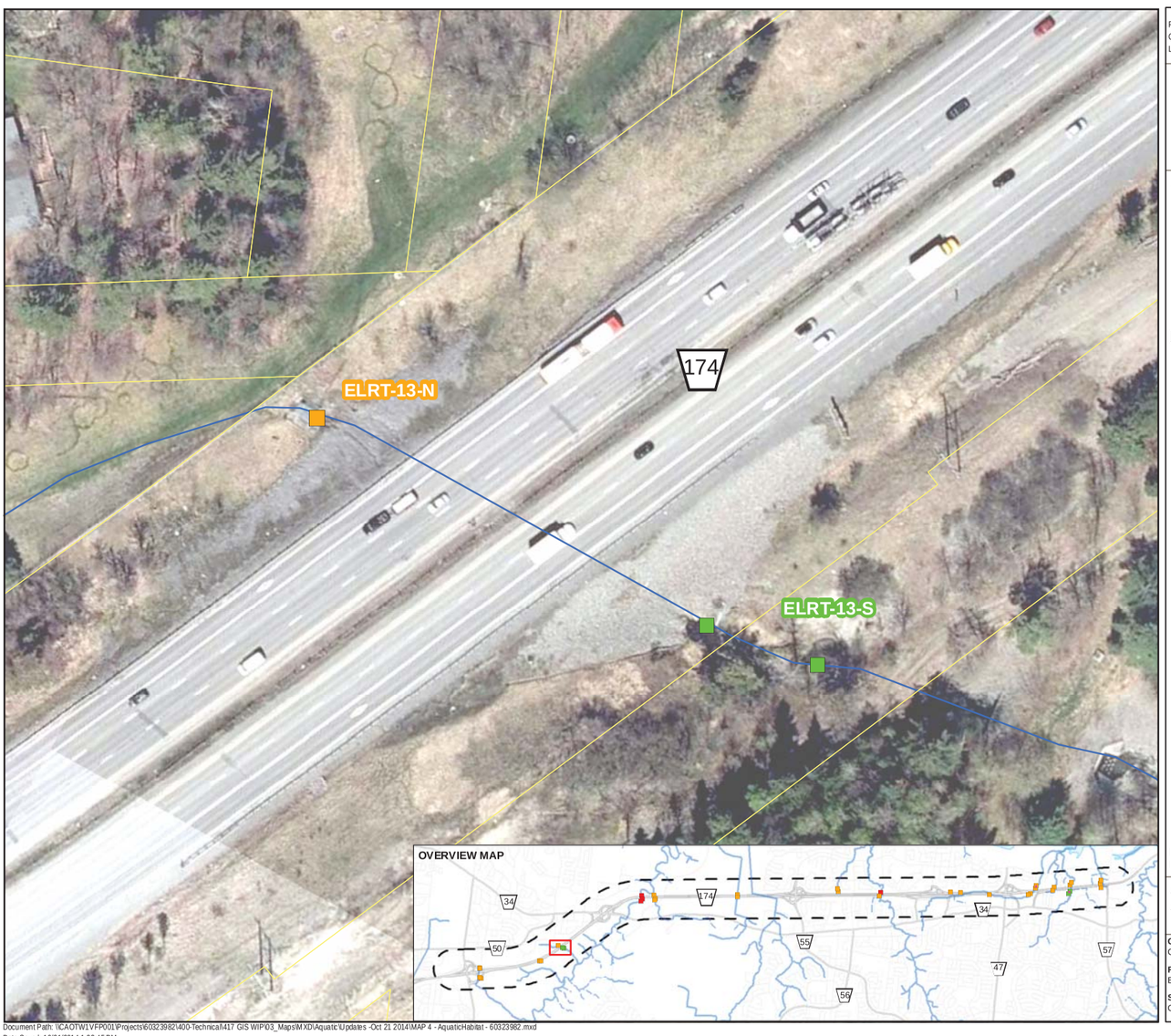

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AQUATIC SENSITIVITY

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Figure
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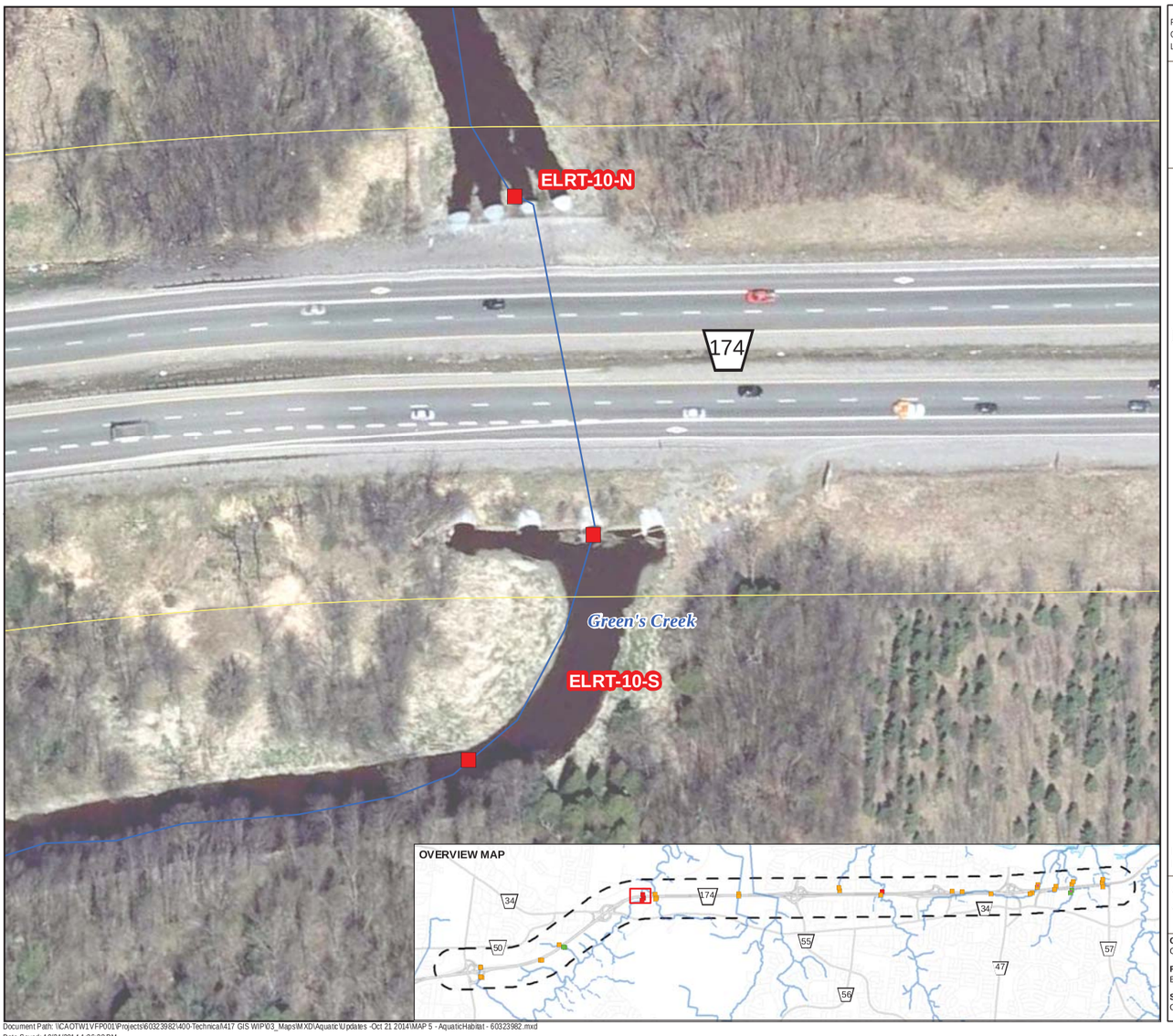

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AQUATIC SENSITIVITY

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Figure
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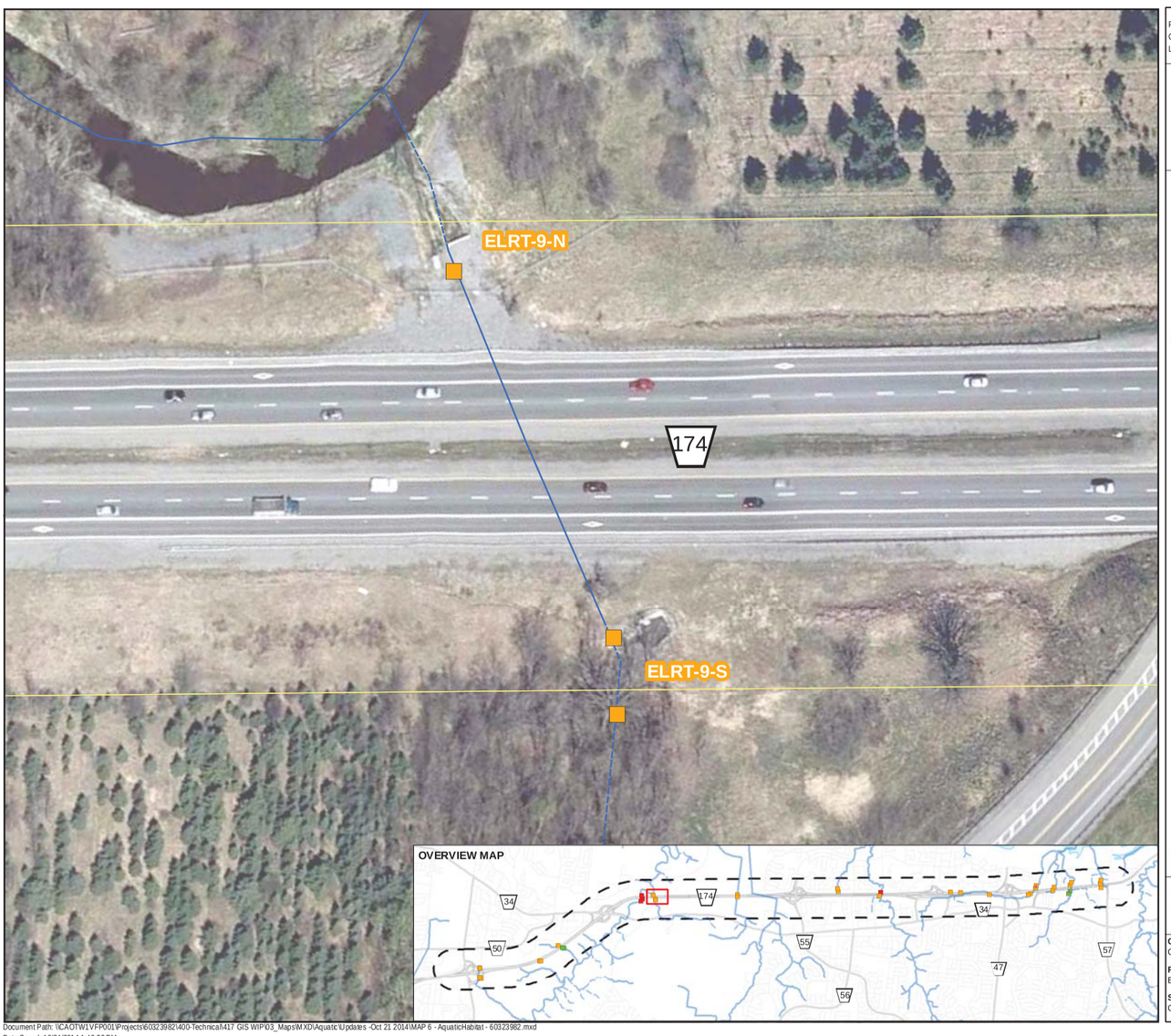

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Figure
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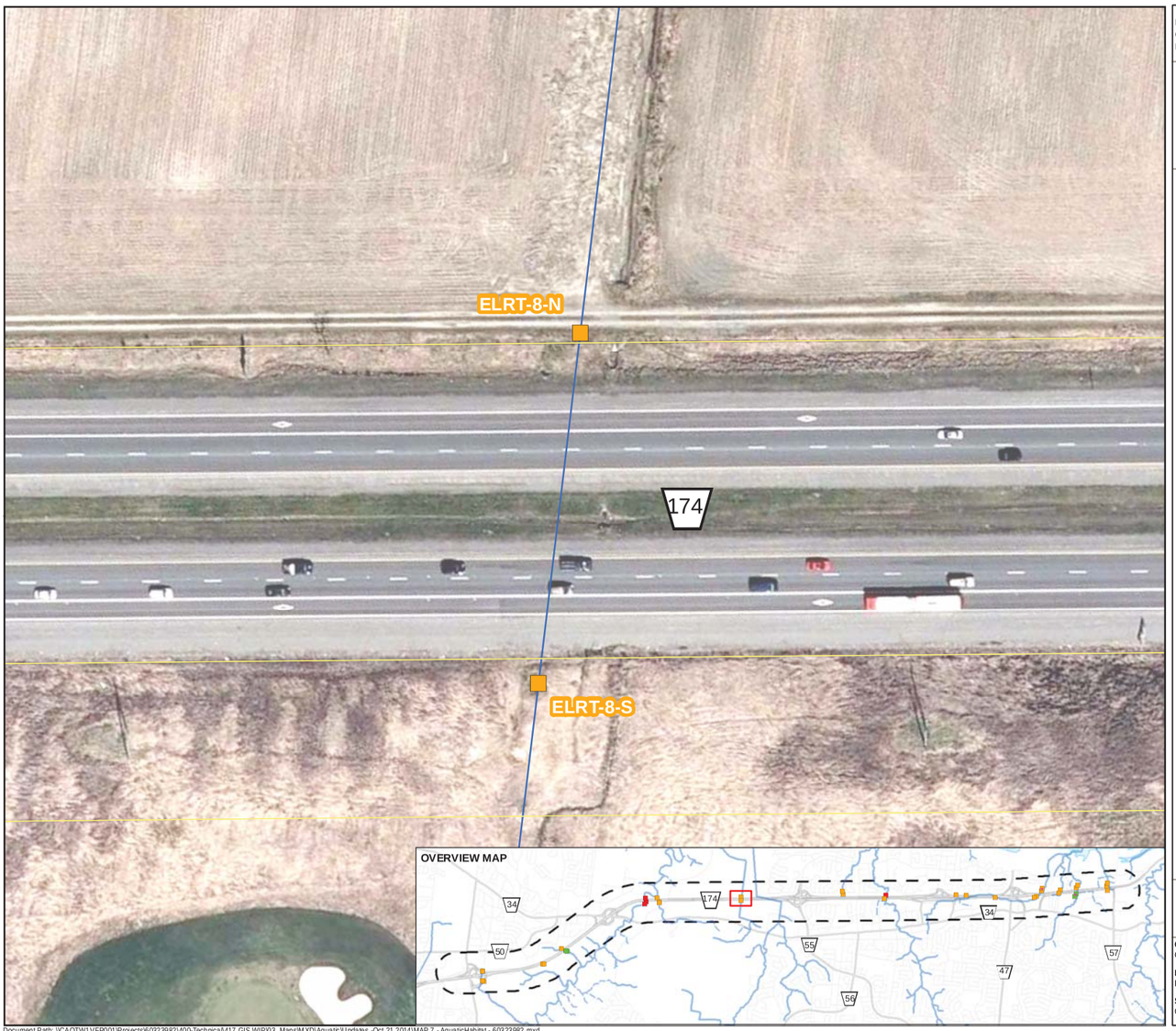

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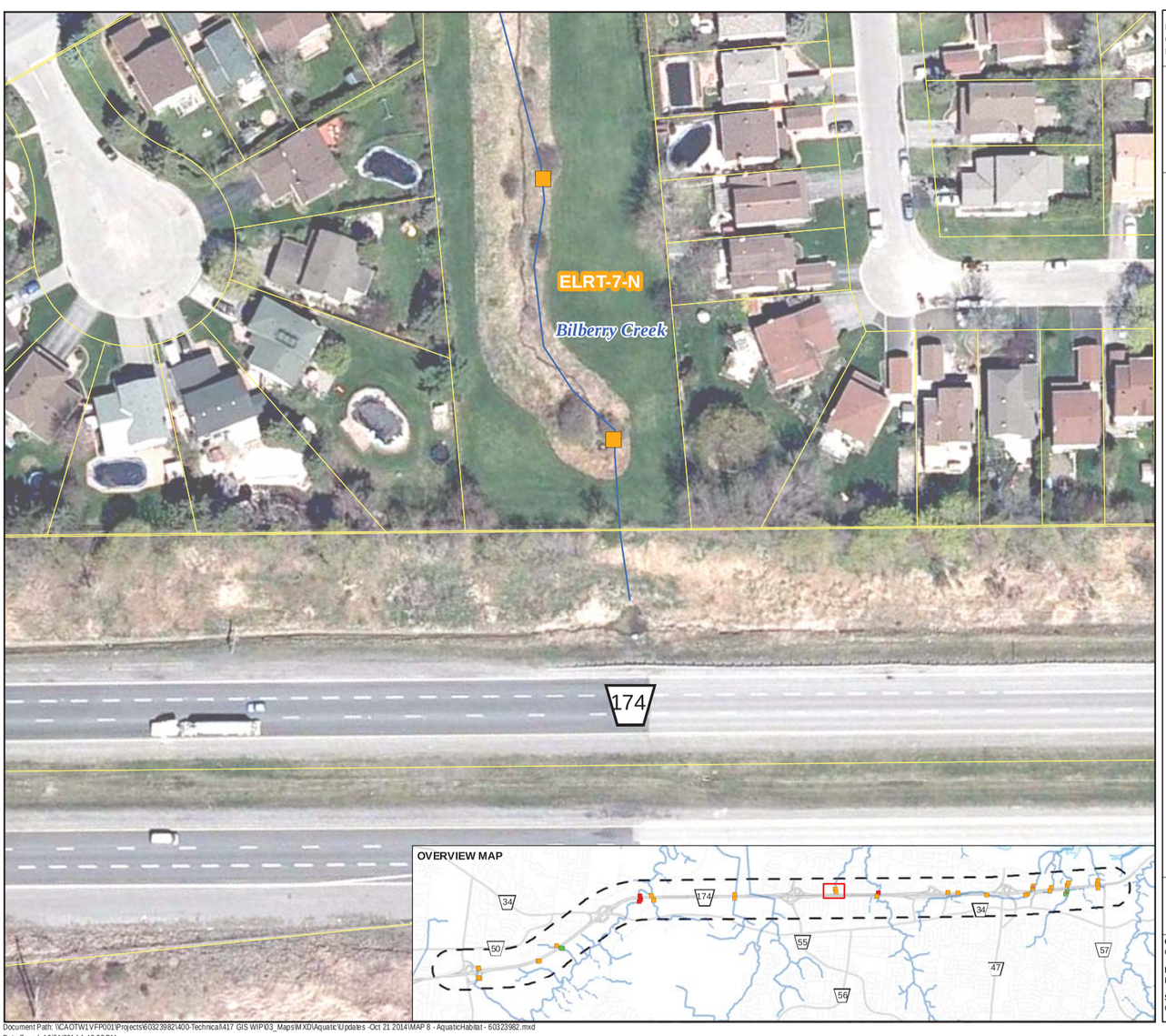

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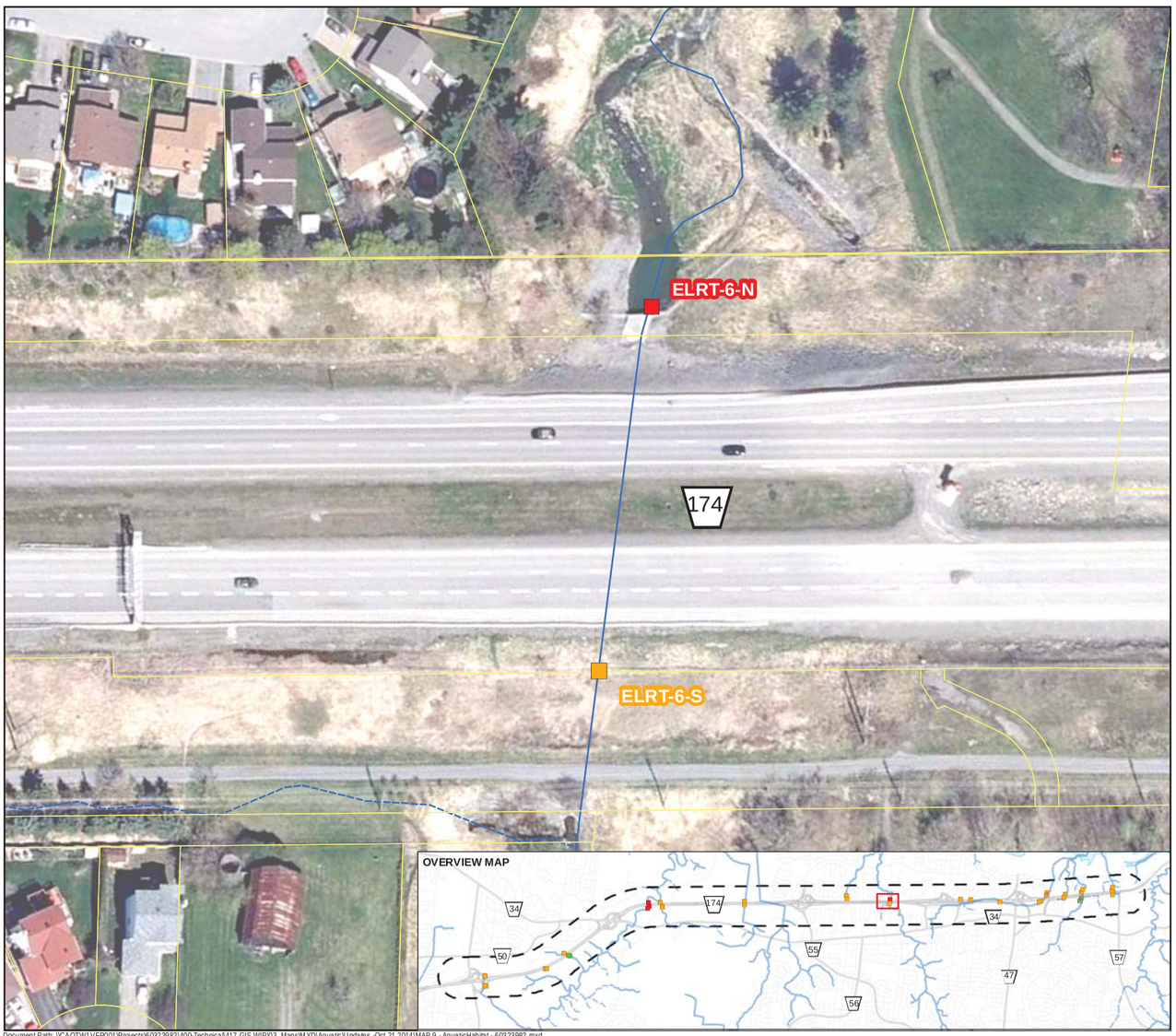

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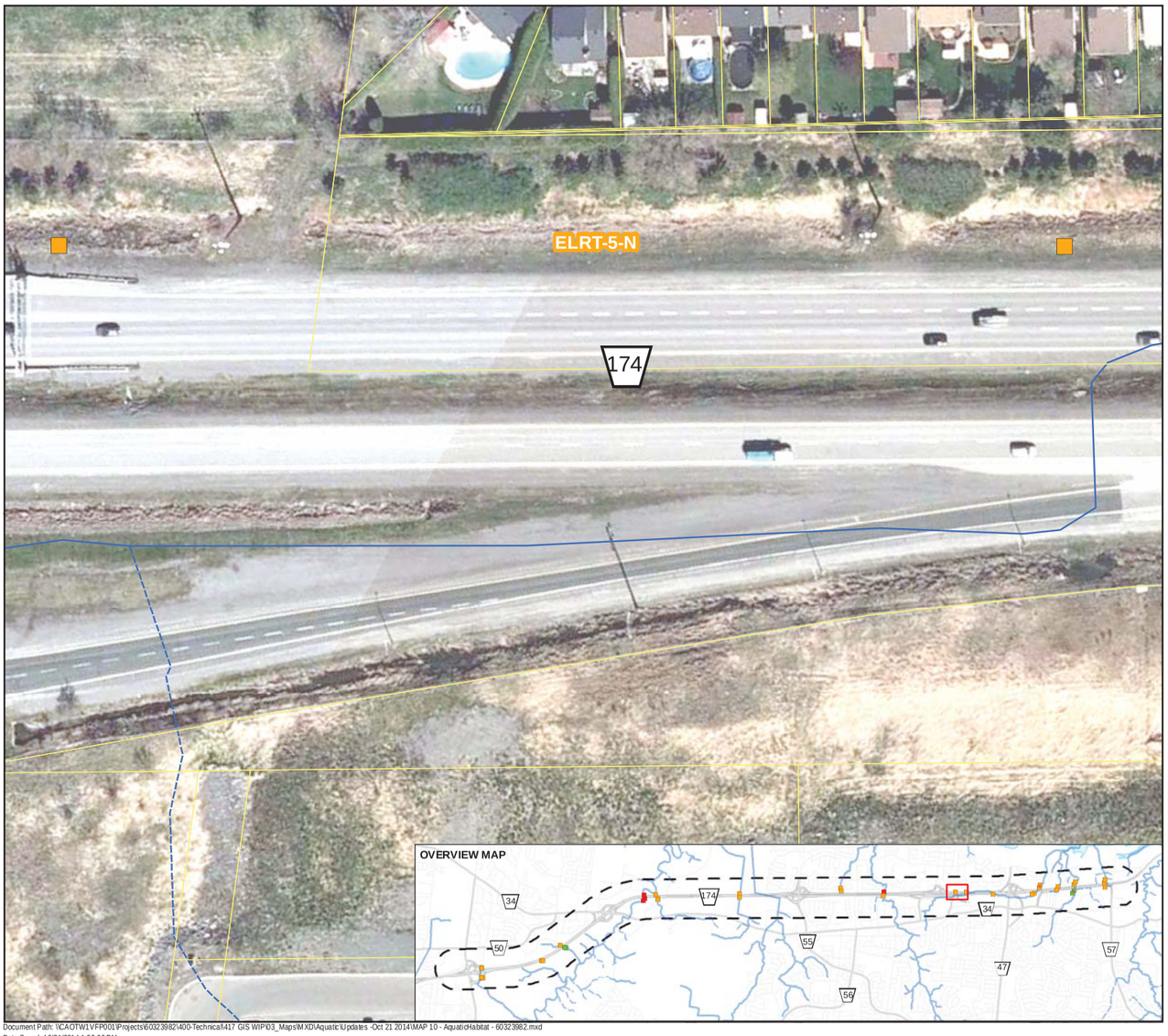

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AQUATIC HABITAT ASSESSMENT

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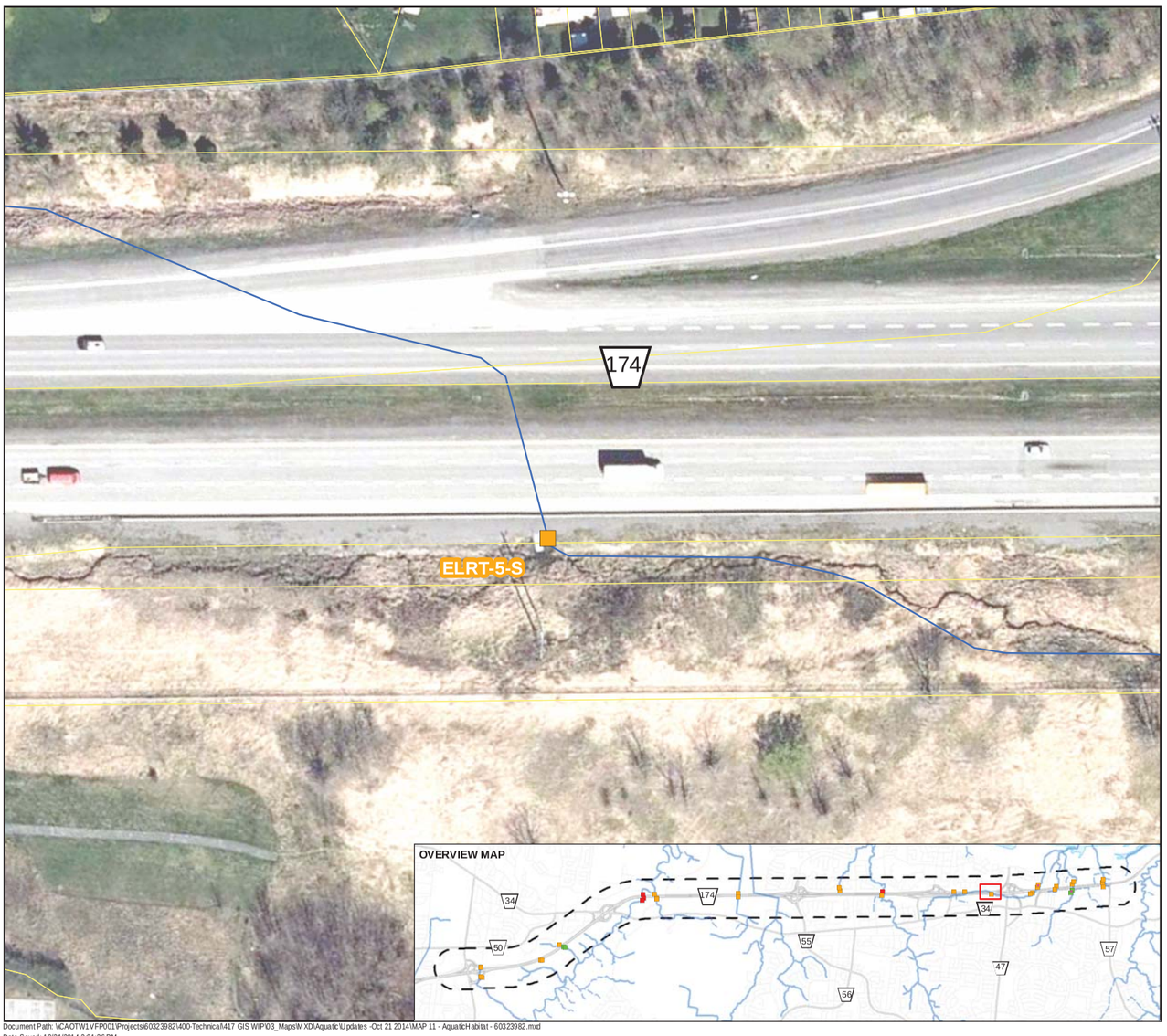

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Figure
11

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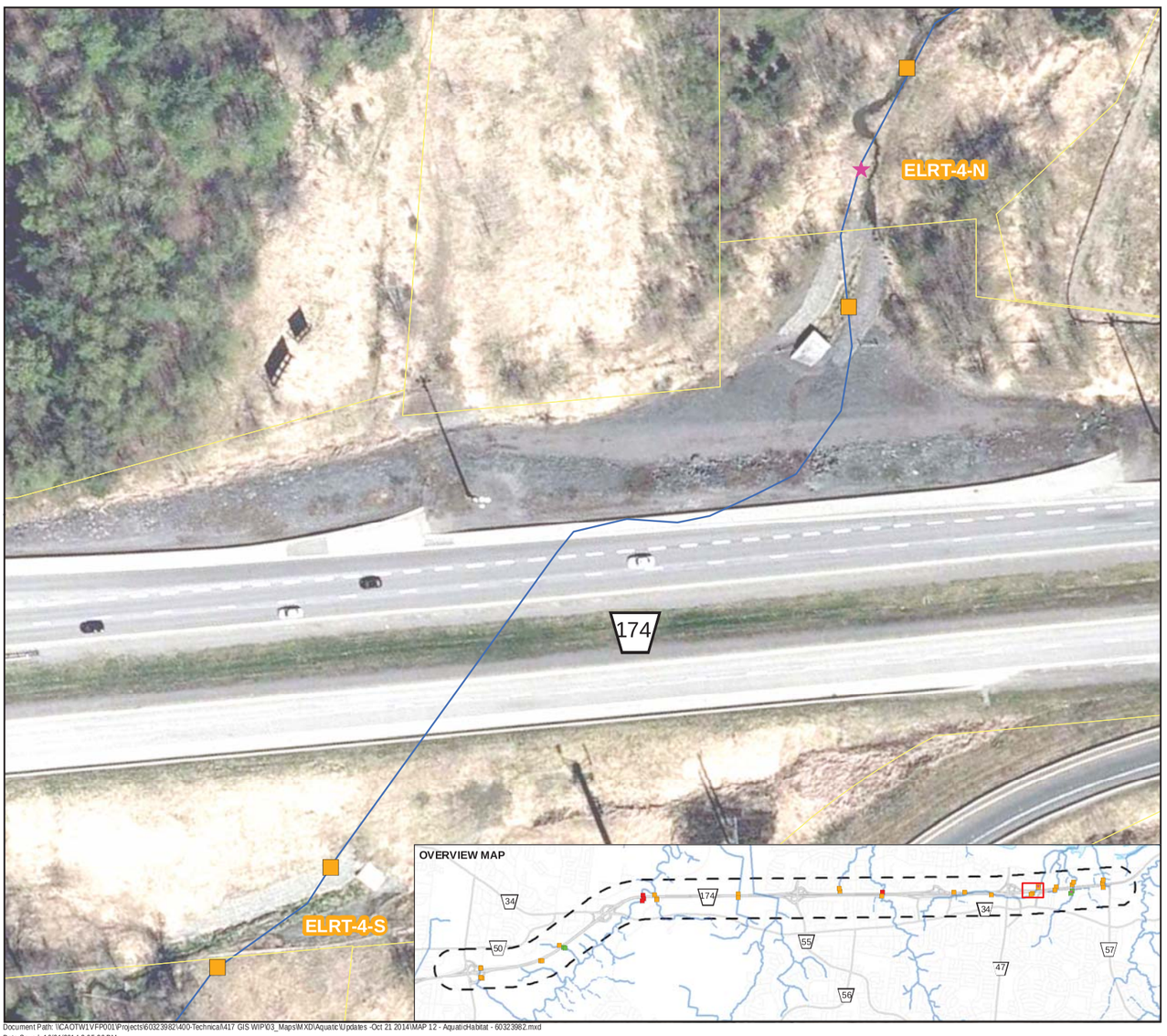

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Eastern Light Rail Transit (Blair to Trim)

Site Address
Ottawa East

Figure
12

Document Path: \\CAOTW1VFP001\Projects\60323982\400-Technical\417 GIS WIP\03_Maps\MXD\Aquatic\Updates -Oct 21 2014\MAP 12 - AquaticHabitat - 60323982.mxd
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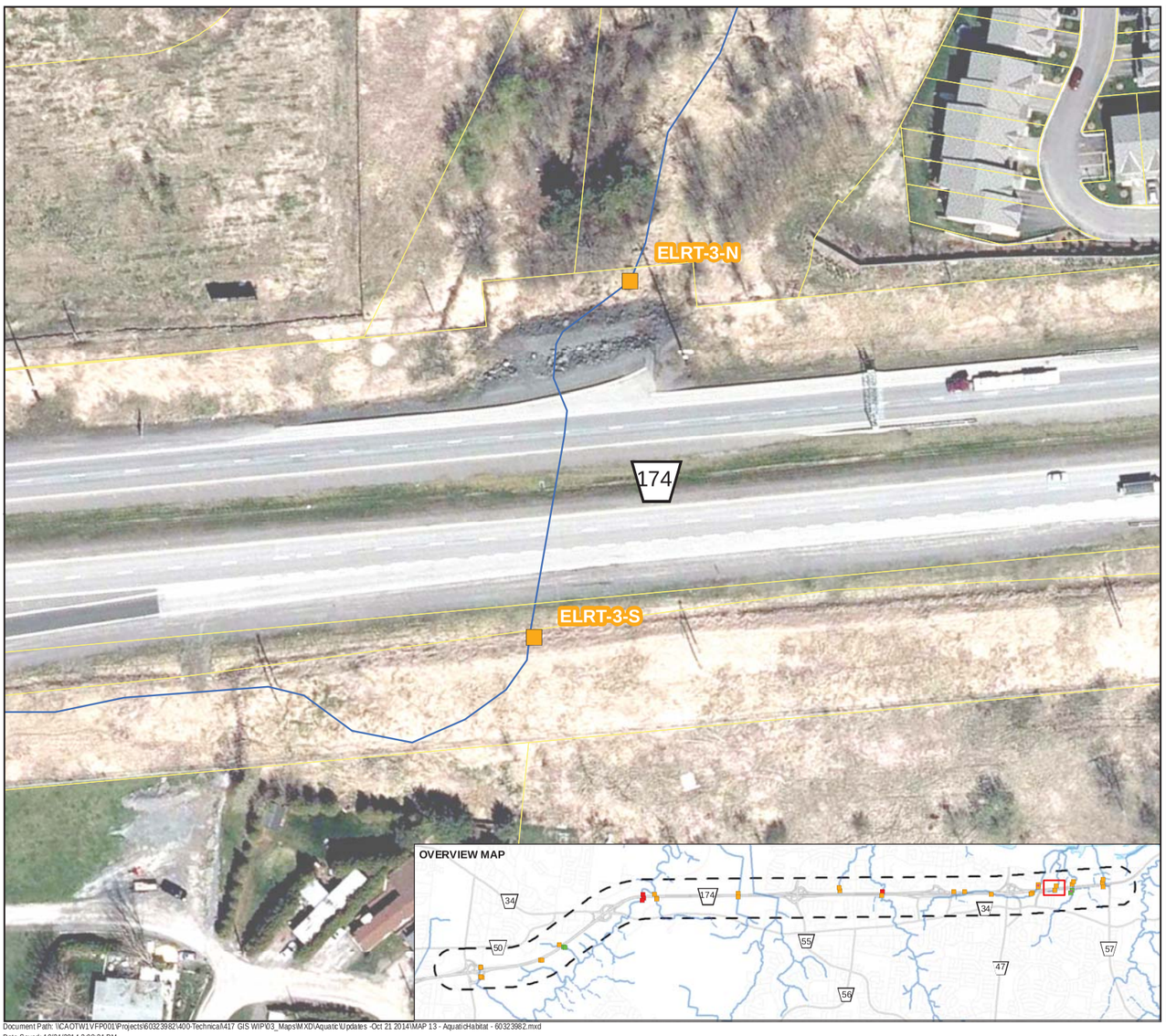

PROJECT ID 60323982
CREATED BY M.Tracey
LAST MODIFIED MT 21 10 2014

AECOM
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DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 4.25 8.5 17 25.5 34
metres

1:1,142

AQUATIC SENSITIVITY

- Potential Fish Barrier
- High
- Moderate
- Low

BACKGROUND INFORMATION

- Parcel Fabric \Propriété
- Study Area \ Zone
- Waterbody \ Plan D'eau
- Intermittent \ Intermittent
- Permanent \ Permanent

Data sources:
Base Data: (c) 2014 City of Ottawa, Land Information

AQUATIC HABITAT ASSESSMENT

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim)

Site Address
Ottawa East

Figure
13

Document Path: \\CAOTW1VFP001\Projects\60323982\400-Technical\417 GIS WIP\03_Maps\MXD\Aquatic\Updates -Oct 21 2014\MAP 13 - AquaticHabitat - 60323982.mxd
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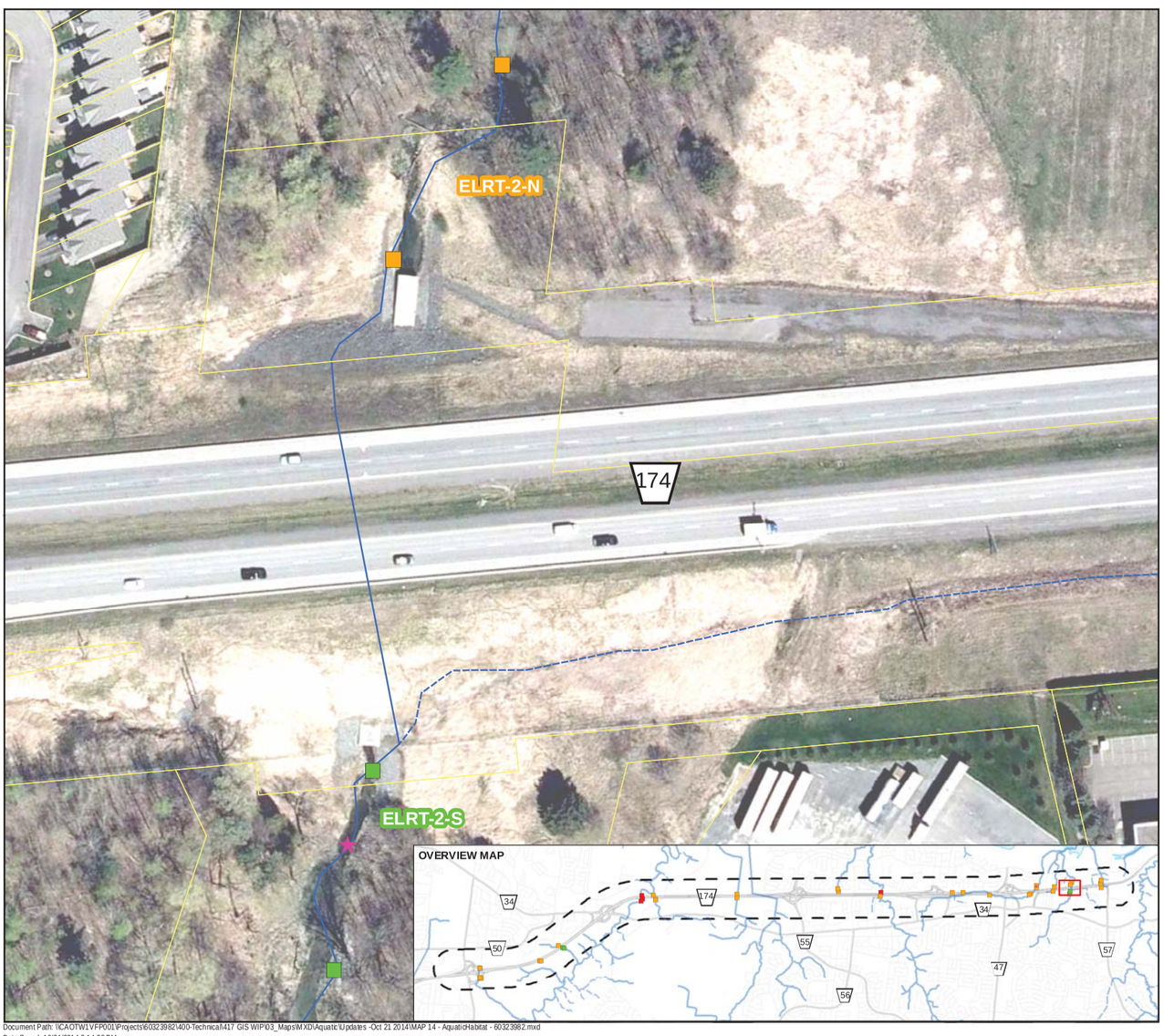

PROJECT ID 60323982
CREATED BY M.Tracey
LAST MODIFIED MT 21 10 2014

AECOM
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DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 3.75 7.5 15 22.5 30
metres

1:1,200

AQUATIC SENSITIVITY

- Potential Fish Barrier
- High
- Moderate
- Low

BACKGROUND INFORMATION

- Parcel Fabric \Propriété
- Study Area \ Zone
- Waterbody \ Plan D'eau
- Intermittent \ Intermittent
- Permanent \ Permanent

Data sources:
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AQUATIC HABITAT ASSESSMENT

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim)

Site Address
Ottawa East

Figure
14

Document Path: \\CAOTW1VFP001\Projects\60323982\400-Technical\417 GIS WIP\03_Maps\MXD\Aquatic\Updates -Oct 21 2014\MAP 14 - AquaticHabitat - 60323982.mxd
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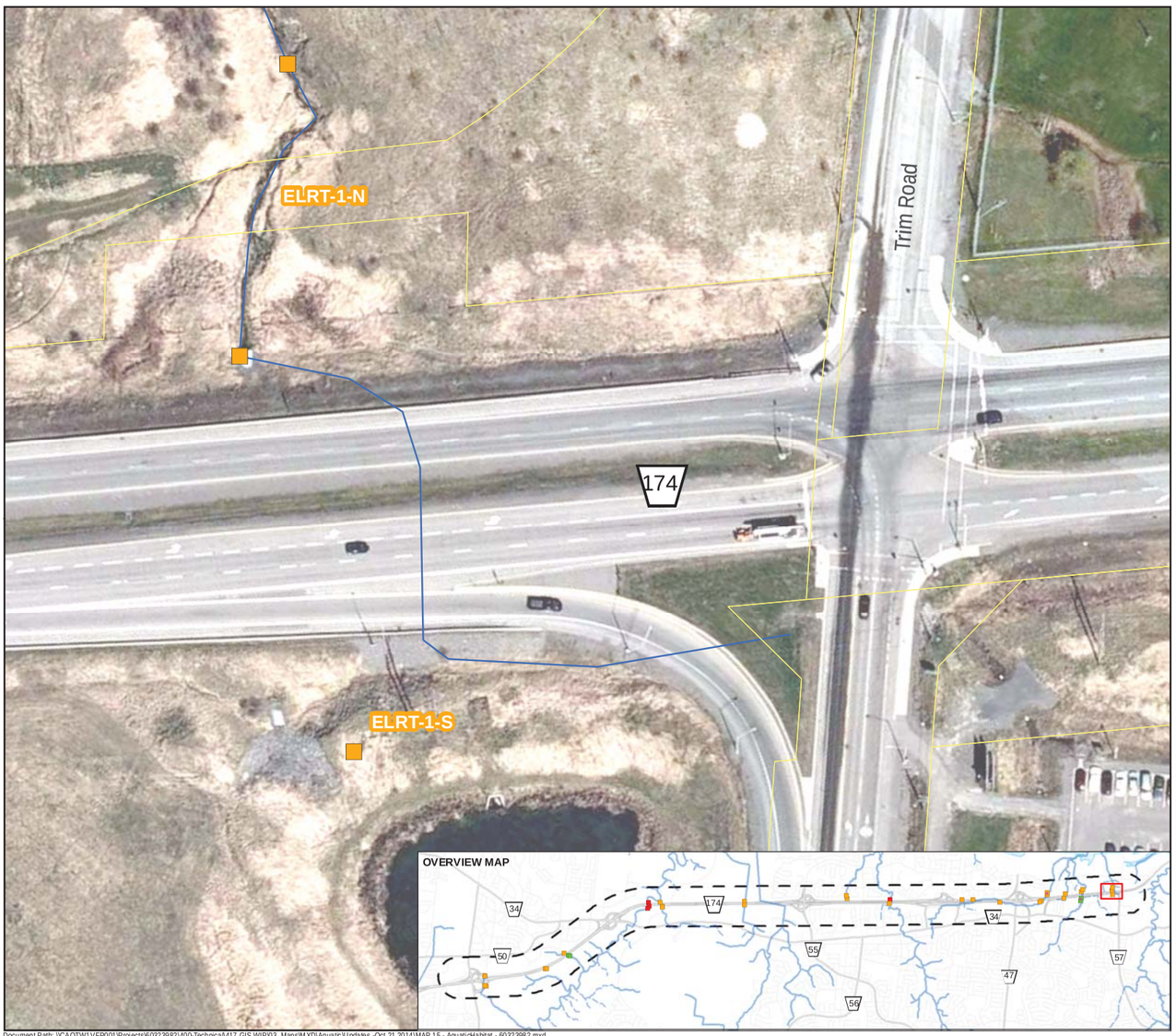

PROJECT ID 60323982
CREATED BY M.Tracey
LAST MODIFIED MT 21 10 2014

AECOM
www.aecom.com

DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR
0 3.75 7.5 15 22.5 30
metres
1:1,000

AQUATIC SENSITIVITY

- Potential Fish Barrier
- High
- Moderate
- Low

BACKGROUND INFORMATION

- Parcel Fabric \Propriété
- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Intermittent \ Intermittent
- Permanent \ Permanent

Data sources:
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AQUATIC HABITAT ASSESSMENT

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim)

Site Address
Ottawa East

Figure
15

ANSI A

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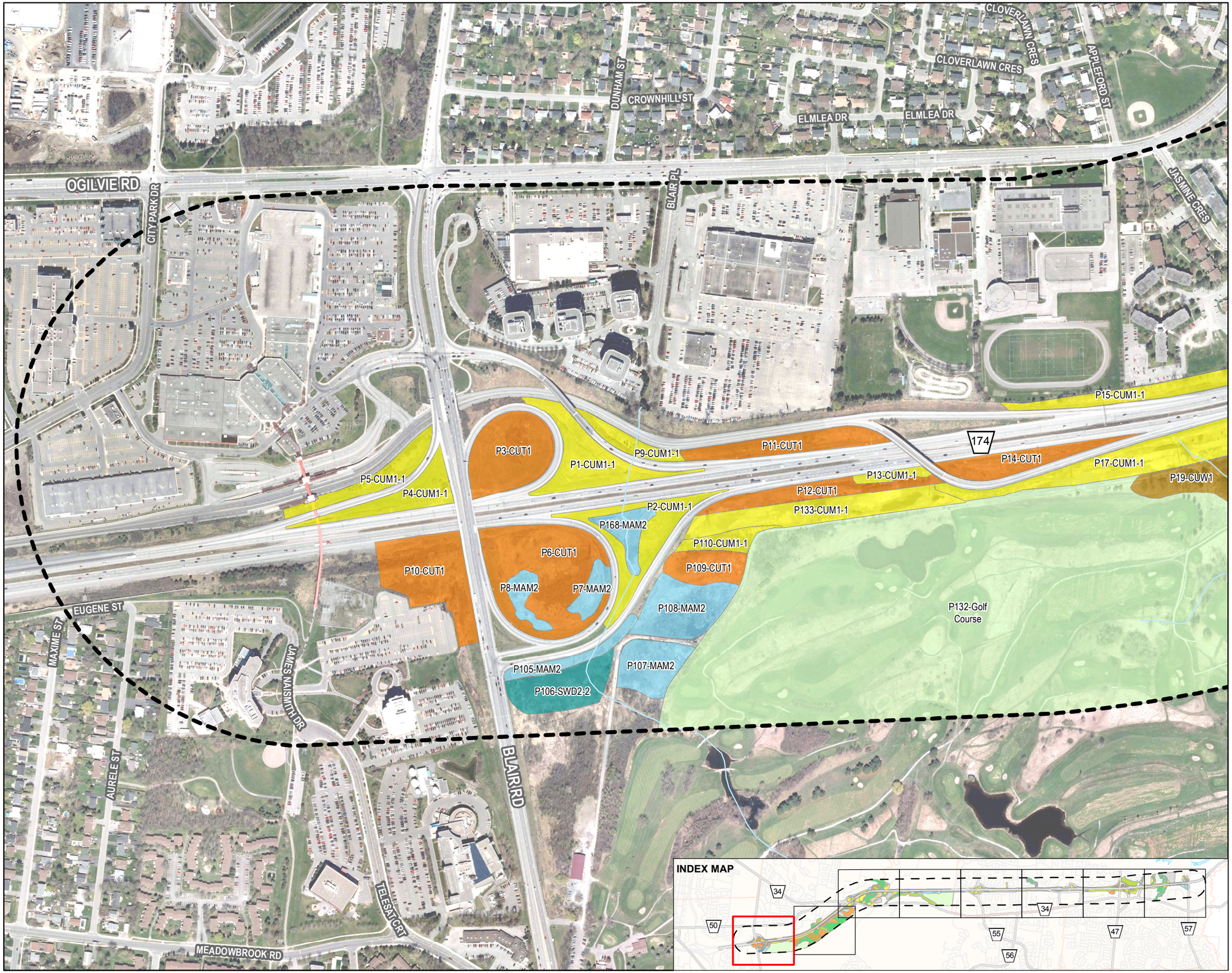
Appendix A-2

Terrestrial Existing Conditions Maps



PROJECT ID 60323982
CREATED BY M. Tracey
LAST MODIFIED MT 20 10 2014

AECOM
www.aecom.com

DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 1,250 2,500 5,000
metres

1:5,000

Ecological Land Classification

- CUM - Cultural Meadow
- CUT - Cultural Thicket
- CUW - Cultural Woodland
- MAM - Meadow Marsh
- SWD - Deciduous Swamp
- Golf Course

BACKGROUND INFORMATION

- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Wards \ Quartier
- Railways \ Chemin de fer
- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale
- Urban Area \ Zone Urbaine

Data sources:
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ECOLOGICAL LAND CLASSIFICATION

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City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
1

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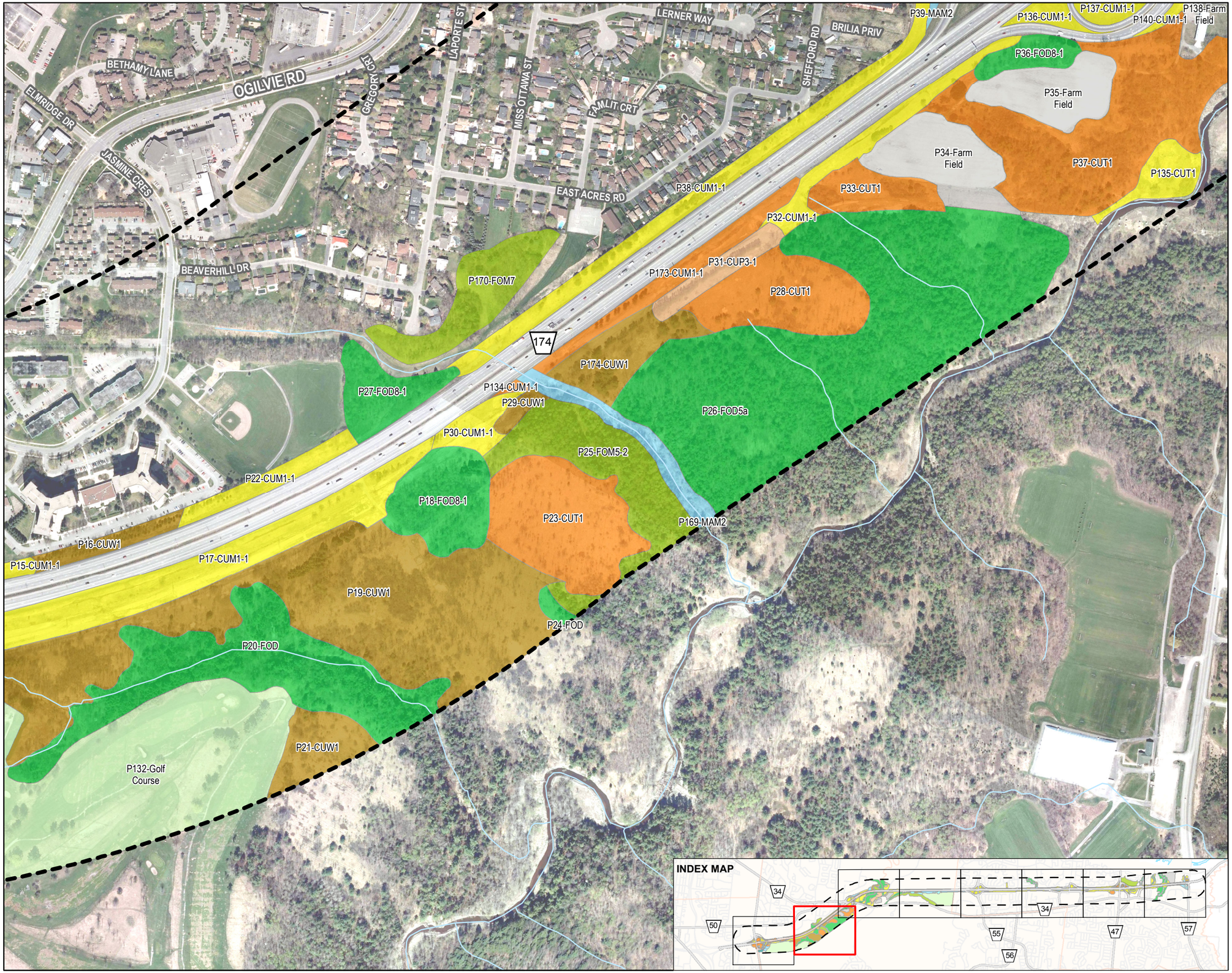

PROJECT ID 60323982
CREATED BY M. Tracey
LAST MODIFIED MT 20 10 2014

AECOM
www.aecom.com

DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 1,250 2,500 5,000
metres

1:5,000

Ecological Land Classification

- CUM - Cultural Meadow
- CUP - Plantation
- CUT - Cultural Thicket
- CUW - Cultural Woodland
- FOD - Deciduous Forest
- FOM - Mixed Forest
- MAM - Meadow Marsh
- Farm Field
- Golf Course

BACKGROUND INFORMATION

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ECOLOGICAL LAND CLASSIFICATION

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Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
2

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PROJECT ID 60323982
CREATED BY M. Tracey
LAST MODIFIED MT 20 10 2014

AECOM
www.aecom.com

DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 1,250 2,500 5,000
metres

1:5,000

Ecological Land Classification

- CUM - Cultural Meadow
- CUP - Plantation
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- Farm Field

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- Local Road \ Route Locale
- Urban Area \ Zone Urbaine

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ECOLOGICAL LAND CLASSIFICATION

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
3

ANSI B

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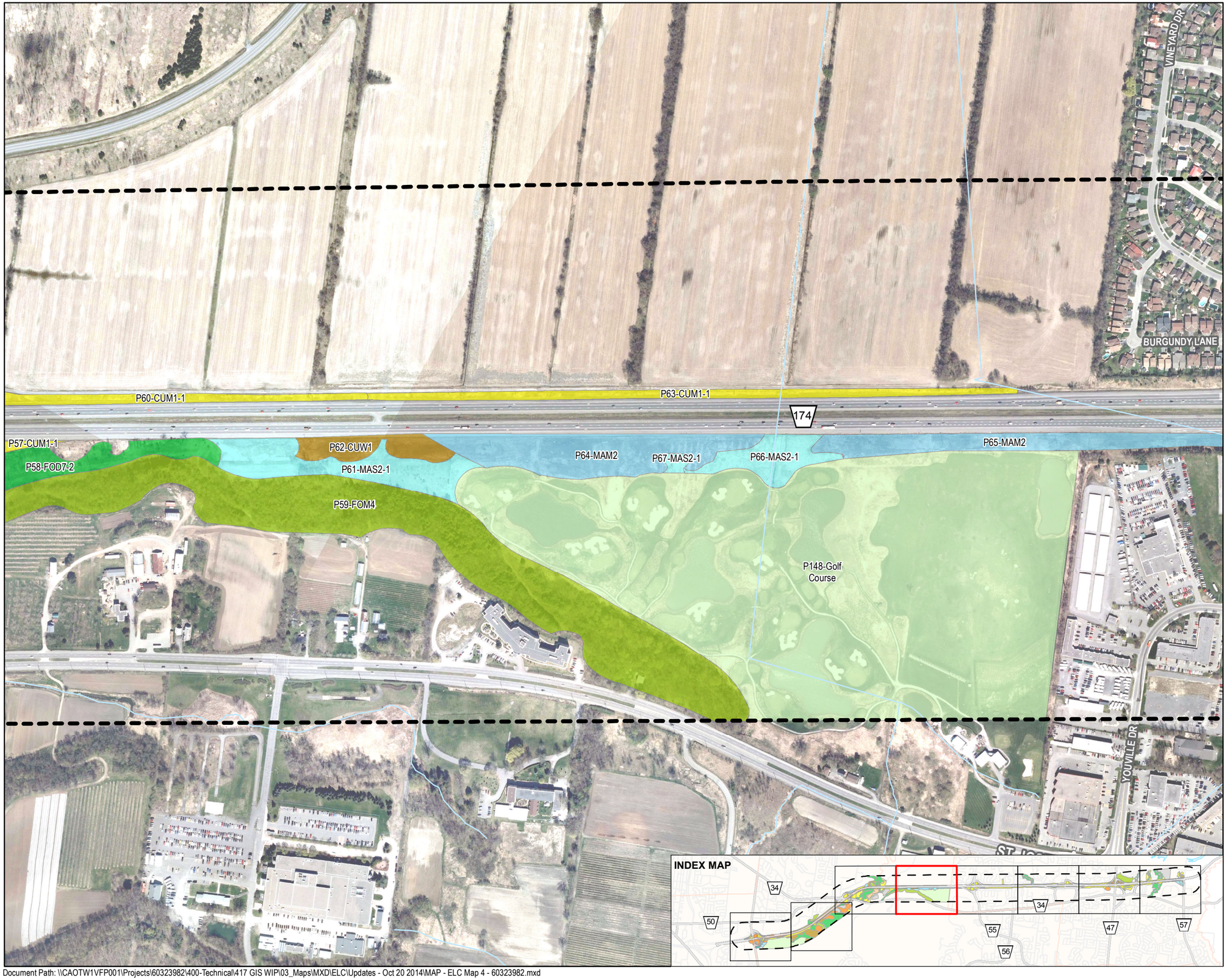

PROJECT ID 60323982
CREATED BY M. Tracey
LAST MODIFIED MT 21 10 2014

AECOM
www.aecom.com

DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 1,250 2,500 5,000
metres

1:5,000

Ecological Land Classification

- CUM - Cultural Meadow
- CUW - Cultural Woodland
- FOD - Deciduous Forest
- FOM - Mixed Forest
- MAM - Meadow Marsh
- MAS - Shallow Marsh
- Golf Course

BACKGROUND INFORMATION

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- Urban Area \ Zone Urbaine

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ECOLOGICAL LAND CLASSIFICATION

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
4

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PROJECT ID 60323982
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DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 1,250 2,500 5,000
metres

1:5,000

Ecological Land Classification

- CUM - Cultural Meadow
- MAM - Meadow Marsh

BACKGROUND INFORMATION

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- Wards \ Quartier
- Railways \ Chemin de fer
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- Arterial Road \ Route Principale
- Local Road \ Route Locale
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ECOLOGICAL LAND CLASSIFICATION

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
5

ANSI B

INDEX MAP

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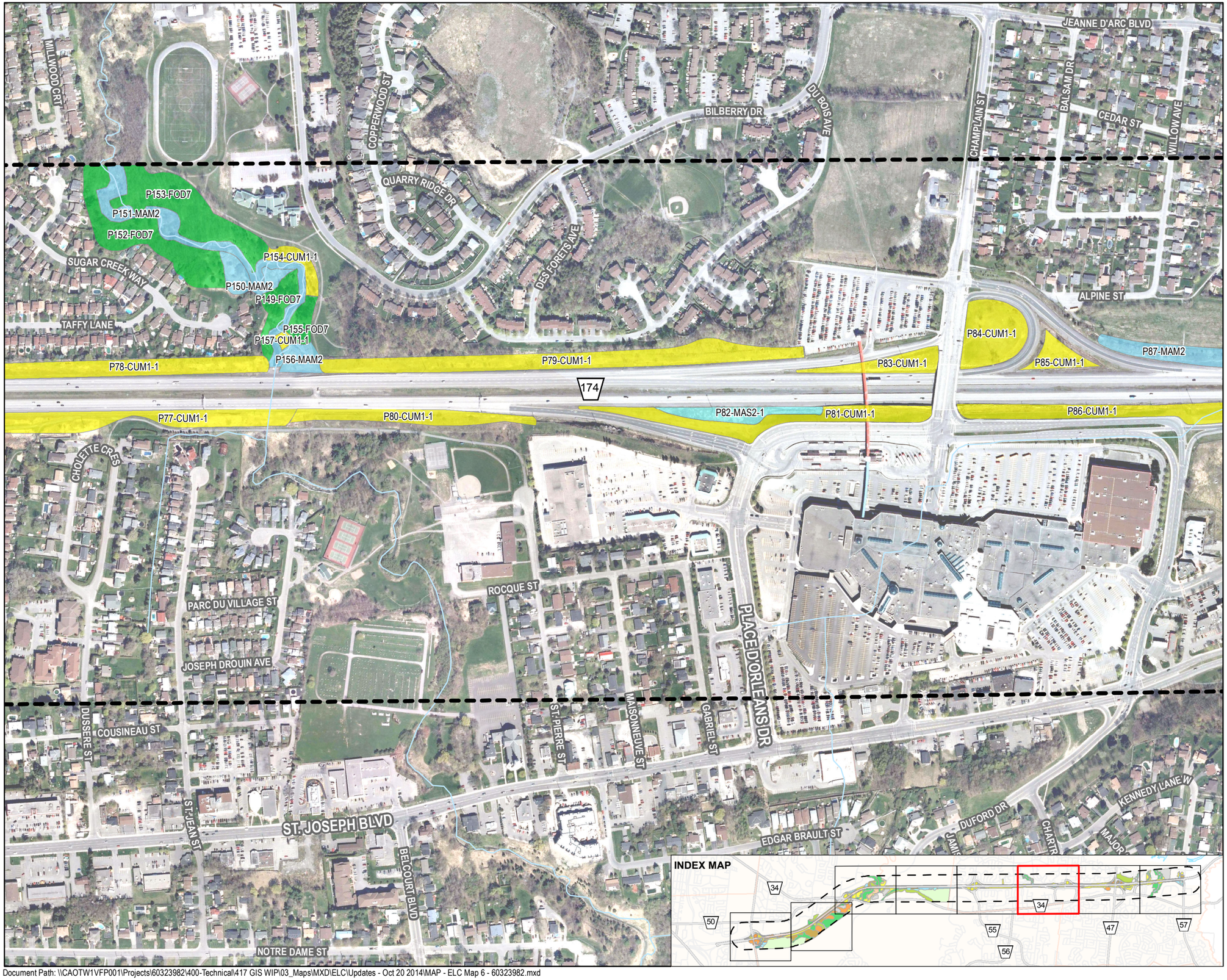

PROJECT ID 60323982
CREATED BY M. Tracey
LAST MODIFIED MT 21 10 2014

AECOM
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DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 1,250 2,500 5,000
metres

1:5,000

Ecological Land Classification

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- MAS - Shallow Marsh

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- Wards \ Quartier
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- Arterial Road \ Route Principale
- Local Road \ Route Locale
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Data sources:
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ECOLOGICAL LAND CLASSIFICATION

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
6

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PROJECT ID 60323982
CREATED BY M. Tracey
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AECOM
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DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 1,250 2,500 5,000
metres

1:5,000

Ecological Land Classification

- CUM - Cultural Meadow
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- CUW - Cultural Woodland
- FOD - Deciduous Forest
- FOM - Mixed Forest
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- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale
- Urban Area \ Zone Urbaine

Data sources:
Base Data: (c) 2014 City of Ottawa, Land Information Ontario & Statistics Canada

ECOLOGICAL LAND CLASSIFICATION

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
7

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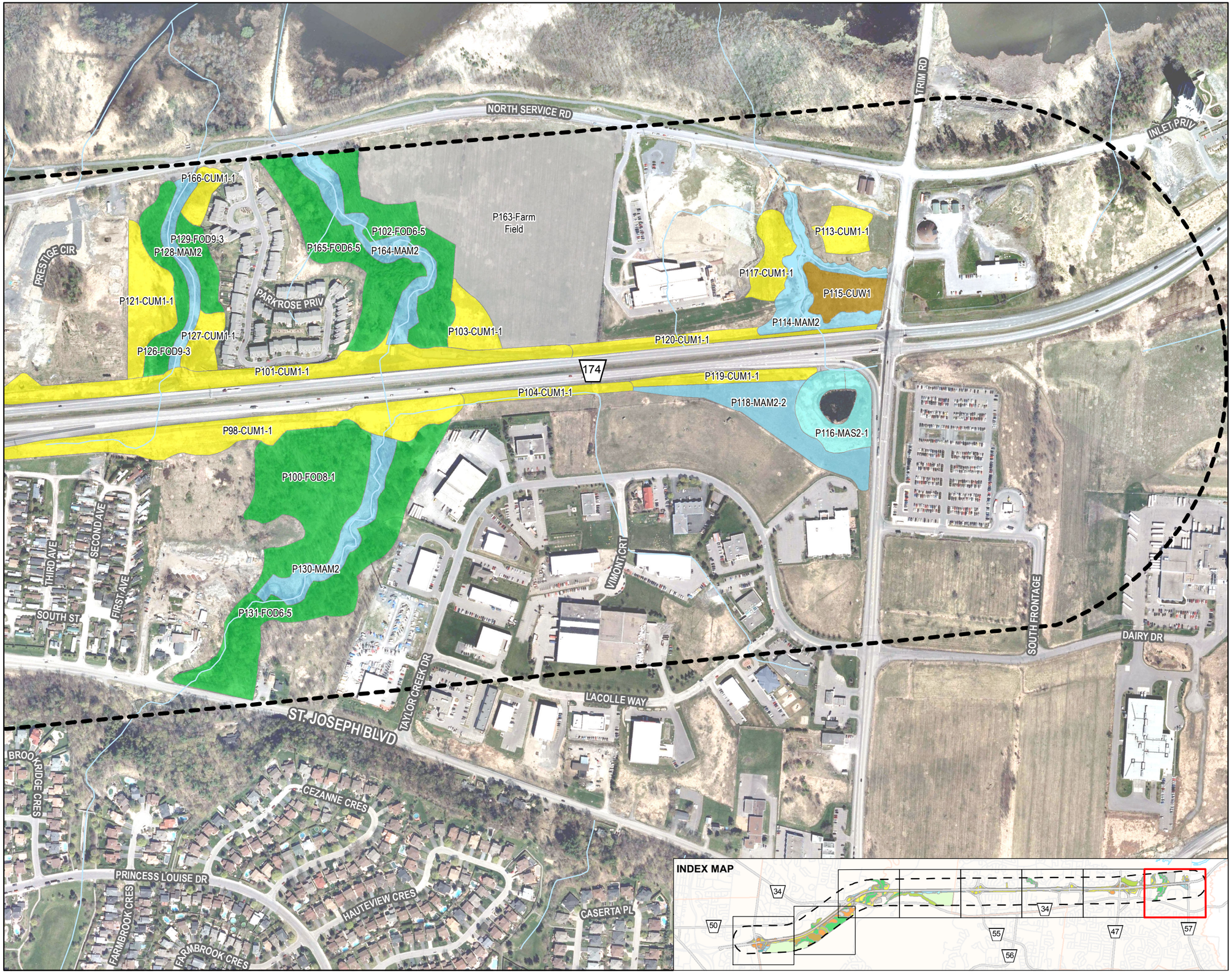

PROJECT ID 60323982
CREATED BY M. Tracey
LAST MODIFIED MT 21 10 2014

AECOM
www.aecom.com

DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 1,250 2,500 5,000
metres

1:5,000

Ecological Land Classification

- CUM - Cultural Meadow
- CUW - Cultural Woodland
- FOD - Deciduous Forest
- MAM - Meadow Marsh
- MAS - Shallow Marsh
- Farm Field

BACKGROUND INFORMATION

- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Wards \ Quartier
- Railways \ Chemin de fer
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City of Ottawa

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Site Address
Ottawa East

Figure
8

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Appendix B

Fish Life History Table

Life History Characteristics of the Ottawa River Watershed

COMMON NAME	SCIENTIFIC NAME	GRANK	NRANK	SRANK	COSEWIC	ORIGIN (Ontario)	ABUNDANCE	TOLERANCE	GENERAL HABITAT	THERMAL REGIME	TROPHIC CLASS	SPAWNING SEASON	HABITAT	NOTES
Banded Killifish	*Fundulus diaphanus*	G5	N5	S5	-	native	common	tolerant	lacustrine, riverine	coolwater	planktivore/invertivore	summer	quiet, shallow, margins of lakes, ponds and sluggish streams in areas with sand and gravel substrates and patches of aquatic macrophytes; preferred water temperature 21°C	Great Lakes - Upper St. Lawrence populations; tolerant of low dissolved oxygen and high water temperature (38°C); moderately tolerant of turbidity; species is euryhaline and exhibits schooling behaviour; usually diurnal
Black Crappie	*Pomoxis nigromaculatus*	G5	N4,N5	S4	-	native/introduced	common	tolerant	lacustrine, riverine	coolwater	invertivore/carnivore	spring	clear, quiet waters of large ponds, small lakes, bays and shallower areas of larger lakes and areas of low flow in larger rivers, associated with abundant aquatic vegetation and mud or sand substrate; preferred water temperature range 21-25°C	expanding its range in Ontario; hybrids with White Crappie are reported; moderately tolerant of turbidity; often occurs in schools
Blunnose Minnow	*Pimephales notatus*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	warmwater	detritivore	summer	sand and gravel bottomed shallows of clear lakes, creeks, rivers and ponds; preferred water temperature 26.3°C	fractional spawner; tolerant of siltation and organic enrichment; moderately tolerant of turbidity
Brassy Minnow	*Hybognathus hankinsoni*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coolwater	planktivore/detritivore	spring summer	pools of sluggish, clear creeks and small rivers with soft substrates, boggy lakes and shallow bays; often stained waters; usually associated with aquatic vegetation	tolerant of a wide range of water temperatures
Brook Stickleback	*Culaea inconstans*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coolwater	planktivore/invertivore	spring summer	small, boggy headwater streams, shallow lake margins, ponds, and clear pools and backwaters of creeks and small rivers; usually associated with aquatic vegetation; occasionally brackish water; preferred water temperature 21.3°C	tolerant of low dissolved oxygen, acidity and alkalinity; intolerant of turbidity; often only species occurring in marginal habitats
Brown Bullhead	*Ameiurus nebulosus*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	warmwater	invertivore/herbivore/ carnivore	spring	pools and sluggish runs over sand to mud substrates in creeks and rivers, impoundments, ponds and lake embayments; preferred water temperature range 26-30°C	tolerant of pollution, low dissolved oxygen (0.2 mg/L) and high water temperature (36°C); moderately tolerant of turbidity; reported to hybridize with Black Bullhead
Burbot	*Lota lota*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coldwater	invertivore/carnivore	winter	moderate to deep waters (to 90 m) of lakes, large cool rivers and streams, often under rocks, among roots or in holes in the banks; preferred water temperature range 7-18°C	typically spawn in lakes, but are known to move into rivers; noctural foraging behaviour; not all adults spawn every year; enters brackish waters
Central Mudminnow	*Umbra limi*	G5	N5	S5	-	native	common	tolerant	riverine	coolwater	invertivore	spring	heavily vegetated ponds, wetlands, bogs or pools of small creeks and quiet, shallow (0.5 m) areas of lakes with mud and organic substrates	tolerant of low dissolved oxygen (<1 mg/L), low pH and high water temperature (29°C); moderately intolerant of turbidity; commonly associated with Brook Stickleback
Channel Catfish	*Ictalurus punctatus*	G5	N5	S4	-	native	common	tolerant	lacustrine, riverine	warmwater	invertivore/carnivore	spring summer	deep pools and runs in small to large rivers with sand, gravel or cobble substrates, and cool, clear, deeper waters of lakes; preferred water temperature range 27-31°C	tolerant of turbidity, low dissolved oxygen and high water temperature (35°C)
Common Shiner	*Luxilus cornutus*	G5	N5	S5	-	native	common	intermediate	riverine	coolwater	invertivore	spring	pools near riffles in clear, cool creeks and small to medium rivers, and nearshore in clear-water lakes; preferred water temperature 21.9°C	hybrids are common, notably with Creek Chub, River Chub, Hornyhead Chub, Fallfish, Central Stoneroller and Rosyface Shiner; tolerant of turbidity
Creek Chub	*Semotilus atromaculatus*	G5	N5	S5	-	native	common	tolerant	riverine	coolwater	generalist	spring	pools of clear creeks and small rivers; rare in lakes and large rivers; preferred water temperature 20.8°C	hybrids occur with redside dace, common shiner, longnose dace and central stoneroller; tolerant of pollution
Emerald Shiner	*Notropis atherinoides*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coolwater	planktivore	summer	pools and runs of medium to large rivers with sand or gravel substrates and open waters of lakes; preferred water temperature range 9-23°C	exhibits schooling behavior; populations appear to fluctuate widely in abundance from year to year; tolerant of turbidity; commonly associated with Spottail Shiner and Rainbow Smelt in the Great Lakes
Fallfish	*Semotilus corporalis*	G5	N5	S4	-	native	uncommom	intermediate	riverine	coolwater	invertivore/carnivore	spring	gravel- and cobble-bottomed pools and runs of small to medium rivers, and lake margins; preferred water temperature 22.3°C	hybrids occur with Common Shiner; largest native minnow species occurring in Ontario
Fathead Minnow	*Pimephales promelas*	G5	N5	S5	-	native	common	tolerant	lacustrine, riverine	warmwater	detritivore/invertivore	spring summer	still waters of ponds, lakes, creeks and small rivers with muddy substrate; preferred water temperature range 23-29°C	fractional spawner; tolerant of high water temperature (33°C), variable pH, salinity and low dissolved oxygen; moderately tolerant of turbidity
Freshwater Drum	*Aplodinotus grunniens*	G5	N5	S5		native	common	tolerant	lacustrine, riverine	warmwater	invertivore/carnivore	spring summer	sandy, silty bottoms of lakes and reservoirs (to 18 m), and pools in low to moderate-gradient, often turbid, rivers; preferred water temperature range 24-28°C	eggs are buoyant and float on the surface; tolerant of turbidity
Golden Shiner	*Notemigonus crysoleucas*	G5	N5	S5	-	native	common	intermediate	lacustrine	coolwater	invertivore/herbivore	summer	clear, weedy, quiet waters of lakes, ponds, reservoirs and pools of small to large rivers with muddy substrate; preferred water temperature range 17-24°C	reported to hybridize with Rudd, an introduced species from Europe; tolerant of high water temperature (34°C), low dissolved oxygen and highly eutrophic conditions; moderately tolerant of turbidity
Goldfish	*Carassius auratus*	G5	-	-	-	introduced	common	tolerant	lacustrine, riverine	warmwater	invertivore/herbivore	spring - summer	shallow, pools and backwaters of sluggish rivers, ponds and lakes with dense aquatic vegetation; preferred water temperature 27.9°C	indigenous to eastern Asia; introduced by release of aquarium stock; hybridize readily with Common Carp; tolerant of high water temperature (41°C), turbidity and low dissolved oxygen; use as bait prohibited
Largemouth Bass	*Micropterus salmoides*	G5	N5	S5	-	native/introduced	common	tolerant	lacustrine, riverine	warmwater	invertivore/carnivore	spring	clear, warm, shallow lakes, bays, ponds, marshes and backwaters and pools of creeks and small to large rivers, often with soft mud or sand substrate and dense aquatic vegetation; usually at depths <6 m; preferred water temperature range 26-30°C	lies in a semidormant state during winter; tolerant of high water temperature (36.5°C) and wide range of pH (5-10); intolerant of low dissolved oxygen; moderately tolerant of turbidity
Longnose Dace	*Rhinichthys cataractae*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coolwater	invertivore	spring summer	cobble, boulder or gravel riffles of clean, cool, swiftly-flowing creeks and small to medium rivers, and rocky shores of lakes; preferred water temperature range 13-21°C	tolerant of rapid water temperature fluctuation and low dissolved oxygen; moderately tolerant of turbidity; widest distribution of any North American minnow
Longnose Gar	*Lepisosteus osseus*	G5	N4	S4		native	common	tolerant	lacustrine, riverine	warmwater	carnivore	spring	vegetated, sluggish pools, backwaters and oxbows of medium to large rivers and weedy, quiet shallows of warm lakes with silty, sandy substrates; often near logs and brushpiles; preferred water temperature 33.1°C	tolerant of high water temperature, turbidity and low dissolved oxygen
Northern Redbelly Dace	*Chrosomus eos*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coolwater	invertivore/planktivore	spring summer	lakes, bogs, ponds and pools of creeks with organic substrates and aquatic vegetation; usually stained water	fractional spawner; hybridize freely with Finescale Dace; often associated with Finescale Dace, Brassy Minnow, Brook Stickleback and Northern Pearl Dace
Pumpkinseed	*Lepomis gibbosus*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	warmwater	generalist	spring summer	warm, shallow, vegetated lakes and ponds; quiet vegetated pools of creeks and small rivers; preferred water temperature 26.0°C	hybrids with bluegill are common and hybrids with other sunfishes (Lepomis spp.) are known
Quillback	*Carpiodes cyprinus*	G5	N5	S4		native	uncommon	intermediate	lacustrine, riverine	coolwater	invertivore/detritivore	spring	clear to turbid pools, backwaters and main channels of creeks and small to large rivers and lakes with bottoms of sand to silt; preferred water temperature range 22-26°C	tolerant of turbidity
Rock Bass	*Ambloplites rupestris*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coolwater	invertivore/carnivore	spring	rocky or vegetated shallows of lakes and pools of creeks and small to medium rivers; preferred water temperature range 21-26°C; reported to depths of 21 m	life span 5-6 years in riverine habitats; intolerant of low dissolved oxygen (<3 mg/L) and siltation; moderately tolerant of turbidity; inhabit deep water and remain in a condition of semi-hibernation during the winter

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Shorthead Redhorse	*Moxostoma macrolepidotum*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	warmwater	invertivore	spring	pools, runs and riffles in small to large rivers with sand and gravel substrates, and lake shallows; preferred water temperature range 26-27.5°C	intolerant of pollution and siltation; tolerant of high water temperature (37°C); moderately intolerant of turbidity
Silver Redhorse	*Moxostoma anisurum*	G5	N5	S4	-	native	uncommon	intermediate	lacustrine, riverine	coolwater	invertivore	spring	mud- to rock-bottomed pools and runs of small to large rivers; occasionally lakes and impoundments	sensitive to siltation and pollution; moderately intolerant of turbidity
Smallmouth Bass	*Micropterus dolomieu*	G5	N5	S5	-	native/introduced	common	intermediate	lacustrine, riverine	warmwater	invertivore/carnivore	spring	clear, gravel-bottomed runs and flowing pools of small to large rivers and shallow (5-7 m), rocky and sandy areas of lakes; preferred water temperature range 20-26°C	inhabits deep waters and lies in a semidormant state during winter; moderately tolerant of turbidity; intolerant of pH <6; often associated with Rock Bass
Spotfin Shiner	*Cyprinella spiloptera*	G5	N4N5	S4	-	native/introduced	common	intermediate	riverine	warmwater	invertivore/herbivore	summer	sand and gravel runs and pools of creeks and small to medium rivers with moderate gradient; occasionally lake shallows; preferred water temperature 29.5°C	fractional spawner; tolerant of turbidity, siltation, high water temperature (35°C) and pollution; spawns on vertical substrate; expanding its range in Ontario, likely due to bait-bucket transfer
Spottail Shiner	*Notropis hudsonius*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coolwater	invertivore/planktivore	spring	lakes, rivers and streams with slow to moderate current and sand, gravel, mud or silt substrates; preferred water temperature range 13-22°C	fractional spawner; tolerant of turbidity and water high temperature (35°C); intolerant of polution; northernmost range of any species of shiner (Notropis spp.)
Trout-perch	*Percopsis omiscomaycus*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coldwater	invertivore/carnivore	spring - summer	deeper waters (9-13 m) of lakes, deep flowing pools of creeks and small to large rivers, usually over sand or gravel bottoms; preferred water temperature range 10-16°C	populations may fluctuate from year to year; large females and most males die after spawning, but a few individuals live to spawn twice; moderately intolerant of turbidity; diurnal onshore movement occurs in lakes
Walleye	*Sander vitreus*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coolwater	invertivore/carnivore	spring	lakes (at depths up to 21 m), and pools, backwaters and runs of medium to large rivers; preferred water temperature range 19-23°C	hybrids with Sauger called "saugeye"; hybrids with Blue Pike occurred in Lake Erie (known as "greye"); moderately tolerant of turbidity
White Sucker	*Catostomus commersonii*	G5	N5	S5	-	native	common	tolerant	lacustrine, riverine	coolwater	generalist	spring	pools and riffles of creeks and rivers, warm shallow lakes and embayments of larger lakes usually at depths of 6-9 m; preferred water temperature range 22-26°C	very tolerant of polluted waters; hybrids with longnose sucker are reported
Yellow Bullhead	*Ameiurus natalis*	G5	N4	S4	-	native	uncommon	tolerant	lacustrine, riverine	warmwater	invertivore/carnivore	spring	pools and backwaters over muddy substrates in sluggish creeks and small to large rivers, oxbows, ponds, impoundments and heavily vegetated areas of shallow bays and small lakes; preferred water temperature 27.6°C	tolerant of pollution, turbidity, low dissolved oxygen and a wide range of water temperature
Yellow Perch	*Perca flavescens*	G5	N5	S5	-	native	common	intermediate	lacustrine, riverine	coolwater	invertivore/carnivore	spring	lakes, ponds and pools of creeks and small to large rivers with moderate aquatic vegetation and clear water, usually at depths <9 m; preferred water temperature range 18-24°C	tolerant of low dissolved oxygen, turbidity and salinity; species usually found in schools; use as bait restricted to the Great Lakes

Table created using data from The Ontario Freshwater Fish Life History Database (http://www.fishdb.ca/home.htm) accessed September 23, 2014. SAR designations updated Nov. 2011

COSEWIC Status: Species designation assigned by the Committee on the Status of Endangered Wildlife in Canada.
Extinct (X): A wildlife species that no longer exists.
Extirpated (XT): A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E): A wildlife species facing imminent extirpation or extinction.
Threatened (T): A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC): A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats
Not at Risk (NAR): A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD): A wildlife species for which there is inadequate information to make a direct, or indirect, assessment of its risk of extinction.

GRank (Global Rank): Global conservation status ranks are assigned by NatureServe scientists with input from relevant natural heritage member programs and experts on particular taxonomic groups. These ranks reflect an assessment of the condition of the species across its entire range.
GX: Presumed Extinct; not located despite intensive searches and virtually no likelihood of rediscovery.
GH: Possibly Extinct; missing; known from only historical occurrences but still some hope of rediscovery.
G1: Critically Imperiled; at very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2: Imperiled; at high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3: Vulnerable; at moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4: Apparently Secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5: Secure; common, widespread, and abundant.
GRGI: Range Rank; a numeric range rank is used to indicate the range of uncertainty in the status of a species.
GU: Unrankable; currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
GNR: Unranked; global rank not yet assessed.

GNA: Not Applicable; a conservation status rank is not applicable because the species is not a suitable target for conservation activities (i.e., hybrid).
? : Inexact Numeric Rank; denotes inexact numeric rank (e.g., G2?).

NRank (National Rank): National conservation status ranks in Canada are assigned similar to global ranks. The condition of a species can vary from one country to another, and national conservation status ranks document its condition in a particular country.
NX: Presumed Extirpated; species is believed to be extirpated from the nation. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
NH: Possibly Extirpated; species occurred historically in the nation, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years
N1: Critically Imperiled; critically imperilled in the nation because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.
N2: Imperiled; imperilled in the nation because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation.
N3: Vulnerable; vulnerable in the nation due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
N4: Apparently Secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.
N5: Secure; common, widespread and abundant in the nation.
NNR: Unranked; national conservation status not yet assessed.
NU: Unrankable; currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
NNA: Not Applicable; a conservation status rank is not applicable because the species is not a suitable target for conservation activities (i.e., exotic or hybrid).
NRHI: Range Rank; a numeric rank is used to indicate the range of uncertainty about the status of the species.
?: Inexact or Uncertain; denotes inexact or uncertain numeric rank.

SRank (Subnational Rank): Subnational conservation status ranks are assigned for Ontario by the Natural Heritage Information Centre (NHIC) to set protection priorities for rare species.
SX: Presumed Extirpated; species is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
SH: Possibly Extirpated; species occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years.
S1: Critically Imperiled; critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.
S2: Imperiled; imperilled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation.
S3: Vulnerable; vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4: Apparently Secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5: Secure; common, widespread and abundant in the province.

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SNR: Unranked; provincial conservation status not yet assessed.

SU : Unrankable; currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

SNA: Not Applicable; a conservation status rank is not applicable because the species is not a suitable target for conservation activities (i.e., exotic or hybrid).

S#S#: Range Rank; a numeric rank is used to indicate the range of uncertainty about the status of the species.

?: Inexact or Uncertain; denotes inexact or uncertain numeric rank.

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Appendix C

Aquatic Habitat Data Collection Forms

Fisheries Habitat Assessment ELBT-1N

Stream Morphology

Site Length (m): 55

Channel Dimensions

Mean Wetted Width (m):	0.8	Mean Wetted Depth (m):	0.2
Mean Bankfull Width (m):	5.0	Mean Bankfull Depth (m):	
Mean Top of Bank Width (m):		Mean Top of Bank Depth (m):	

Flow Description: (high or low flow conditions, stagnant, etc)

flow after recent rain event

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☐	☐	☒
Right Bank	☐	☐	☒	☐

Description: US

Habitat

Substrate (< = >)

Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
SI - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: Cl > Co > Gr > Sa > MK

Notes:

Morphological Structure (%)			
Pool	Riffle	Run	Flat
25	25	50	

Instream Cover (%): 60

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
			100			Average Depth: 30 cm (% Cover)

Note: Low = 0 - 30%; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Algae

Canopy Cover (% closed cover):

100-80%	☐	30-1%	☒
80-60%	☐☐	0%	☐

Types of Cover (% cover)

Trees	10	Shrubs	Man-made structures
Grasses	60	Herbaceous	30 Other

Note: Low = 0 - 30%; Moderate = 30 - 80%; High = 80 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of Riparian vegetation: LB - wet meadow, forest 5+m RB - wet meadow 5+m

Overhanging Vegetation Present (Y/N) 60 % Overhanging Vegetation:

Description of Overhanging Vegetation: grasses

Obstructions to Fish Passage

None Observed ☐ Man-Made ☐ Natural ☐ Low Flow Barrier ☒

Description of Barrier: Assumed during low flow, cobble/boulders exposed to low flow barriers

Height of Barrier (m)

GPS Coordinates:

Fisheries Habitat Assessment

AECOM — General Information — Page 1 of 4

Study Area: Otonabee LRT — Site ID: ELBT-1-N (DS)

Date: 24/08/19 — Start time: 4:10 — End Time:

Weather Conditions: Overcast, Rain, 11°C — Field Crew: MG+JP — Field Notes By: ME

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting:	0462213	Northing:	5055805
Easting:	0462195	Northing:	5053809
Easting:		Northing:	
Easting:		Northing:	

Description: Start
Description: End
Description:
Description:

Surrounding Landuse: Residential ☐, Agriculture ☐, Forest ☒, Other ☐; Meadow ☒ (wet meadow), Wetland ☐, Livestock ☐

Description: wet meadow on RB up past bend, US left bank

Type of Watercourse: Intermittent ☒, Permanent ☐, Ephemeral ☐; Channelized ☐, Natural Channel ☐

Description:

Notes: (Include any inputs into the system i.e. tile drainage, seepages, overland flow)

Overland flow, drainage ditch from left

Is any portion of the water body underground or not as mapped? Y / N

If Yes describe:

GPS Coordinate: Easting: — Northing: — Description:

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

- Steep bank w/ watercourse.
- Run-off from left

In-Situ Water Quality

WT (°C):	18.90	ATC():	19.9
pH:	7.85	Cond (uS/cm):	1.64
D.O. (mg/L)	9.11		

Water Clarity: Clear ☒ Turbid ☐

Water Colour: Clear

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☒
Bubbling ☐ ☐ _____
Other _____

Details:

Notes: After rain fall event

Fisheries Habitat Assessment

AECOM Date: ELRT-1N Page 3 of 4

Other General Comments Regarding the Study Area:

- Leopard frog observed
- Cyprinids observed
- evidence of flat flooding
- high erosion along US Left bank (clay substrate)
- end of assessment ~~2nd~~ 2nd, true zero water co-ordinates

Additional UTM Coordinates:

Photo log

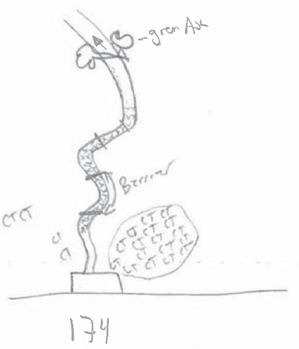
Picture #	Description	Picture #	Description
1	Overview (DS)	13	Clay substrate
2	Substrate at culvert	14	45m DS Overview
3	Overview (DS)	15	Clay
4	~~Coarse~~ Riprap along culvert	16	end of Assessment/tree
5	riprap US left side	17	50m DS → US
6	" " right "	18	45m DS → US
7	Culvert / substrate	19	45m DS → US
8	15m downstream	20	US overview
9	15m DS substrate	21	35m DS → US
10	25m DS substrate/pool	22	30m DS → US
11	undercut banks/erosion	23	25m erosion DS → US
12	~~Riprap~~ 35m DS	24	Overview culvert DS → US

25 Habitat
26 Habitat (redo).

Fisheries Habitat Assessment

AECOM Page 4 of 4

Study Area: ELRT 1-N Watercourse Sketch Site ID



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-1-S

Date: July 29/14 Start time: End Time:

Weather Conditions: Field Crew: MG TJP

Field Notes By: MG

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 462268 Northing: 5037979 Description:

Easting: Northing: Description:

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☒
Agriculture ☐ Wetland ☐
Forest ☐ Livestock ☐
Other
Description:

Type of Watercourse

Intermittent ☐ Channelized ☒
Permanent ☐ Natural Channel ☐
Ephemeral ☒
Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

overland flow. tile drains.

Is any portion of the water body underground or not as mapped? Y (N)

If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

Slopes towards

In-Situ Water Quality

WT (°C): AT(°C):
pH: Cond (s/cm):
D.O. (mg/L)
Water Clarity: Clear ☒ Turbid ☐
Water Colour:
Notes: dry

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☒
Bubbling ☐
Other ☐
Details: dry

Fisheries Habitat Assessment

ELRT-1S

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m):		Mean Wetted Depth (m):	
Mean Bankfull Width (m):		Mean Bankfull Depth (m):	
Mean Top of Bank Width (m):		Mean Top of Bank Depth (m):	

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☒	☐	☐	☐
Right Bank	☒	☐	☐	☐

Description: rock Stabilization

Flow Description: (high or low flow conditions, stagnant, etc)

dry.

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: Co

Morphological Structure (%)

Pool	Riffle	Run	Flat

Notes: dry

Instream Cover (%) 100

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
				100		Average Depth: (% Cover)

Note: Low = 0 - 30%; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

grasses.

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☐
90-60% ☐ 0% ☒
60-30% ☐

Types of Cover (% cover)

Trees ___ Shrubs ___ Man-made structures ___
Grasses 100 Herbaceous ___ Other ___

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - 2m RB - 2m

Overhanging Vegetation Present (Y) N % Overhanging Vegetation: 75

Description of Overhanging Vegetation: grasses

Obstructions to Fish Passage

None Observed ☐ Man-Made ☐ Natural ☐ Low Flow Barrier ☒

Description of Barrier: dry at time of assessment

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT 1-5 Page 3 of 4

Other General Comments Regarding the Study Area:

- drainage from road cuts.
- no watercourse present
- dry at culvert.

Additional UTM Coordinates:

Photo log

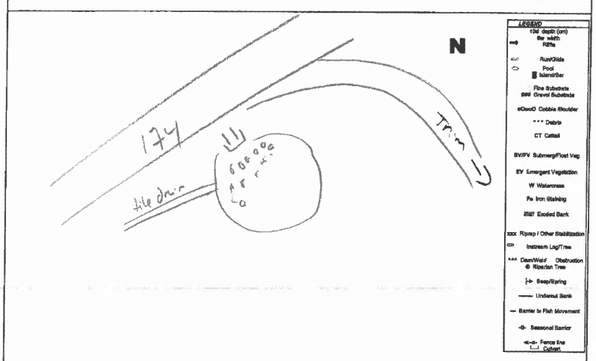
Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT-1-5 Site ID:



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-2-N (PS)

Date: July 27/14 Start time: 8:00 End Time:

Weather Conditions: Sunny 14°C Field Crew: MG + JP

Field Notes By: MG

Site Location

Taylor Creek

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 0461733	Northing: 5037952	Description:	Start
Easting: 0461733	Northing: 5037808	Description:	End
Easting:	Northing:	Description:	
Easting:	Northing:	Description:	

Surrounding Landuse

Residential ☐ Meadow ☑ Marsh
Agriculture ☐ Wetland ☐
Forest ☒ Livestock ☐
Other

Description: Mostly surrounds creek meadow marsh, otherwise forest

Type of Watercourse

Intermittent ☑ Channelized ☐
Permanent ☐ Natural Channel ☑
Ephemeral ☐

Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Is any portion of the water body underground or not as mapped? Y / N

If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

In-Situ Water Quality

WT (°C):	19.5	AT(°C):	17
pH:	8.25	Cond (ms/cm):	.794
D.O. (mg/L)	6.93		

Water Clarity: Clear ☐ Turbid ☒

Water Colour: off brown/grey.

Notes: after rain event.

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☒
Bubbling ☐
Other ☐

Details:

Fisheries Habitat Assessment

ELRT 2N

Stream Morphology

Site Length (m): 55

Channel Dimensions

Mean Wetted Width (m):	2.5	Mean Wetted Depth (m):	Pool 1.9m Run 1.0m
Mean Bankfull Width (m):	5.0	Mean Bankfull Depth (m):	0.8
Mean Top of Bank Width (m):	/	Mean Top of Bank Depth (m):	/

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☐	☒	☐
Right Bank	☐	☐	☒	☐

Description: Signs of heavy erosion

Flow Description: (high or low flow conditions, stagnant, etc)

flow after recent precipitation

Habitat

Substrate (< = >)

Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description
0-35m Cl > Gr > Si > Cl
35-55 Cl > Gr > Si > MK

Morphological Structure (%)			
Pool	Riffle	Run	Flat
50	25	25	

Notes:

Instream Cover (%) 70

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
	20	5	60	20		Average Depth: / (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

algae

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☐
90-60% ☐ 0% ☐
60-30% ☒

Types of Cover (% cover)

Trees 90 Shrubs Man-made structures
Grasses 10 Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Marsh meadow 0-35, deciduous trees 35-55

Riparian Vegetation

Width and Description of riparian vegetation: LB - >5m RB - >5m

Overhanging Vegetation Present (Y) N % Overhanging Vegetation: 5

Description of Overhanging Vegetation:

grasses.

Obstructions to Fish Passage

None Observed ☐ Man-Made ☐ Natural ☐ Low Flow Barrier ☑

Description of Barrier: Potential barriers at low flow (riprap)

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT 2N Page 3 of 4

Other General Comments Regarding the Study Area:

0-35 m - altred Site, riprap, straightened
- veg removal. Needs help

35-55 m - Natural meandery
- Clay substrate
- heavy bank erosion
- high silt load.

Additional UTM Coordinates:

Culvert - gabion baskets surrounding site
- high flows likely based on debris, matted grasses

Photo log

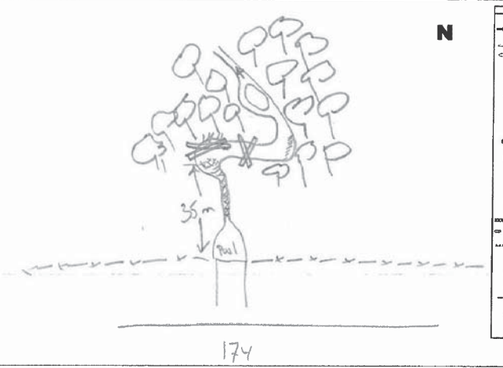
Picture #	Description	Picture #	Description
1	Site overview	13	looking us into riprap
2	Site overview East	14	Woody debris
3	" " West	15	looking DS
4	Pool DS	16	bank erosion
5	DS of Pool	17	looking DS
6	Culvert / Pool	18	" "
7	Substrate at Pool / riffle	19	" "
8	Channel / Riffle	20	" "
9	" "	21	Pool at DS end
10	End of riprap area (35m)	22	end of site
11	Clay Substrate	23	looking u/s
12	Woody debris	24	" "
25	" "	29	" "
26	" "	30	" "
27	" "	31	" "
28	" "	32	Horiz

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT-2N Site ID:



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-2-S

Date: July 29/19 Start time: End Time:

Weather Conditions: Field Crew: MG LSP

Field Notes By: MG

Site Location

Taylor creek

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 046 1778	Northing: 5037649	Description:	
Easting: 046 1785	Northing: 5037695	Description:	End
Easting:	Northing:	Description:	
Easting:	Northing:	Description:	

Surrounding Landuse

Residential ☐ Meadow ☑
Agriculture ☐ Wetland ☐
Forest ☑ Livestock ☐
Other
Description:

Type of Watercourse

Intermittent ☐ Channelized ☐
Permanent ☑ Natural Channel ☑
Ephemeral ☐
Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Overland flow

Is any portion of the water body underground or not as mapped? Y / N
If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

rolly hill

In-Situ Water Quality

WT (°C):	8.13	AT(°C):	27°
pH:	8.26	Cond (µs/cm):	1445
D.O. (mg/L)	8.58		

Water Clarity: Clear ☐ Turbid ☐ slightly turbid

Water Colour: grey

Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☑
Bubbling ☐
Other ☐
Details:

ELRT-2S

Fisheries Habitat Assessment

Stream Morphology

Site Length (m): 55m (from Run/Pool)

Channel Dimensions

Mean Wetted Width (m):	2.5 / 8	Mean Wetted Depth (m):	0.1 / 1.5
Mean Bankfull Width (m):		Mean Bankfull Depth (m):	
Mean Top of Bank Width (m):		Mean Top of Bank Depth (m):	

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☑	☐	☐	☐
Right Bank	☑	☐	☐	☐

Description: gabion basket

Flow Description: (high or low flow conditions, stagnant, etc)

Medium flow - beaver dam

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: Si > MK > Co

Morphological Structure (%)			
Pool	Riffle	Run	Flat
50	25		25

Notes:

Instream Cover (%) 40

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
			90	10		Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Algae

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☐
90-60% ☐ 0% ☐
60-30% ☑

Types of Cover (% cover)

Trees (0) Shrubs Man-made structures
Grasses Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - 5m RB - 5m

Overhanging Vegetation Present (Y / N) 10 % Overhanging Vegetation:

Description of Overhanging Vegetation: grasses

Obstructions to Fish Passage

None Observed ☐ Man-Made ☐ Natural ☑ Low Flow Barrier ☐

Description of Barrier: Beaver Dam

Height of Barrier (m) GPS Coordinates: 046 1784

(IBT) 5037628

Fisheries Habitat Assessment

AECOM Date: ELRT-2S Page 3 of 4

Other General Comments Regarding the Study Area:

- Beaver dam / pond
- heavily altered
- in need of repair
- barn swallows in culvert (barn)

Additional UTM Coordinates:

Photo log

Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Study Area: ELRT 2S Watercourse Sketch Site ID

Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-3-N

Date: July 23/14 Start time: 9:10 End Time:

Weather Conditions: Sunny 16°C Field Crew: MG+ JP

Field Notes By: MG

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 0461486 Northing: 5057574 Description: low Point

Easting: Northing: Description:

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☑
Agriculture ☐ Wetland ☐
Forest ☑ Livestock ☐
Other

Description: Meadow along "wet area" Forest out further

Type of Watercourse

Intermittent ☐ Channelized ☐
Permanent ☐ Natural Channel ☐
Ephemeral ☐

Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Overland flow, culvert from Hwy 174

Is any portion of the water body underground or not as mapped? Y / (N)

If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

Sloping towards watercourse

In-Situ Water Quality

WT (°C): AT(°C):
pH: Cond (s/cm):
D.O. (mg/L)
Water Clarity: Clear ☐ Turbid ☐
Water Colour:
Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☑
Bubbling ☐
Other ☐
Details:

Fisheries Habitat Assessment

ELRT-3N

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m): Mean Wetted Depth (m):
Mean Bankfull Width (m): Mean Bankfull Depth (m):
Mean Top of Bank Width (m): Mean Top of Bank Depth (m):

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☑	☐	☐	☐
Right Bank	☐	☐	☑	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description

Morphological Structure (%)

Pool	Riffle	Run	Flat

Notes:

Instream Cover (%)

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
						Average Depth: (% Cover)

Note: Low = 0 - 30%; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☒
90-60% ☐ 0% ☐
60-30% ☐

Types of Cover (% cover)

Trees 60 Shrubs 20 Man-made structures
Grasses 20 Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - 5m RB - 5m

Overhanging Vegetation Present (Y) N % Overhanging Vegetation:

Description of Overhanging Vegetation: grasses

Obstructions to Fish Passage

None Observed ☒ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT - 3N Page 3 of 4

Other General Comments Regarding the Study Area:

- Low lying wet meadow at low point of site
- Culvert exits onto riprap substrate approx 20 m from low point
- No watercourse present

Additional UTM Coordinates:

Photo log

Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Study Area: ELRT - 3N Watercourse Sketch Site ID

N

Location
- 10M depth (m) Bar width Riffle
- Run/Glide
- Pool Isolated Bar
- Fine Substrate Small Cobble Substrate
- oCbwD Cobble Boulder
- *** Debris
- CT Cattail
- SV/PV Submerged Plant Veg
- EV Emergent Vegetation
- W Watercress
- Fe Iron Staining
- ES/I Eroded Bank
- xxx Riprap / Other Stabilization
- Instream Log/Tree
- *** Dam/Weir Obstruction Riparian Tree
- Seep/Spring
- Undercut Bank
- Barrier to Fish Movement
- Seasonal Barrier
- Fence Sw Culvert

Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-3-S

Date: July 24/14 Start time: End Time:

Weather Conditions: Field Crew: MG + JP

Field Notes By: MG

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 46 1488 Northing: 5037011 Description:

Easting: Northing: Description:

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☑
Agriculture ☐ Wetland ☐
Forest ☐ Livestock ☐
Other ☒ 174
Description:

Type of Watercourse

Intermittent ☑ Channelized ☑
Permanent ☐ Natural Channel ☐
Ephemeral ☐
Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Overland flow

Is any portion of the water body underground or not as mapped? Y / (N)

If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

rolling hill

In-Situ Water Quality

WT (°C):	AT(°C):
pH:	Cond (s/cm):
D.O. (mg/L)	

Water Clarity: Clear ☑ Turbid ☐

Water Colour:

Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☐
Bubbling ☐
Other ☐
Details:

Fisheries Habitat Assessment

ELRT - 3S

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m):		Mean Wetted Depth (m):	
Mean Bankfull Width (m):		Mean Bankfull Depth (m):	
Mean Top of Bank Width (m):		Mean Top of Bank Depth (m):	

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☑	☐	☐
Right Bank	☐	☑	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

Stagnant

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: MK > DT > Si

Morphological Structure (%)

Pool	Riffle	Run	Flat
			100

Notes:

Instream Cover (%) 100

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
				100		Average Depth: (% Cover)

Note: Low = 0 - 30%; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Reed Canary, grasses

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☐
90-60% ☐ 0% ☒
60-30% ☐

Types of Cover (% cover)

Trees ___ Shrubs ___ Man-made structures ___
Grasses ___ Herbaceous ___ Other ___

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - 1m RB - 1m

Overhanging Vegetation Present (Y) N % Overhanging Vegetation:

Description of Overhanging Vegetation: grasses

Obstructions to Fish Passage

None Observed ☒ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT - 3S Page 3 of 4

Other General Comments Regarding the Study Area:

- roadside drainage ditch
- No culvert

Additional UTM Coordinates:

Photo log

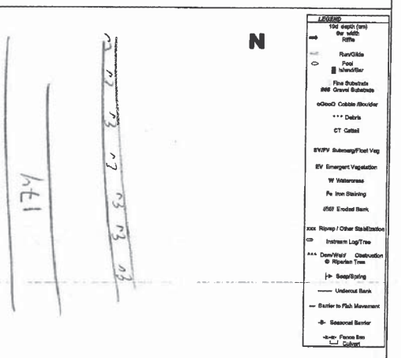
Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT - 3S Site ID:



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-4-N

Date: July 29/14 Start time: 9:30 End Time:

Weather Conditions: Field Crew: MG & JP

Field Notes By: MG

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 046 1176 Northing: 5057494 Description: Start

Easting: 046 1185 Northing: 5057454 Description: End

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☑
Agriculture ☑ Wetland ☐
Forest ☐ Livestock ☐
Other
Description:

Type of Watercourse

Intermittent ☑ Channelized ☐
Permanent ☐ Natural Channel ☐
Ephemeral ☐
Description: Heavily altered Channel

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

tile drainage, culvert at one of crossings, overland flow

Is any portion of the water body underground or not as mapped? Y / N

If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

rolling towards watercourse

In-Situ Water Quality

WT (°C):	14.91	AT(°C):	16
pH:	6.87	Cond (µ\s/cm):	3.12
D.O. (mg/L)	5.23		

Water Clarity: Clear ☐ Turbid ☐

Water Colour: Clear

Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☐
Bubbling ☐
Other ☐
Details: Nil

ELRT - 4N

Fisheries Habitat Assessment

Stream Morphology

Site Length (m): 55

Channel Dimensions

Mean Wetted Width (m):	2.0	Mean Wetted Depth (m):	0.2
Mean Bankfull Width (m):	2.40	Mean Bankfull Depth (m):	1.0
Mean Top of Bank Width (m):	/	Mean Top of Bank Depth (m):	/

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☑	☐	☐
Right Bank	☐	☑	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

medium to low flow - recent rain

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: Si > Mk > Gr > Sa

Morphological Structure (%)			
Pool	Riffle	Run	Flat
30	10		60

Notes:

Instream Cover (%) 30

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
	50			50		Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Pondweed, algae, broad-leafed ~~cattail~~ cattail

Canopy Cover (% closed cover):

100-90% ☑ 30-1% ☐
90-60% ☐ 0% ☐
60-30% ☐

Types of Cover (% cover)

Trees 10 Shrubs Man-made structures
Grasses 90 Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Cattails reed Canary grass, grasses

Riparian Vegetation

Width and Description of riparian vegetation: LB - Meadow Species 75m RB - Sumach, deciduous trees, meadow species 75m

Overhanging Vegetation Present (Y / N) % Overhanging Vegetation: 80

Description of Overhanging Vegetation:

grasses

Obstructions to Fish Passage

None Observed ☐ Man-Made ☑ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

- beaver dam installed

Height of Barrier (m) - 30 cm GPS Coordinates: WP 116 0461167 5057495

Fisheries Habitat Assessment

AECOM Date: ELRT -4N Page 3 of 4

Other General Comments Regarding the Study Area:

- first 35 m of assessment area DS of culvert; gabion basket lined channel, choked with Aquatic veg. No defined Channel.
- D/S 20 m, Sediment laden 2cm thick
- Cypress observed
- green frogs.

Additional UTM Coordinates:

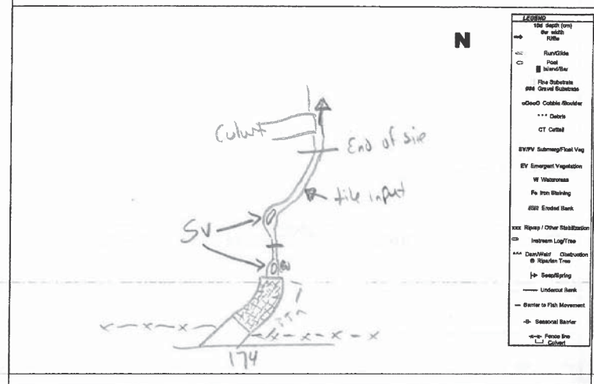
Photo log

Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Study Area: ELRT -4N Watercourse Sketch Site ID



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-4-S

Date: July 29/14 Start time: End Time:

Weather Conditions: Sunny 27° Field Crew: MC+TP

Field Notes By: AL

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 0451165 Northing: 503 7762 Description:

Easting: 0451139 Northing: 503 7737 Description: End

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☒
Agriculture ☐ Wetland ☐
Forest ☐ Livestock ☐
Other
Description:

Type of Watercourse

Intermittent ☑ Channelized ☒
Permanent ☐ Natural Channel ☐
Ephemeral ☐
Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Overland Flow

Is any portion of the water body underground or not as mapped? Y / (N)

If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

Sloping towards

In-Situ Water Quality

WT (°C):	20.65	AT(°C):	27
pH:	7.98	Cond (mS/cm):	2.92
D.O. (mg/L)	6.58		

Water Clarity: Clear ☐ Turbid ☐

Water Colour:

Notes: Clear

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☒
Bubbling ☐
Other ☐
Details:

Fisheries Habitat Assessment

ELRT -4S

Stream Morphology

Site Length (m): 55

Channel Dimensions

Mean Wetted Width (m):	0.4	Mean Wetted Depth (m):	
Mean Bankfull Width (m):		Mean Bankfull Depth (m):	
Mean Top of Bank Width (m):		Mean Top of Bank Depth (m):	

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☒	☐	☐	☐
Right Bank	☑	☐	☐	☐

Description: Gabion baskets

Flow Description: (high or low flow conditions, stagnant, etc)

Stagnant

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: gabion baskets

Notes:

Morphological Structure (%)			
Pool	Riffle	Run	Flat
			100

Instream Cover (%) 100

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
				100		Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

reed canary grass, grasses

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☐
90-60% ☐ 0% ☑
60-30% ☐

Types of Cover (% cover)

Trees Shrubs Man-made structures
Grasses Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - 5m RB - 0

Overhanging Vegetation Present (Y) N % Overhanging Vegetation:

Description of Overhanging Vegetation:

reed canary grass / grasses

Obstructions to Fish Passage

None Observed ☐ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier: entire site is a barrier!!

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT - US Page 3 of 4

Other General Comments Regarding the Study Area:

- heavily altered site
- gabion basket lined channel
- gabion basket lined margin
- very little water present
- substrate: sand, silt

Additional UTM Coordinates:

Photo log

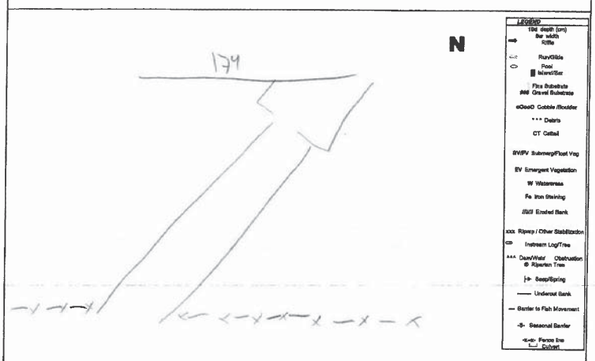
Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT - US Site ID



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT - S-NU

Date: July 29/14 Start time: 10:05 End Time:

Weather Conditions: Sunny 17° Field Crew: MG / SP

Field Notes By: MG

Site Location

Ottawa 174

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 0459005 Northing: 5036684 Description: start

Easting: 0459833 Northing: 5036596 Description: end

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☑
Agriculture ☐ Wetland ☐
Forest ☐ Livestock ☐
Other

Description: Hwy 174

Type of Watercourse

Intermittent ☑ Channelized ☐
Permanent ☐ Natural Channel ☐
Ephemeral ☐

Description: Prainge ditch

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Overland flow

Is any portion of the water body underground or not as mapped? Y / (N)

If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

rolling hills towards wetland

In-Situ Water Quality

WT (°C):	16.44	AT(°C):	17°
pH:	7.59	Cond (µs/cm):	346
D.O. (mg/L)	0.00		

Water Clarity: Clear ☐ Turbid ☑

Water Colour: dark grey

Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☐
Bubbling ☐
Other ☐

Details:

Fisheries Habitat Assessment

ELRT - SN

Stream Morphology

Site Length (m): 100 m

Channel Dimensions

Mean Wetted Width (m):	2.0	Mean Wetted Depth (m):	0.05
Mean Bankfull Width (m):	7.0	Mean Bankfull Depth (m):	1.5
Mean Top of Bank Width (m):	/	Mean Top of Bank Depth (m):	/

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☑	☐	☐	☐
Right Bank	☑	☐	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

Stagnant

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: SI > MK

Morphological Structure (%)			
Pool	Riffle	Run	Flat
			100

Notes: Prainge ditch

Instream Cover (%)

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
				100		Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

(Cattails), duckweed, algae, reed canary grass

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☑
90-60% ☐
60-30% ☐ 0% ☐

Types of Cover (% cover)

Trees Shrubs Man-made structures
Grasses 100 Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - 0 RB - 2m

Overhanging Vegetation Present (Y) / N % Overhanging Vegetation:

Description of Overhanging Vegetation:

Obstructions to Fish Passage

None Observed ☑ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT - SN Page 3 of 4

Other General Comments Regarding the Study Area:

- Orange ditch alongside westbound Hwy 174
- Stagnant,
- low D.O
- Cattail choked
- heavy Sediment

Additional UTM Coordinates:

Photo log

Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT - SN Site ID

N

Ditch

ATI

LEGEND

Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-SN

Date: July 24/14 Start time: End Time:

Weather Conditions: Sunny 21°C Field Crew: MG + SP

Field Notes By: MG

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 446004.99 Northing: 5036893 Description:

Easting: Northing: Description:

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☒
Agriculture ☐ Wetland ☒
Forest ☐ Livestock ☐
Other 174

Description:

Type of Watercourse

Intermittent ☒ Channelized ☐
Permanent ☐ Natural Channel ☒
Ephemeral ☒ _____ ☐

Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Overland Flow

Is any portion of the water body underground or not as mapped? Y (N)
If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

Slight roll

In-Situ Water Quality

WT (°C): AT(°C):
pH: Cond (s/cm):
D.O. (mg/L)
Water Clarity: Clear ☐ Turbid ☐
Water Colour:
Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☐
Bubbling ☐ _____ ☐
Other ☐
Details:

Fisheries Habitat Assessment

ELRT - SS

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m):		Mean Wetted Depth (m):	
Mean Bankfull Width (m):		Mean Bankfull Depth (m):	
Mean Top of Bank Width (m):		Mean Top of Bank Depth (m):	

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☒	☐	☐	☐
Right Bank	☐	☒	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

Stagnant

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description

MK > DT

Morphological Structure (%)

Pool	Riffle	Run	Flat

Notes:

Instream Cover (%) low

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
				160		Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☐
90-60% ☐ 0% ☒
60-30% ☐

Types of Cover (% cover)

Trees _____ Shrubs _____ Man-made structures _____
Grasses _____ Herbaceous _____ Other _____

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - 1m RB - 3m

Overhanging Vegetation Present (Y) N % Overhanging Vegetation:

Description of Overhanging Vegetation: grass

Obstructions to Fish Passage

None Observed ☒ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT - SS Page 3 of 4

Other General Comments Regarding the Study Area:

- drainage ditch running parallel to Hwy 174 east
- no culvert identified ~~under the road~~ between champlain 2nd 10th line

Additional UTM Coordinates:

Photo log

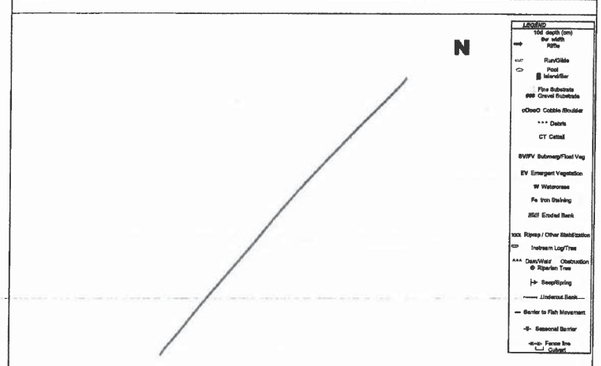
Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT - SS Site ID



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-GN

Date: Jun 29/17 Start time: End Time:

Weather Conditions: Field Crew: MH JP

Field Notes By: MH

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 0458694 Northing: 5035988 Description: Start

Easting: Northing: Description:

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☑
Agriculture ☐ Wetland ☐
Forest ☐ Livestock ☐
Other
Description:

Type of Watercourse

Intermittent ☑ Channelized ☐
Permanent ☐ Natural Channel ☑
Ephemeral ☐ _____ ☐
Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

overland flow

Is any portion of the water body underground or not as mapped? Y / (N)
If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

Rolling on W/S Right bank, flat on left

In-Situ Water Quality

WT (°C):	AT(°C):
pH:	Cond (s/cm):
D.O. (mg/L)	

Water Clarity: Clear ☐ Turbid ☐

Water Colour:

Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☐
Bubbling ☐ _____ ☐
Other ☐

Details:

Fisheries Habitat Assessment

ELRT GN

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m):		Mean Wetted Depth (m):	
Mean Bankfull Width (m):		Mean Bankfull Depth (m):	
Mean Top of Bank Width (m):		Mean Top of Bank Depth (m):	

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☒	☐	☐	☐
Right Bank	☐	☒	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

Normal flow

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus
Description

Morphological Structure (%)			
Pool	Riffle	Run	Flat
			100

Notes:

Instream Cover (%) 0

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
					X	Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Not observed

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☐
90-60% ☐ 0% ☒
60-30% ☐

Types of Cover (% cover)

Trees _____ Shrubs _____ Man-made structures _____
Grasses _____ Herbaceous _____ Other _____

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - 0 RB - 3m

Overhanging Vegetation Present 0 N % Overhanging Vegetation:

Description of Overhanging Vegetation:

grasses

Obstructions to Fish Passage

None Observed ☒ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT-6N Page 3 of 4

Other General Comments Regarding the Study Area:

- No access to site.
- fenced off at culvert.

Additional UTM Coordinates:

Photo log

Picture #	Description	Picture #	Description

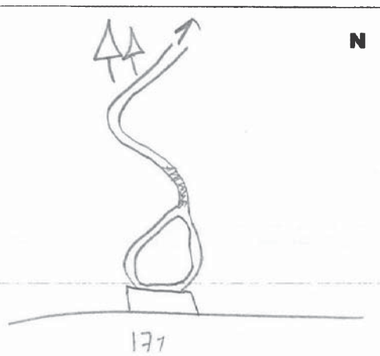
Fisheries Habitat Assessment

ELRT 6N

AECOM Page 4 of 4

Watercourse Sketch

Study Area: _____ Site ID _____



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Options LRT Site ID: ELRT-6-S

Date: Jun 25/14 Start time: End Time:

Weather Conditions: Field Crew: MG + JP

Field Notes By: MG

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 458703 Northing: 5035424 Description:

Easting: Northing: Description:

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☑
Agriculture ☐ Wetland ☐
Forest ☐ Livestock ☐
Other X

Description: 174, Commercial

Type of Watercourse

Intermittent ☐ Channelized ☐
Permanent ☐ Natural Channel ☐
Ephemeral ☐ _____ ☐

Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Is any portion of the water body underground or not as mapped? (Y) N
If Yes describe:
Assumed watercourse is buried

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

Sloping

In-Situ Water Quality

WT (°C): AT(°C):
pH: Cond (s/cm):
D.O. (mg/L)
Water Clarity: Clear ☐ Turbid ☐
Water Colour:
Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☐
Bubbling ☐ _____ ☐
Other ☐
Details:

Fisheries Habitat Assessment

ELRT 6J

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m): Mean Wetted Depth (m):
Mean Bankfull Width (m): Mean Bankfull Depth (m):
Mean Top of Bank Width (m): Mean Top of Bank Depth (m):

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☒	☐	☐	☐
Right Bank	☑	☐	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description

Morphological Structure (%)

Pool	Riffle	Run	Flat

Notes:

Instream Cover (%)

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
						Average Depth:
						(% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Canopy Cover (% closed cover):

100-80% ☐ 30-1% ☐
90-60% ☐ 0% ☐
60-30% ☐

Types of Cover (% cover)

Trees Shrubs Man-made structures
Grasses Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - RB -

Overhanging Vegetation Present Y / N % Overhanging Vegetation:
Description of Overhanging Vegetation:

Obstructions to Fish Passage

None Observed ☐ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT 65 Page 3 of 4

Other General Comments Regarding the Study Area:

- No identifiable watercourse
- Potentially burned
- Private property - no access

Additional UTM Coordinates:

Photo log

Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT 65 Site ID

N

Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-7-N

Date: July 29/14 Start time: End Time:

Weather Conditions: Sunny 17°c Field Crew: MG + JP

Field Notes By: MG

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 457993 Northing: 5035640 Description: Start

Easting: 457958 Northing: 5035679 Description: End

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☒ Meadow ☒

Agriculture ☐ Wetland ☐

Forest ☐ Livestock ☐

Other

Description:

Type of Watercourse

Intermittent ☒ Channelized ☐

Permanent ☐ Natural Channel ☒

Ephemeral ☐ _____ ☐

Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Overland flow

Is any portion of the water body underground or not as mapped? Y (N)

If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

rolling hill sloping towards waterbody

In-Situ Water Quality

WT (°C):	15.58	AT(°C):	17
pH:	8.18	Cond (ms/cm):	10.6
D.O. (mg/L)	4.99		

Water Clarity: Clear ☐ Turbid ☒

Water Colour:

- Slightly turbid
- light brown

Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐

Iron Staining ☐ None ☐

Bubbling ☐

Other ☐

Details:

Fisheries Habitat Assessment

ELRT - 7N

Stream Morphology

Site Length (m): 55

Channel Dimensions

Mean Wetted Width (m):	0.45	Mean Wetted Depth (m):	0.05
Mean Bankfull Width (m):	2.5	Mean Bankfull Depth (m):	0.50
Mean Top of Bank Width (m):	10 m	Mean Top of Bank Depth (m):	3 m

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☒	☐	☐
Right Bank	☐	☒	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

low flow

Habitat

Substrate (< = >)

Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description

Si > MK > Gr > Sa

Morphological Structure (%)			
Pool	Riffle	Run	Flat
	25	25	50

Notes:

Instream Cover (%) 10

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
	100					Average Depth: (% Cover)

Note: Low = 0 - 30%; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

algae

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☐

90-60% ☒ 0% ☐

60-30% ☐

Types of Cover (% cover)

Trees 50 Shrubs 50 Man-made structures

Grasses 50 Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

grasses, Shrubs.

Riparian Vegetation

Width and Description of riparian vegetation: LB - Cultrel thicket/meadow RB - Cultrel thicket/meadow

Overhanging Vegetation Present (Y) N

Description of Overhanging Vegetation: 90% grasses

% Overhanging Vegetation:

Obstructions to Fish Passage

None Observed ☐ Man-Made ☐ Natural ☐ Low Flow Barrier ☒

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT 7N Page 3 of 4

Other General Comments Regarding the Study Area:

- Choked with vegetation
- low flow, Small channel
- most likely dry most of the year
- recent rain

Additional UTM Coordinates:

Photo log

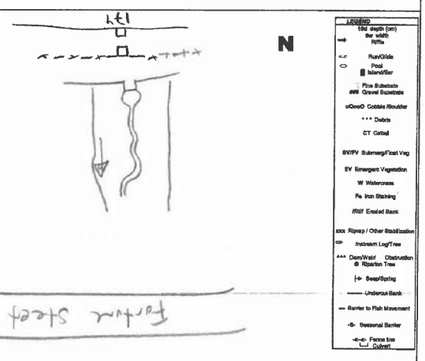
Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT 7N Site ID



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-8-N

Date: July 20/17 Start time: 12:15 End Time:

Weather Conditions: Sunny 21°C Field Crew: MA + JP

Field Notes By: MA

Site Location

Hwy 174

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 456370 Northing: 5054719 Description:

Easting: Northing: Description:

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☐
Agriculture ☑ Wetland ☑
Forest ☐ Livestock ☐
Other
Description: Hwy 174

Type of Watercourse

Intermittent ☑ Channelized ☑
Permanent ☐ Natural Channel ☐
Ephemeral ☐
Description: Roadside drainage

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Overland flow

Is any portion of the water body underground or not as mapped? Y (N)

If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

gently sloping towards roadside drainage

In-Situ Water Quality

WT (°C): AT(°C):
pH: Cond (s/cm):
D.O. (mg/L)
Water Clarity: Clear ☐ Turbid ☐
Water Colour:
Notes: dry

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☑
Bubbling ☐
Other ☐
Details:

Fisheries Habitat Assessment

ELRT 8N

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m): Mean Wetted Depth (m):
Mean Bankfull Width (m): Mean Bankfull Depth (m):
Mean Top of Bank Width (m): Mean Top of Bank Depth (m):

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☑	☐	☐	☐
Right Bank	☐	☑	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

dry at time of assessment

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: SiCMkGr

Notes:

Morphological Structure (%)

Pool	Riffle	Run	Flat

Instream Cover (%)

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
					100	Average Depth: (% Cover)

Note: Low = 0 - 30%; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

None

Canopy Cover (% closed cover):

100-90% ☒ 30-1% ☐
90-60% ☐ 0% ☐
60-30% ☐

Types of Cover (% cover)

Trees Shrubs Man-made structures
Grasses 100 Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Cattails, reed canary grass

Riparian Vegetation

Width and Description of riparian vegetation: LB - 2m → highway RB - 1.5m agriculture

Overhanging Vegetation Present (Y) N % Overhanging Vegetation:

Description of Overhanging Vegetation:

Obstructions to Fish Passage

None Observed ☒ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT SW Page 3 of 4

Other General Comments Regarding the Study Area:

- drainage ditch from Hwy 174 into Farmers fields
- no access (fence)
- dry.
- lots of vegetation

Additional UTM Coordinates:

Photo log

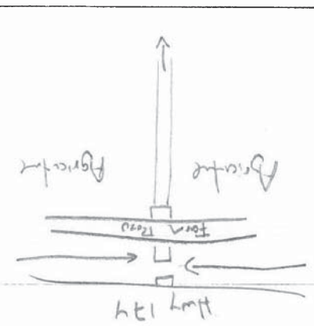
Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT SW Site ID



LEGEND
- 10M depth (cm) Bar width Riffle
- Run/Glide
- Pool Isolated Pool
- Fine Substrate Gravel Substrate
- Boulder Cobble Boulder
- Debris
- CT Culvert
- SW/PV Submerged/Float Veg
- EV Emergent Vegetation
- W Watercress
- Fe Iron Staining
- ES/F Eroded Bank
- Riprap / Other Rehabilitation
- Instream Log/Tree
- Dam/Weir Obstruction Riparian Tree
- Seep/Spring
- Undercut Bank
- Barrier to Fish Movement
- Seasonal Barrier
- Fence line Culvert

Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-8-S

Date: July 29/14 Start time: End Time:

Weather Conditions: Sunny 21°C Field Crew: MK + JP

Field Notes By: MK

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 0456390 Northing: 5034679 Description:

Easting: Northing: Description:

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☐
Agriculture ☐ Wetland ☒
Forest ☐ Livestock ☐
Other ☒ 174
Description:

Type of Watercourse

Intermittent ☒ Channelized ☐
Permanent ☐ Natural Channel ☒
Ephemeral ☒ ☐
Description: dry at time of assessment.

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)
Overland flow

Is any portion of the water body underground or not as mapped? Y / (N)
If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)
- rolling towards water body.

In-Situ Water Quality

WT (°C): AT(°C):
pH: Cond (s/cm):
D.O. (mg/L)
Water Clarity: Clear ☐ Turbid ☐
Water Colour:
Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☒
Bubbling ☐ ☐
Other ☐
Details:

Fisheries Habitat Assessment

ELRT 8S

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m):		Mean Wetted Depth (m):	
Mean Bankfull Width (m):		Mean Bankfull Depth (m):	
Mean Top of Bank Width (m):		Mean Top of Bank Depth (m):	

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)
Stagnant

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: MK > DT > Si

Notes:

Morphological Structure (%)

Pool	Riffle	Run	Flat
			100

Instream Cover (%) 100

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
	5			95		Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%
*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)
Cattails, grasses

Canopy Cover (% closed cover):

100-90%	☐	30-1%	☐
90-60%	☐	0%	☒
60-30%	☐		

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Types of Cover (% cover)

Trees	Shrubs	Man-made structures
Grasses	Herbaceous	Other

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - Sm t RB - Sm t

Overhanging Vegetation Present (Y) N % Overhanging Vegetation: 100
Description of Overhanging Vegetation:

Obstructions to Fish Passage

None Observed ☒ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT 85 Page 3 of 4

Other General Comments Regarding the Study Area:

- Drainage ditch along east 174
- Fenced in front of culvert
- Similar to other side of Hwy
- gulf corp

Additional UTM Coordinates:

Photo log

Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT 85 Site ID

N

Hwy 174

LEGEND
15M depth (cm)
Bw width
Riffle
Run/Glide
Pool
Isolated/Bar
Fine Substrate
Gravel Substrate
Cobble Boulder
Debris
Cattail
Submerged/Float Veg
Emergent Vegetation
Watercress
Fe Iron Staining
Eroded Bank
Riprap / Other Rock/Gabion
Instream Log/Tree
Drain/Wildlife Crossing @ Riparian Tree
Seep/Spring
Undercut Bank
Barrier to Fish Movement
Seasonal Barrier
Fence line Turf Orchard

Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-9-N

Date: Sep 29/14 Start time: End Time:

Weather Conditions: Sunny 26° Field Crew: MK + JP

Field Notes By: MK

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 455012 Northing: 5053985 Description: 10 m zone

Easting: Northing: Description:

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☒
Agriculture ☐ Wetland ☐
Forest ☒ Livestock ☐
Other

Description: Hwy 174

Type of Watercourse

Intermittent ☒ Channelized ☒
Permanent ☐ Natural Channel ☐
Ephemeral ☐
Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Overland flow. culvert coming from SIDE of road.

Is any portion of the water body underground or not as mapped? Y (N)

If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

Rolling hills

In-Situ Water Quality

WT (°C): AT(°C):
pH: Cond (µs/cm):
D.O. (mg/L)
Water Clarity: Clear ☐ Turbid ☐
Water Colour:
Notes: Dry/No Access.

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☐
Bubbling ☐
Other ☐
Details:

Fisheries Habitat Assessment

ELRT 9N

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m):		Mean Wetted Depth (m):	
Mean Bankfull Width (m):		Mean Bankfull Depth (m):	
Mean Top of Bank Width (m):		Mean Top of Bank Depth (m):	

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☐	☐	☐
Right Bank	☐	☐	☒	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

Stagnant

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description

Morphological Structure (%)

Pool	Riffle	Run	Flat

Notes:

Instream Cover (%)

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
						Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High >75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Canopy Cover (% closed cover):

100-80% ☐ 30-1% ☒
90-60% ☐ 0% ☐
60-30% ☐

Types of Cover (% cover)

Trees 25 Shrubs 25 Man-made structures
Grasses 50 Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - 3m RB - 5+m

Overhanging Vegetation Present (Y) N % Overhanging Vegetation: 10

Description of Overhanging Vegetation: grasses

Obstructions to Fish Passage

None Observed ☒ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT 9N Page 3 of 4

Other General Comments Regarding the Study Area:

- Roadside drainage ditch(es) exits into greens ~~Creek~~ creek via two culverts, boxed, end cap
- No access to site. pics only.

Additional UTM Coordinates:

Photo log

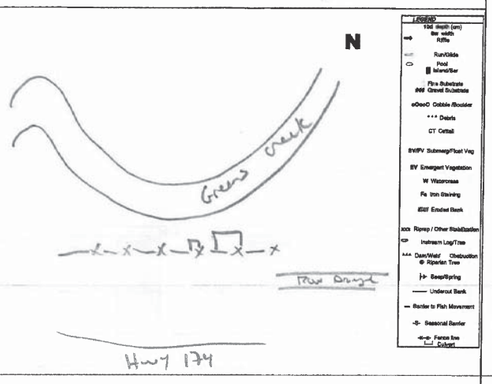
Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT 9N Site ID



LEGEND
- 10d depth (cm) 6w width (cm) Riffle
- Run/Glide
- Pond
- Marsh/Bar
- Fb/s Substrate
- Gravel Substrate
- Cobble /Boulder
- Debris
- CT Cattail
- SW/PV Submerg/Float Veg
- EV Emergent Vegetation
- W Watercress
- Fe Iron Staining
- ES/I Eroded Bank
- Rprap / Other Rock/Gabion
- Instream Log/Tree
- Dam/Weir/ Obstruction
- Riparian Tree
- Seep/Spring
- Undercut Bank
- Barrier to Fish Movement
- Seasonal Barrier
- Fence line Culvert

Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-9S

Date: July 29/14 Start time: End Time:

Weather Conditions: Field Crew: MK + JP

Field Notes By: MK

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 455070 Northing: 5033943 Description:

Easting: 455064 Northing: 5033920 Description: End

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☐
Agriculture ☒ Wetland ☐
Forest ☒ Livestock ☐
Other ☐
Description:

Type of Watercourse

Intermittent ☒ Channelized ☒
Permanent ☐ Natural Channel ☐
Ephemeral ☐
Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

tile Drainage at culvert.

Is any portion of the water body underground or not as mapped? Y (N)
If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

Sloping towards waterbody

In-Situ Water Quality

WT (°C):	20.75	AT(°C):	27
pH:	8.47	Cond (s/cm):	
D.O. (mg/L)	9.44		

Water Clarity: Clear ☒ Turbid ☐

Water Colour:

Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☐
Bubbling ☐
Other ☐
Details:

Fisheries Habitat Assessment

ELRT 9L

Stream Morphology

Site Length (m): 25m (Fence)

Channel Dimensions

Mean Wetted Width (m):	0.4	Mean Wetted Depth (m):	0.03
Mean Bankfull Width (m):	2.5	Mean Bankfull Depth (m):	1.0
Mean Top of Bank Width (m):	—	Mean Top of Bank Depth (m):	—

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☒	☐	☐
Right Bank	☐	☒	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

low flow

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: Sa > Gr > Si > MK

Notes:

Morphological Structure (%)

Pool	Riffle	Run	Flat
		100	

Instream Cover (%) 30

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
	100					Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

—

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☐
90-60% ☐ 0% ☐
60-30% ☒

Types of Cover (% cover)

Trees 70 Shrubs 30 Man-made structures
Grasses Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - <5m RB - <5m

Overhanging Vegetation Present (Y) / N % Overhanging Vegetation:

Description of Overhanging Vegetation: grass.

Obstructions to Fish Passage

None Observed ☐ Man-Made ☐ Natural ☐ Low Flow Barrier ☒

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT 9S Page 3 of 4

Other General Comments Regarding the Study Area:

- Overgrown creek
- tile input into culvert creek
- fence prevents further upstream access

Additional UTM Coordinates:

Photo log

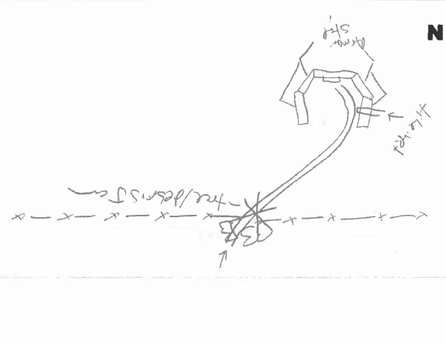
Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT 9S Site ID



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-10-N

Date: July 21/19 Start time: End Time:

Weather Conditions: Sunny 21°C Field Crew: MC + JP

Field Notes By: MC

Site Location

Greens Creek

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 454812 Northing: 5033896 Description:

Easting: Northing: Description:

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☒
Agriculture ☐ Wetland ☐
Forest ☒ Livestock ☐
Other
Description:

Type of Watercourse

Intermittent ☐ Channelized ☐
Permanent ☒ Natural Channel ☒
Ephemeral ☐
Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Overland flow - 174

Is any portion of the water body underground or not as mapped? Y (N)

If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

rolling hill towards watercourse

In-Situ Water Quality

WT (°C): AT(°C):
pH: Cond (s/cm)
D.O. (mg/L)
Water Clarity: Clear ☐ Turbid ☐
Water Colour:
Notes: No access to site

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☐
Bubbling ☐
Other ☐
Details: None

Fisheries Habitat Assessment

ELRT 10N

Stream Morphology

Site Length (m): 55

Channel Dimensions

Mean Wetted Width (m):	2m	Mean Wetted Depth (m):	0.45
Mean Bankfull Width (m):	2.5	Mean Bankfull Depth (m):	1.5
Mean Top of Bank Width (m):	/	Mean Top of Bank Depth (m):	/

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☐	☒	☐
Right Bank	☐	☐	☒	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

Normal flow

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: gr > co > bo > si

Notes:

Morphological Structure (%)			
Pool	Riffle	Run	Flat
			100

Instream Cover (%) 30

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
	25	25	45	25		Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Pondweed

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☐
90-60% ☐ 0% ☐
60-30% ☐

Types of Cover (% cover) 30

Trees 75 Shrubs 10 Man-made structures
Grasses 15 Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

grasses, Pondweed

Riparian Vegetation

Width and Description of riparian vegetation: LB - Forest RB - Mowed

Overhanging Vegetation Present (Y) N % Overhanging Vegetation: 20

Description of Overhanging Vegetation:

grasses, trees

Obstructions to Fish Passage

None Observed ☒ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT 10N Page 3 of 4

Other General Comments Regarding the Study Area:

- 4 culverts - 3 exist water, 4th one animal crossing
- Nice, natural watercourse
- Warm water?
- No access (fence)

Additional UTM Coordinates:

Photo log

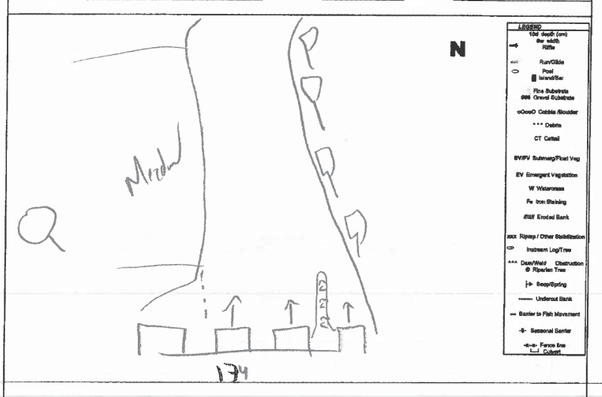
Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT 10N Site ID



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-10-S

Date: JUN 27/14 Start time: End Time:

Weather Conditions: Field Crew: MK, JP

Field Notes By: MK

Site Location

Greens Creek

UTM Co-ordinates (continue on page 3 if necessary)

Easting:	0454860	Northing:	5033828	Description:
Easting:	454858	Northing:	5033780	Description:
Easting:		Northing:		Description:
Easting:		Northing:		Description:

Surrounding Landuse

Residential ☐ Meadow ☐
Agriculture ☐ Wetland ☒
Forest ☒ Livestock ☐
Other ☐
Description:

Type of Watercourse

Intermittent ☐ Channelized ☐
Permanent ☒ Natural Channel ☒
Ephemeral ☐
Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

overland flow

Is any portion of the water body underground or not as mapped? Y (N)
If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

rolling and sloping.

In-Situ Water Quality

WT (°C):	19.56	AT(°C):	21°
pH:	8.44	Cond (µs/cm):	1.77
D.O. (mg/L)	9.45		

Water Clarity: Clear ☐ Turbid ☒

Water Colour: greeny / brown

Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☒
Bubbling ☐
Other ☐
Details:

Fisheries Habitat Assessment

ELRT 10S

Stream Morphology

Site Length (m): 160

Channel Dimensions

Mean Wetted Width (m):	8	Mean Wetted Depth (m):	9
Mean Bankfull Width (m):	9.5	Mean Bankfull Depth (m):	1.5
Mean Top of Bank Width (m):	/	Mean Top of Bank Depth (m):	/

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☒	☐	☐
Right Bank	☐	☒	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: gr > sa > si > mk

Notes:

Morphological Structure (%)

Pool	Riffle	Run	Flat
			160

Instream Cover (%) 30

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
	100					Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Mint observed

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☐
90-60% ☐ 0% ☒
60-30% ☐

Types of Cover (% cover)

Trees ___ Shrubs ___ Man-made structures ___
Grasses ___ Herbaceous ___ Other ___

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

~~Mint observed~~

Riparian Vegetation

Width and Description of riparian vegetation: LB - meadow marsh 75m RB - meadow mix / forest 75m

Overhanging Vegetation Present Y (N)

% Overhanging Vegetation:

Description of Overhanging Vegetation:

Obstructions to Fish Passage

None Observed ☒ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

ELRT 10S

AECOM Date: Page 3 of 4

Other General Comments Regarding the Study Area:

- woody debris pile in front of culvert
- ~ soil/earth blocking across to # 4 west culvert to overflow?
-

Additional UTM Coordinates:

Photo log

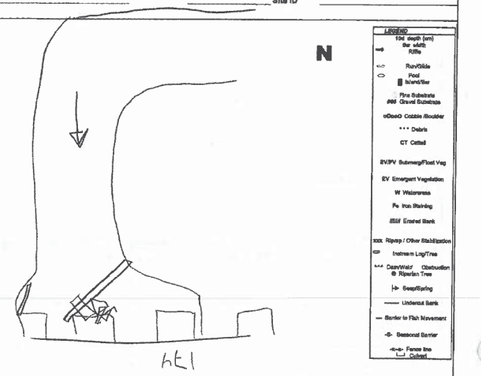
Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT 10S Site ID



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-11-S

Date: Start time: End Time:

Weather Conditions: Overcast 21° Field Crew: MK + JP

Field Notes By: MK

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 0453715	Northing: 5031929	Description:	
Easting: 453733	Northing: 5031937	Description:	End
Easting:	Northing:	Description:	
Easting:	Northing:	Description:	

Surrounding Landuse

Residential	☐	Meadow	☑
Agriculture	☐	Wetland	☐
Forest	☐	Livestock	☐
Other	X		

Description: 174

Type of Watercourse

Intermittent	☒	Channelized	☐
Permanent	☐	Natural Channel	☒
Ephemeral	☑		☐

Description: dry at time of assessment

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Overland flow. Roadside drainage

Is any portion of the water body underground or not as mapped? Y (N)

If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

Sloping towards wetland

In-Situ Water Quality

WT (°C):		AT(°C):	
pH:		Cond (s/cm):	
D.O. (mg/L)			

Water Clarity: Clear ☐ Turbid ☐

Water Colour:

Notes:

Ground Water and Seepage Indicators

Watercress	☐	Bank Seepage	☐
Iron Staining	☐	None	☑
Bubbling	☐		☐
Other	☐		

Details:

Fisheries Habitat Assessment

ELRT 11S

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m):	1.2	Mean Wetted Depth (m):	0.11
Mean Bankfull Width (m):	1.5	Mean Bankfull Depth (m):	0.85
Mean Top of Bank Width (m):	/	Mean Top of Bank Depth (m):	/

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☑	☐	☐
Right Bank	☐	☑	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

Habitat

Substrate (< = >)

Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: MK 75%

Notes:

Morphological Structure (%)

Pool	Riffle	Run	Flat

Instream Cover (%) 90

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
				100		Average Depth: (% Cover)

Note: Low = 0 - 30%; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Algae

Canopy Cover (% closed cover):

100-90%	☐	30-1%	☐
90-60%	☐	0%	☒
60-30%	☐		

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Types of Cover (% cover)

Trees Shrubs Man-made structures

Grasses Herbaceous Other

Notes: (vegetation species, types of structures)

(Cattail) reed (grass), grass

Riparian Vegetation

Width and Description of riparian vegetation: LB - RB -

Overhanging Vegetation Present Y (N) % Overhanging Vegetation: 90

Description of Overhanging Vegetation: (Cattail)

Obstructions to Fish Passage

None Observed ☒ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT 115 Page 3 of 4

Other General Comments Regarding the Study Area:

- Drainage ditch along Eastbound 174
- unable to determine direction of water

Additional UTM Coordinates:

Photo log

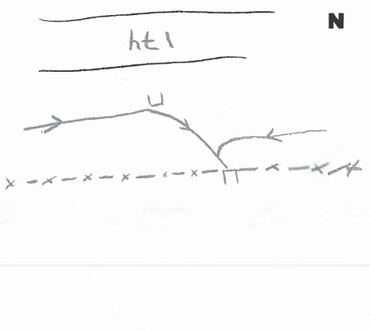
Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

AECOM Page 4 of 4

Watercourse Sketch

Study Area: ELRT 115 Site ID



LEGEND

Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-12-N

Date: July 30/14 Start time: End Time:

Weather Conditions: Rain, 14°C Field Crew: MK+JP

Field Notes By: MK

Site Location

Stair Road

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 0452782	Northing: 5031294	Description:	
Easting: 0452780	Northing: 5031284	Description: End	
Easting:	Northing:	Description:	
Easting:	Northing:	Description:	

Surrounding Landuse

Residential ☐ Meadow ☒
Agriculture ☐ Wetland ☐
Forest ☐ Livestock ☐
Other ☒
Description: Hwy 174

Type of Watercourse

Intermittent ☒ Channelized ☐
Permanent ☐ Natural Channel ☐
Ephemeral ☐ _____
Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Is any portion of the water body underground or not as mapped? Y (N)
If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

flat, slight roll towards centre

In-Situ Water Quality

WT (°C): 17.12	AT(°C): 14		
pH: 8.05	Cond (µs/cm): 2.04		
D.O. (mg/L) 6.69			

Water Clarity: Clear ☒ Turbid ☐

Water Colour: - clear - off brown

Notes: - thick oil sheen on surface

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☒
Bubbling ☐ _____
Other ☐
Details:

Fisheries Habitat Assessment

ELRT-12-N

Stream Morphology

Site Length (m): 16m

Channel Dimensions

Mean Wetted Width (m):	1.2	Mean Wetted Depth (m):	0.15
Mean Bankfull Width (m):	3.0	Mean Bankfull Depth (m):	5.0
Mean Top of Bank Width (m):	/	Mean Top of Bank Depth (m):	/

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☒	☐	☐
Right Bank	☐	☒	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

medium flow. Raining

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: Si > MK > Co

Notes:

Morphological Structure (%)			
Pool	Riffle	Run	Flat
			100

Instream Cover (%) 20

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
	25		75		/	Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

None

Canopy Cover (% closed cover):

100-90% ☒ 30-1% ☐
90-60% ☐ 0% ☐
60-30% ☐

Types of Cover (% cover)

Trees 40 Shrubs 60 Man-made structures _____
Grasses _____ Herbaceous _____ Other _____

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

glossy buckthorn

Riparian Vegetation

Width and Description of riparian vegetation: LB - 2m RB - 2m

Overhanging Vegetation Present Y / (N) % Overhanging Vegetation:

Description of Overhanging Vegetation:

Obstructions to Fish Passage

None Observed ☒ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM	Date: ELRT 12-N	Page 3 of 4

Other General Comments Regarding the Study Area:

- drainge culvert
- lots of oil on surface, probably from 5w) traffic runny 2 lny road
- intermittent

Additional UTM Coordinates:

Photo log

Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

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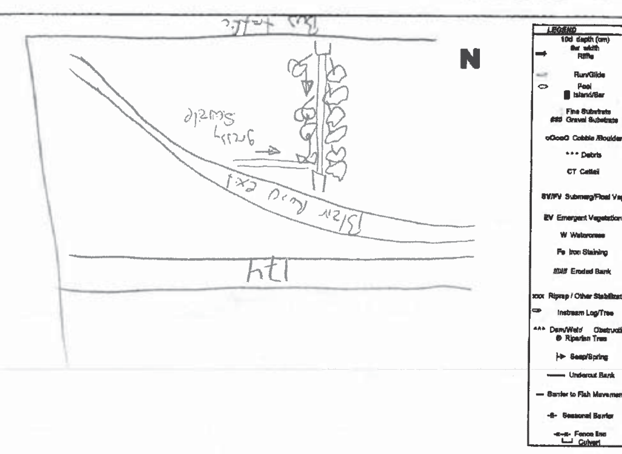
Watercourse Sketch

Study Area: ELRT -12-N   Site ID



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM		Page 1 of 4

General Information

Study Area: Ottawa LRT   Site ID: ELRT-12-S

Date: July 30/14   Start time: End Time:

Weather Conditions: Overcast 21°C   Field Crew: MG LJP   Field Notes By: MG

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting	Northing	Description
0452899	5031135	South side of on Rw?
0452872	5031137	End

Surrounding Landuse: Residential ☐ Agriculture ☐ Forest ☐ Other; Meadow ☐ Wetland ☒ Livestock ☐

Description:

Type of Watercourse: Intermittent ☐ Permanent ☐ Ephemeral ☐; Channelized ☐ Natural Channel ☒ ☐

Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Is any portion of the water body underground or not as mapped? Y / (N)
If Yes describe:

GPS Coordinate: Easting -   Northing -   Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

Flat, slightly rolly.

In-Situ Water Quality

WT (°C):   AT(°C):
pH: Cond (s/cm):
D.O. (mg/L)
Water Clarity: Clear ☐ Turbid ☐
Water Colour:
Notes:

Ground Water and Seepage Indicators

Watercress ☐ Iron Staining ☐ Bubbling ☐ Other ☐; Bank Seepage ☐ None ☒ ☐

Details:

ELRT 12S

Fisheries Habitat Assessment

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m):		Mean Wetted Depth (m):	
Mean Bankfull Width (m):		Mean Bankfull Depth (m):	
Mean Top of Bank Width (m):		Mean Top of Bank Depth (m):	

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

Habitat

Substrate (< = >): Bo - Boulder, Co - Cobble, Gr - Gravel, Sa - Sand, Si - Silt, Cl - Clay, MK-Muck, DT-Detritus

Description: Si > MK

Morphological Structure (%)

Pool	Riffle	Run	Flat
			100

Notes:

Instream Cover (%)

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
				100		Average Depth: (% Cover)

Note: Low = 0 - 30%; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Cattails

Canopy Cover (% closed cover): 100-90% ☐ 90-60% ☐ 60-30% ☒ 30-1% ☐ 0% ☐

Types of Cover (% cover): Trees 5 Shrubs 5 Grasses 95 Herbaceous; Man-made structures; Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Buckthorn, Cattail

Riparian Vegetation

Width and Description of riparian vegetation: LB - 2+   RB - 2+

Overhanging Vegetation Present (Y) / N
Description of Overhanging Vegetation: % Overhanging Vegetation: 95%

Obstructions to Fish Passage

None Observed ☒ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m)   GPS Coordinates:

Fisheries Habitat Assessment

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Other General Comments Regarding the Study Area:

- Wetland drainage
- No water/ Stagnant.

Additional UTM Coordinates:

Photo log

Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

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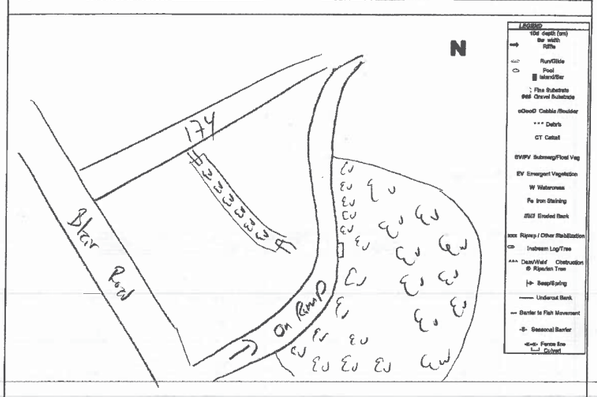
Watercourse Sketch

Study Area: ELRT 12s Site ID



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-13-N

Date: July 30/14 Start time: End Time:

Weather Conditions: Rainy. Field Crew: MG+JP

Field Notes By: MG

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 0453885 Northing: 5032336 Description:

Easting: Northing: Description:

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☒ Meadow ☒
Agriculture ☐ Wetland ☐
Forest ☐ Livestock ☐
Other

Description:

Type of Watercourse

Intermittent ☐ Channelized ☐
Permanent ☐ Natural Channel ☐
Ephemeral ☐

Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)

Is any portion of the water body underground or not as mapped? (Y) / N

If Yes describe:

Partial Watercourse underground.

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)

Sloping towards waterbody.

In-Situ Water Quality

WT (°C): AT(°C):
pH: Cond (s/cm):
D.O. (mg/L)
Water Clarity: Clear ☐ Turbid ☐
Water Colour:
Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☐
Bubbling ☐ _____
Other ☐
Details:

Fisheries Habitat Assessment

ELRT 13N

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m):		Mean Wetted Depth (m):	
Mean Bankfull Width (m):		Mean Bankfull Depth (m):	
Mean Top of Bank Width (m):		Mean Top of Bank Depth (m):	

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description

Morphological Structure (%)

Pool	Riffle	Run	Flat

Notes:

Instream Cover (%)

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
						Average Depth: (% Cover)

Note: Low = 0 - 30% ; Moderate = 30 - 75%; High = 75 - 100%

*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Canopy Cover (% closed cover):

100-80% ☐ 30-1% ☐
90-60% ☐ 0% ☐
60-30% ☐

Types of Cover (% cover)

Trees Shrubs Man-made structures
Grasses Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)

Riparian Vegetation

Width and Description of riparian vegetation: LB - RB -

Overhanging Vegetation Present Y / N % Overhanging Vegetation:

Description of Overhanging Vegetation:

Obstructions to Fish Passage

None Observed ☐ Man-Made ☐ Natural ☐ Low Flow Barrier ☐

Description of Barrier:

Height of Barrier (m) GPS Coordinates:

Fisheries Habitat Assessment

AECOM Date: ELRT - 13N Page 3 of 4

Other General Comments Regarding the Study Area:

- Watercourse Surveyed under Hwy #174
- Numerous Culverts and tile drains flow into Surrounding area
- highly impacted US/DS.

Additional UTM Coordinates:

Shawn 519-774-2447.

Photo log

Picture #	Description	Picture #	Description

Fisheries Habitat Assessment

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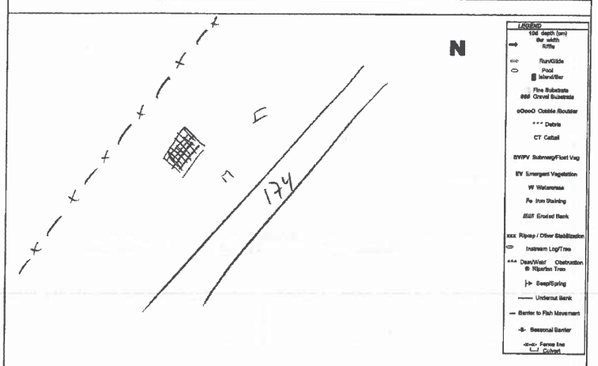
Watercourse Sketch

Study Area: ELRT 13N Site ID:



Horizontal View of Channel

Fisheries Habitat Assessment

AECOM Page 1 of 4

General Information

Study Area: Ottawa LRT Site ID: ELRT-13-S

Date: JLY 23/19 Start time: End Time:

Weather Conditions: Overcast 21C Field Crew: MC HSP

Field Notes By: MC

Site Location

UTM Co-ordinates (continue on page 3 if necessary)

Easting: 0455970 Northing: 5032331 Description:

Easting: 0455993 Northing: 5032340 Description: End

Easting: Northing: Description:

Easting: Northing: Description:

Surrounding Landuse

Residential ☐ Meadow ☐
Agriculture ☐ Wetland ☐
Forest ☒ Livestock ☐
Other
Description:

Type of Watercourse

Intermittent ☑ Channelized ☐
Permanent ☐ Natural Channel ☒
Ephemeral ☐
Description:

Notes: (include any inputs into the system i.e. tile drainage, seepages, overland flow)
Numerous tile drains and culverts. overland flow.

Is any portion of the water body underground or not as mapped? Y (N)
If Yes describe:

GPS Coordinate: Easting - Northing - Description-

Description of Land Topography Surrounding Water Body (rolling hills, sloping towards water body)
Sloping towards water body

In-Situ Water Quality

WT (°C):	16.02	AT(°C):	21
pH:	8.11	Cond (mS/cm):	2.59
D.O. (mg/L)	7.21		

Water Clarity: Clear ☐ Turbid ☒

Water Colour: Slightly turbid, grey

Notes:

Ground Water and Seepage Indicators

Watercress ☐ Bank Seepage ☐
Iron Staining ☐ None ☑
Bubbling ☐
Other ☐
Details:

Fisheries Habitat Assessment

ELRT 13S

Stream Morphology

Site Length (m):

Channel Dimensions

Mean Wetted Width (m):	1.0	Mean Wetted Depth (m):	0.2
Mean Bankfull Width (m):	/	Mean Bankfull Depth (m):	/
Mean Top of Bank Width (m):	/	Mean Top of Bank Depth (m):	/

Bank Stability:

	Stable	Slightly unstable	Moderately unstable	Unstable
Left Bank	☐	☐	☐	☒
Right Bank	☐	☐	☒	☐

Description:

Flow Description: (high or low flow conditions, stagnant, etc)
medium flow after rain event

Habitat

Substrate (< = >)
Bo - Boulder
Co - Cobble
Gr - Gravel
Sa - Sand
Si - Silt
Cl - Clay
MK-Muck
DT-Detritus

Description: Co>Gr>Cl>Si>MK

Morphological Structure (%)

Pool	Riffle	Run	Flat
25	50	25	

Notes:

Instream Cover (%) 50

Other	Woody Debris	Boulders	Cobble	Aquatic Vegetation*	None	Undercut Banks
	50	25	25			Average Depth: (% Cover)

Note: Low = 0 - 30%; Moderate = 30 - 75%; High = 75 - 100%
*Aquatic Vegetation Species Present (algae, submergent, emergent etc.)

Canopy Cover (% closed cover):

100-90% ☐ 30-1% ☐
90-60% ☐ 0% ☐
60-30% ☒

Types of Cover (% cover)

Trees 40 Shrubs 30 Man-made structures
Grasses 10 Herbaceous Other

Note: Low = 0 - 30%; Moderate = 30 - 60%; High = 60 - 100%

Notes: (vegetation species, types of structures)
White pine, elm, Sumac, manitoba maple, buckthorn

Riparian Vegetation

Width and Description of riparian vegetation: LB - 45m Forest RB - 45m meadow / forest

Overhanging Vegetation Present (Y) N 30 % Overhanging Vegetation:

Description of Overhanging Vegetation:
grasses

Obstructions to Fish Passage

None Observed ☐ Man-Made ☒ Natural ☐ Low Flow Barrier ☒

Description of Barrier: - culvert during low flow
" substrate " "

Height of Barrier (m) GPS Coordinates:

AECOM Date: ELRT -13s

Other General Comments Regarding the Study Area:

- lots of garbage
- debris piles, high flows
- undercut/eroded banks
- road waste in Pool
- 4 culverts drain into Pool

Additional UTM Coordinates:

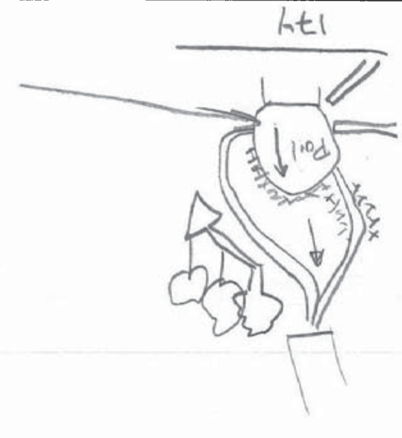
Photo log

Picture #	Description	Picture #	Description

AECOM

Watercourse Sketch

Study Area: ELRT 13s Site ID



N

LEGEND

- 10d depth (cm), 8w width, Riffle
- Run/Glide
- Pool
- Island/Bar
- Fine Substrate
- Gravel Substrate
- oOooO Cobble/Boulder
- *** Debris
- CT Cattail
- SV/FV Submerg/Float Veg
- EV Emergent Vegetation
- W Watercress
- Fe Iron Staining
- Eroded Bank
- xxx Riprap / Other Stabilization
- Instream Log/Tree
- Dam/Weir/ Obstruction
- Riparian Tree
- Seep/Spring
- Undercut Bank
- Barrier to Fish Movement
- Seasonal Barrier
- Fence line
- Culvert

Horizontal View of Channel

Appendix D

Aquatic Habitat Representative Photographs

Photograph 1. ↑
ELRT1N

Photograph 2. ↑
ELRT1N

Photograph 3. ↑
ELRT1S

Photograph 4. ↑
ELRT1S

Photograph 5. ELRT2N

Photograph 6. ELRT2N

Photograph 7. ELRT2S

Photograph 8. ELRT2S

Photograph 9. ELRT3N

Photograph 10. ELRT3N

Photograph 11. ELRT3S

Photograph 12. ELRT3S

Photograph 13. ELRT4N

Photograph 14. ELRT4N

Photograph 15. ELRT4S

Photograph 16. ELRT4S

Photograph 17. ELRT5N

Photograph 18. ELRT5N

Photograph 19. ELRT6N

Photograph 20. ELRT6N

Photograph 21. ↑
ELRT6S

Photograph 22. ↑
ELRT6S

Photograph 22. ↑
ELRT7N

Photograph 23. ↑
ELRT7N

Photograph 24. ↑
ELRT8N

Photograph 25. ↑
ELRT8N

Photograph 25. ↑
ELRT8S

Photograph 26. ↑
ELRT8S

Photograph 27. ↑
ELRT9N

Photograph 28. ↑
ELRT9N

Photograph 29. ↑
ELRT9S

Photograph 30. ↑
ELRT9S

Photograph 31. ↑
ELRT10N

Photograph 32. ↑
ELRT10N

Photograph 33. ↑
ELRT10S

Photograph 34. ↑
ELRT10S

Photograph 35. ELRT11S

Photograph 36. ELRT11S

Photograph 37. ELRT12N

Photograph 38. ELRT12N

Photograph 38. ELRT12S

Photograph 39. ELRT12S

Photograph 40. ELRT13N

Photograph 41. ELRT13N

Photograph 42. ↑
ELRT13S

Photograph 43. ↑
ELRT13S

Appendix E

Aquatic and Terrestrial Existing Conditions Table

Route	Date Assessed	Watercourse Name	Aquatic Findings	In-situ water quality readings	Fish Species	Permanent/ Intermittent/ Ephemeral	MAP ID	Terrestrial Findings
ELRT-1N	28-Jul-14		The reach downstream of the 174 follows a naturally meandering channel with a riffle/run/pool morphology sequence. The average width of the channel was 2.7 m and average wetted width of approximately 0.8 m. These values however may not be indicative of base flows as the assessments were made shortly after a period of substantial precipitation. Substrates consisted of clay, cobble, gravel, silt and muck. There was heavy erosion along the banks of the watercourse with the left bank showing the heaviest signs of erosion, suggesting that flows at times could be quite high. The assessed portion of the watercourse has already been modified with riprap placed throughout the majority of the assessed area. This riprap is likely to create barriers to migration with numerous areas presenting restrictions during low flows.	Water Temperature (°C): 18.9 Air Temperature (°C): 19 pH: 7.85 Dissolved Oxygen (mg/L) 7.91 Conductivity (µs/cm) 1.98	Cyprinids observed	Intermittent	P114	**MAM2-2: Reed Canary Grass Mineral Meadow Marsh Type** present along watercourse dominated by reed canary grass (*Phalaris arundinacea*), New England aster (*Symphyotrichum novae-angliea*), cow vetch (*Vicca cracs*)
							P115	**CUW1: Mineral Cultural Woodland Ecosite**. Dominated by Green ash (*Fraxinus pennsylvanica*)
							P113, P115, P117, P120	**CUM1-1: Dry-Moist Old Field Meadow Type.** Community is present in small patches throughout the cultural woodland community, as well as a stip alongside the road. Dominant species observed incude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thistle (*Sonchus arvensis*), bird's foot trefoil (*Lotus corniculatos*), and smooth brome (*Bormis inermis*)
ELRT-1S	29-Jul-14		No watercourse present at the time of assessment with no water identified at the culvert under 174 . Appears it may be inundated with water during periods of precipitation based on channel running alongside Hwy 174.			Ephemeral	P116	**MAS2-1: Cattail Shallow Marsh Type.** Community present at intersection of Trim Road and Highway 174.
							P118	**MAM2-2: Reed Canary Grass Mineral Meadow Marsh Type** present adjacent ot he road and is dominated by reed canary grass (Phalaris arundinacea), New England aster (*Symphyotrichum nova-angliea*), cow vetch (*Vicas cracs*)
							P104, P119	**CUM1-1: Dry-Moist Old Field Meadow Type.** Community is present as a stip alongside the road.
ELRT-2N	29-Jul-14	Taylor Creek	The initial reach downstream of the 174 has been heavily altered with a pool created at the mouth of the culvert, which at the time of assessment was over 1.5m deep. Downstream of the pool the channel follows a modified riffle section before entering another pool which then turns sharply to the east. Numerous trees had fallen into the watercourse through the erosion of these banks. From this point downstream the watercourse follows a more natural sequence with riatls being the dominant morphological sequence in this section. The average width of the assessed reach was 3.1 m and an average wetted width of approximately 2.5 m. These values however, may not be indicative of base flows as the assessments were made shortly after a period of substantial precipitation. Substrates in the modified section consisted of cobble, gravel, silt and clay, whereas in the natural section it consisted of clay, gravel, silt and muck.	Water Temperature (°C): 14.31 Air Temperature (°C): 14 pH: 8.25 Dissolved Oxygen (mg/L) 6.43 Conductivity (µs/cm) 1.74	RV/CA: Banded killifish, Brassy Minnow, Brook stickleback, Central Mudminnow, Common shiner, Creek chub, Fathead minnow, Pumpkinseed, White sucker MNR: bluntnose minnow, common shiner, creek chub, eastern blacknose dace, johnny darter, longnose dace, rock bass, sauger, trout-perch, white sucker, yellow perch.	Permanent	P164	**MAM2-2: Reed canary Grass Mineral Meadow Marsh Type** present along watercourse dominated by reed canary grass (Phalaris arundinacea), purple loosestrife (*Lythrum salicaria*), jewelweed (*Impatiens capensis*), and moneywort (*Lysmachia nummularia*).
							P102, P165	**FOD6-5: Fresh-Moist Sugar Maple Deciduous Forest Type.** Community is located on both sides of the creek directly adjacent to the MAM2-2 community. Dominant species observed incude sugar maple (Acer saccharum), basswood (Tilia americana), green ash, and white elm (Ulmus americana).
							P101, P103.	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed incude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thistle (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
ELRT-2S	29-Jul-14	Taylor Creek	Similar to the downstream section, the area surrounding the culvert under the 174 has been heavily altered with the channel being modified and straightened with gabion baskets lining the banks of the watercourse. The average wetted width of this section 2.5m with an average depth of 0.15m. The substrate through this section consisted of cobble, gravel, silt and muck. There was a thick layer of algae covering the substrate in this area suggesting low flows at times. This is likely associated with the beaver dam located approximately 25m upstream from the culvert. The area upstream of the dam is considered to be a pool and was approximately 3m wide at the time of assessment. Average depth recorded for this area weren't available due to the thick layer of sediment in the pool.	Water Temperature (°C): 18.13 Air Temperature (°C): 27 pH: 8.26 Dissolved Oxygen (mg/L) 8.38 Conductivity (µs/cm) 1.45	RV/CA: Banded killifish, Brassy Minnow, Brook stickleback, Central Mudminnow, Common shiner, Creek chub, Fathead minnow, Pumpkinseed, White sucker MNR: bluntnose minnow, common shiner, creek chub, eastern blacknose dace, johnny darter, longnose dace, rock bass, sauger, trout-perch, white sucker, yellow perch.	Permanent	P131, P130	**FOD6-5: Fresh-Moist Sugar Maple Deciduous Forest Type.** This community is found on the eastern side of the watercourse and is dominated by sugar maple, basswood, green ash, and manitoba maple. Inclusion: MAM2-10: Fen, Mineral Meadow Marsh Type/CUM1-1: Dry-Moist Old Field Meadow Type found along creek.
							P100	**FOD6-1: Fresh-Moist Poplar Deciduous Forest Type**. This community is found on the western side of the watercourse and is dominated by trembling aspen (Populus tremuloides)
							P98	**CUM1-1: Dry-Moist Old Field Meadow Type.** Community is present as a small strip alongside the road. Dominant species observed incude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thistle (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)

Route	Date Assessed	Watercourse Name	Aquatic Findings	In-situ water quality readings	Fish Species	Permanent/ Intermittent/ Ephemeral	MAP ID	Terrestrial Findings
ELRT-3N	29-Jul-14		No watercourse present at the time of assessment, only a low lying wet depression was identified. A culvert was identified exiting from under the 174 onto riprap approximately 20m above the low lying wet meadow.			Ephemeral	P128	**MAM2-2: Reed canary Grass Mineral Meadow Marsh Type.** Is found along watercourse dominated by reed canary grass (Phalaris arundinacea), and cattail (Typha latifolia)
							P126, P129	**FOD9-3: Fresh-Moist Bur Oak Deciduous Forest Type**. This community is located on both sides of the watercourse. The area was fenced and access was limited. Dominant species observed inlcuded: bur oak (Quercus macrocarpa), green ash, basswood, and white elm.
							P101, P121, P127, P166	**CUM1-1: Dry-Moist Old Field Meadow Type.** Community is present as a small patch on the east side of the creek and a larger patch on the west of the FOD9-3 community. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thistle (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), reed canary grass, and smooth brome (Bormis inermis)
ELRT-3S	29-Jul-14		No watercourse present at the time of assessment with no water or culvert identified at the 174. Appears to be a roadside drainage ditch.			Unknown	P98	**CUM1-1: Dry-Moist Old Field Meadow Type.** This community is found along the road with a small MAM2 community running through the middle following the existing drainage.
ELRT-4N	29-Jul-14		This heavy altered watercourse appears to have had the initial 35m section completely encased with gabion baskets (banks and substrate), assumed to decrease downstream sedimentation. This gabion basket area was heavily choked with aquatic vegetation and no defined channel was identified. The 20m section downstream followed a natural channel and was laden with thick sediment. This section had an average wetted width of 2.0m with an average depth of 0.2m with overhanging grasses providing the majority of canopy cover to this section. In stream cover was provided equally by woody debris and aquatic vegetation. A barrier to fish migration was observed in the watercourse and appeared to be an approximate 0.3m wooden bern installed across the channel. Tile inputs were identifed within this section, and just downstream of the assessed area a culvert was identified draining into the watercourse.	Water Temperature (°C): 14.41 Air Temperature (°C): 16 pH: 8.04 Dissolved Oxygen (mg/L) 5.23 Conductivity (µs/cm) 3.12		Permanent	P122	**MAM2-2: Reed canry Grass Mineral Meadow Marsh.** This community is found running along the watercourse. Community is dominated by reed canary grass with scattered cattail, purple loosestrife, and purple-stemmed aster *(Symphiotrichum puniceus)*.
							P124, P125	**FOD7: Fresh-Moist Lowland Deciduous Froest Ecosite**. Community is present along both side of the watercourse. Dominant species observed included green ash, trembling aspen, Manitoba maple, and white elm.
							P123	**FOD8-1: Fresh-Moist Poplar Deciduous Forest Type**. This community is found directly behind the FOD7 community. Dominant species observed included trembling aspen and green ash.
							P101	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thistle (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
ELRT-4S	29-Jul-14		Similar to the downstream section, the upstream area was also heavily altered and had a gabion basket lined watercourse. This gabion basket area was heavily choked with aquatic vegetation and no defined channel was identified. The area upstream of the gabion basket channel was relatively natural with a thick layer of sediment built up at the area directly upstream of the gabion baskets. There was very little water present at the time of the assessment with the channel having an average width of 0.4m.	Water Temperature (°C): 20.65 Air Temperature (°C): 27 pH: 6.58 Dissolved Oxygen (mg/L) 6.58 Conductivity (µs/cm) 2.92		Permanent	P122	**MAM2-2: Reed canry Grass Mineral Meadow Marsh.** This community runs along a small drainage feature towards the FOD8-1 community.
							P123	F**OD8-1: Fresh-Moist Poplar Deciduous Forest Type**. This community is found along the watercouse. Dominant species observed included trembling aspen, white elm, bur oak, and suagr maple.
							P96, P99	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thistle (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
ELRT-5N	29-Jul-14		This watercourse appears to be a series of roadside drainage ditches running parallel to the 174 in an east-west direction. These dithches form a series of pool areas between numerous culverts. The water was stagnant and had thick aquatic vegetation throughout. No flow was identifed within the pool sections and with the dissolved oxygen levels reading 0.00 (mg/L), this area was not identified as being suitable for supporting fish.	Water Temperature (°C): 16.44 Air Temperature (°C): 17 pH: 7.57 Dissolved Oxygen (mg/L) 0.00 Conductivity (µs/cm) 3.46		Intermittent	P87	**MAS2-1: Cattail Shallow Marsh Type**. Community is located along a small drainage feature next to the road.
							P85, P84, P88	**CUM1-1: Dry-Moist Old Field Meadow Type.** Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thistle (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
ELRT-5S	29-Jul-14					Unknown	P87	**MAS2-1: Cattail Shallow Marsh Type**. Community is located along a small drainage feature next to the road
							along roadside ditch	**MAM2-2: Reed canary Grass Mineral Meadow Marsh Type**. Community is found next to the road.

Route	Date Assessed	Watercourse Name	Aquatic Findings	In-situ water quality readings	Fish Species	Permanent/ Intermittent/ Ephemeral	MAP ID	Terrestrial Findings
							P86	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thistle (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
ELRT-6N	29-Jul-14	Bilberry Creek	Only visual assessments of this watercourse were made due to the area surrounding the culvert being completely fenced off and assumed that no access to the private property was obtained therefore limited information available at this site. From the visual assessment it appears that similar to a number of the watercourses in this stretch has been heavily modified with the use of gabion baskets to line the margins and assumed the substrate too. The area directly downstream of the culvert was a pool area and then a small channel flowed downstream from there.	Water Temperature (°C): - Air Temperature (°C): - pH: - Dissolved Oxygen (mg/L) - Conductivity (µs/cm) -	RVCA: Black crappie, Rockbass, Pumpkinseed, Smallmouth bass, Bluntnose minnow, Creek chub, Emerald Shiner, Fallfish, Fathead minnow, Longnose dace, Spotfin shiner, Spottail shiner, White sucker, Burbot, Brook stickleback, Brown bullhead, Yellow perch, Central mudminnow	Permanent	P151, P156	**MAM2-2: Reed canary Grass Mineral Meadow Marsh Type**. Community is found next to the watercourse.
							P149, P151, P152	F**OM: Mixed Forest/FOD7: Fresh-Moist Lowland Deciduous Forest Ecosite**. This community is found on the west side of the watercourse and a few hundred meters north of the road. The east side was manicured. Dominant species observed inlcuded Manitoba maple, white pine (Pinus strobus), green ash, black walnut (Juglans nigra), and white spruce (Picea glauca).
							P154, P157, P78	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thistle (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
ELRT-6S	29-Jul-14		No identifiable watercourse observed in the upstream assessment and is assumed it is buried; however, no access to the private property was obtained therefore limited information available at this site.			Unknown	P80	**CUT1-1: Sumac Cultural Thicket Type**. Located along the road.
							P77, P80	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thistle (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
ELRT-7N	29-Jul-14	Bilberry Creek	This watercourse was identified through the GIS mapping and named as Bilberry Creek. A roadside assessment was not possible due to unsafe parking along the side of 174, so an assessment was made at the closest available location which was off of Fortune Drive in Orleans. At the time of assessment the watercourse flowed out of a culvert on the backside of a berm in a park area and through an overgrown cultural thicket valley. The watercourse which was found at the bottom of the valley had a mean wetted width of 0.45m and a mean wetted depth of 0.05m. Substrates consisted of silt, muck, gravel and sand. Based on the available evidence, it is expected that this watercourse is dry for a good portion of the year.	Water Temperature (°C): 15.58 Air Temperature (°C): 17 pH: 8.18 Dissolved Oxygen (mg/L) 4.99 Conductivity (µs/cm) 10.6	RVCA: Black crappie, Rockbass, Pumpkinseed, Smallmouth bass, Bluntnose minnow, Creek chub, Emerald Shiner, Fallfish, Fathead minnow, Longnose dace, Spotfin shiner, Spottail shiner, White sucker, Burbot, Brook stickleback, Brown bullhead, Yellow perch, Central mudminnow	Intermittent	P112	**CUM1-1: Dry-Moist Old Field Meadow Type**. This community is located along a small drainage feature within a park off of Fortune Drive. A small **CUT1: Mineral Cultural Thicket Ecosite inclusion** runs down the centre of the drain surrounded by the cultural meadow and manicured lawn. Dominant species observed included amur maple (Acer ginnala), Manitoba maple, sumac, common buckthorn (Rhamnus cathartica), smooth brome, sow thistle, wild carrot, and reed canary grass.
ELRT-7S	29-Jul-14					Unknown	n/a	none
ELRT-8N	29-Jul-14		This watercourse appears to be a roadside drainage ditch which collects water along the 174 and flows towards the Ottawa River through a farmers field. At the time of assessment the watercourse was dry and heavily chocked with vegetation. The substrate appeared to be a mix of silt, muck and gravel.	Water Temperature (°C): - Air Temperature (°C): - pH: - Dissolved Oxygen (mg/L) - Conductivity (µs/cm) -		Ephemeral	n/a	Deciduous Treerow: found along small drainage feature. Species observed inlcuded Manitoba maple and green ash.
							P63	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thistle (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
ELRT-8S	29-Jul-14		Similar to the downstream section, this watercourse appears to be a roadside drainage ditch which collects water along the 174; however this channel appears to collect water from the golf course that it flows through too; however, this notion wasn't able to be confirmed as the area directly in front of the culvert was fenced off. At the time of assessment the watercourse was dry and heavily chocked with vegetation and the substrate appeared to be a mix of silt, muck and gravel.	Water Temperature (°C): - Air Temperature (°C): - pH: - Dissolved Oxygen (mg/L) - Conductivity (µs/cm) -		Ephemeral	P64, P65, P66, P67	**MAM2-2: Reed canary Grass Mineral Meadow Marsh Type.** Community is located adjacent to the road with a small **MAS2-1: Shallow Cattail Marsh Type** with some standing water right at the culvert opening.
							P64, P65	**CUM1-1: Dry-Moist Old Field Meadow Type.** Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thistle (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)

Route	Date Assessed	Watercourse Name	Aquatic Findings	In-situ water quality readings	Fish Species	Permanent/ Intermittent/ Ephemeral	MAP ID	Terrestrial Findings
ELRT-9N	29-Jul-14		This watercourse flows under the 174 from the upstream section and also collects water from the north side of the 174; however, at the time of assessment the watercourse wasn't accessible due to the entire area surrounding the watercourse/culvert being fenced off.	Water Temperature (°C): - Air Temperature (°C): - pH: - Dissolved Oxygen (mg/L) - Conductivity (µs/cm) -		Intermittent	P171	**MAM2-2: Reed canary Grass Mineral Meadow Marsh Type.** This is a small community following the watercourse and is dominated by reed canary grass, Canada goldenrod, sow thistle and bouncing bet (*Saponaria officinalis*).
							P53, P54	**FOD9-3: Fresh-Moist Bur Oak Deciduous Forest Type**. This community is located on both sides of the watercourse. Dominant species observed inlcuded: bur oak (Quercus macrocarpa), white elm, green ash, Manitoba maple.
							P172	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thislte (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
ELRT-9S	29-Jul-14		This small watercourse flows through a heavily overgrown area with grasses covering the majority of the assessed area. The assessment area only included the area surrounding the culvert and approximately 25m upstream due to a fence blocking any further investigaton. The average wetted width at the time of assessment was 0.4m and an average depth of 0.03m. Substrates consisted mainly of sand, with gravel, silt and muck also evident. Woody debris provided the in-stream cover with the surrounding trees and shrubs providing the canopy cover. A tile input was identified within the main culvert area and was flowing at the time of assessment. It wasn't possible to identify where the tile drain flowed from.	Water Temperature (°C): 20.75 Air Temperature (°C): 27 pH: 8.47 Dissolved Oxygen (mg/L) 9.44 Conductivity (µs/cm) -		Intermittent	P171	**MAM2-2: Reed canary Grass Mineral Meadow Marsh Type**. This is a small community following the watercourse and is dominated by reed canary grass, Canada goldenrod, and sow thistle.
							P45	**FOD7-2: Fresh-Moist Ash Lowland Deciduous Forest Type**. This community is found adjacent to the road on the west side of the watercourse. A lot of dead ash were observed throughout as well as pockets of cattail, reed canary grass, and purple loosestrife.
							P46	**FOM7: Fresh-Moist White Cedar-Hardwood Mixed Forest Ecosite**. Community is located along the watercourse and is dominated by white cedar (Thuja occidentalis), green ash, white pine, and bur oak.
							P47	**CUP3: Coniferous Plantation**. Community is located just south of the cultural meadow found along the road. Dominant species observed inlcuded blue spruce (Picea pungens), and green ash.
							P145	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thislte (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
ELRT-10N	29-Jul-14	Greens Creek	Only visual assessments of this watercourse were made due to the area surrounding the culverts being completely fenced off and assumed that no access to the private property was obtained therefore limited information available at this site. From the visual assessment, Greens Creek flows under the 174 through a four culvert system with three having water flowing through them and the forth (west culvert) appeared to have very little water within it and numerous sets of animal prints were observed suggesting this culvert is being used as a mammal migration corridor. Greens Creek itself appeared to be a natural watercourse with a gravel, cobble, boulder and silt substrate. Through the use of a range finder, the approximate average wetted width in this section was 20m.	Water Temperature (°C): - Air Temperature (°C): - pH: - Dissolved Oxygen (mg/L) - Conductivity (µs/cm) -	RVCA: Black crappie, Largemouth bass, Pumpkinseed, Smallmouth bass, Blacknose dace, Common shiner, Creek chub, Fathead minnow, Golden shiner, Goldfish, Longnose dace, Northern redbelly dace, Quillback, Shorthead Redhorse, Silver redhorse, White sucker, Burbot, Brook stickleback, Brown bullhead, Channel catfish, Yellow bullhead, Longnose gar, Walleye, Trout-perch, Freshwater drum, Central mudminnow MNR: bluntnose minnow, common shiner, creek chub, eastern blacknose dace, johnny darter, longnose dace, rock bass, sauger, trout-perch, white sucker, yellow perch.	Permanent	P50	**MAM2-2: Reed canary Grass Mineral Meadow Marsh Type.** This is a small community following the watercourse and is dominated by reed canary grass, Canada goldenrod, sow thistle and bouncing bet (*Saponaria officinalis*).
							P54	**FOD9-3: Fresh-Moist Bur Oak Deciduous Forest Type**. This community is located on both sides of the watercourse. Dominant species observed inlcuded: bur oak (Quercus macrocarpa), white elm, green ash, Manitoba maple.
ELRT-10S	29-Jul-14	Greens Creek	The upstream section of Greens Creek is a wide, slow moving, natural watercourse which flows under the 174 through a four culvert system. There were large piles of woody debris built-up along a couple of the culverts with similar to the downstream section, the forth (west culvert) appeared to have very little water within it and the area surrounding the culvert was mostly blocked off from Greens Creek with a large sediment barrier built up within its general vicinity. It is assumed this culvert is being used as a mammal migration corridor. The average depth of the assessed area was 1 m and an average wetted width of approximately 8 m. Substrates in the modified section consisted of gravel, sand, silt and muck.	Water Temperature (°C): 19.56 Air Temperature (°C): 21 pH: 8.44 Dissolved Oxygen (mg/L) 9.43 Conductivity (µs/cm) 1.77	RVCA: Black crappie, Largemouth bass, Pumpkinseed, Smallmouth bass, Blacknose dace, Common shiner, Creek chub, Fathead minnow, Golden shiner, Goldfish, Longnose dace, Northern redbelly dace, Quillback, Shorthead Redhorse, Silver redhorse, White sucker, Burbot, Brook stickleback, Brown bullhead, Channel catfish, Yellow bullhead, Longnose gar, Walleye, Trout-perch, Freshwater drum, Central mudminnow MNR: bluntnose minnow, common	Permanent	P171	**MAM2-2: Reed canary Grass Mineral Meadow Marsh Type.** This is a small community following the watercourse and is dominated by reed canary grass, Canada goldenrod, and sow thistle.
							P44, P45	**FOD7-2: Fresh-Moist Ash Lowland Deciduous Forest Type**. This community is found adjacent to the road on the west side of the watercourse. A lot of dead ash were observed throughout as well as pockets of cattail, reed canary grass, and purple loosestrife.
							P46	**FOM7: Fresh-Moist White Cedar-Hardwood Mixed Forest Ecosite**. Community is located along the watercourse and is dominated by white cedar (Thuja occidentalis), green ash, white pine, and bur oak.

Route	Date Assessed	Watercourse Name	Aquatic Findings	In-situ water quality readings	Fish Species	Permanent/ Intermittent/ Ephemeral	MAP ID	Terrestrial Findings
					shiner, creek chub, eastern blacknose dace, johnny darter, longnose dace, rock bass, sauger, trout-perch, white sucker, yellow perch.		P47	**CUP3: Coniferous Plantation**. Community is located just south of the cultural meadow found along the road. Dominant species observed inlcuded blue spruce (Picea pungens), and green ash.
ELRT-11N	29-Jul-14					Unknown	n/a	none
ELRT-11S	29-Jul-14		This watercourse was only assessed on the south side of the 174 and appeared to be a roadside drainage ditch flowing into Greens Creek. The average wetted width was 1.2m and an average wetted depth of 0.1m. The substrate consisted of muck and silt and the water was stagnant at the time of assessment. Thick areas of algae, cattails and reed canary grass were identified within the watercourse and appeared to be adding to the stagnation of the water within it.			Intermittent	P17	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thislte (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
							P19	**CUW1: Mineral Cultural Woodland Ecosite**. This community is located just behind the cultural meadow community adjacent to the road. Dominant species observed inlcude white elm, trembling aspen, Norway spruce (Picea abies), and Manitoba maple.
ELRT-12N	30-Jul-14		This 18m section of watercourse appears to be a roadside drainage ditch which flows under the transitway into the assessed area and then continues under the Blair road exit and the 174 before connecting to the ELRT-12S culverts. The entire watercourse is surrounded by a thick, overgrown area of glossy buckthorn. At the time of assessment the watercourse had an average wetted width of 1.2m and an average wetted depth of 0.15m. These values however, may not be indicative of base flows as the assessments were made during a period of substantial precipitation. The substrate was dominated by silt with muck and cobbles also evident. A thick sheen layer of oil was also observed on the water.	Water Temperature (°C): 17.12 Air Temperature (°C): 14 pH: 8.05 Dissolved Oxygen (mg/L) 6.69 Conductivity (µs/cm) 2.04		Intermittent	P3	**CUT1: Mineral Cultural Thicket Ecosite**. Community is a small pocket alongside the road. Dominant species osberved inlcuded Russian olive (Elaeagnus angustifolia), glossy buckthorn (Frangula ulnus), common buckthorn, and sumac (Rhus hirta).
							P9, P1	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thislte (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
ELRT-12S	29-Jul-14		This assessed area is a series of culverts flowing from the 174 in a southern direction into a wetland marsh. At the time of assessment their was very little water within these sections and the water that was there was stagnant. Cattails and buckthorns were the dominant vegetation within the assessed area.			Intermittent	P168, P107, P108, P8, P7	**MAM2: Mineral Meadow Marsh**. This community is found along the road and is dominated by cattail, reed canary and common reed grass (*Phragmites australis*).
							P106	**SWD2-2: Green Ash Mineral Deciduous Swamp**. This community is located behind cattail marsh at the Blair Road on-ramp.
							P110	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thislte (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
							P6, P12, P109	**CUT1: Mineral Cultural Thicket Ecosite**. Community is a small pocket alongside the road. Dominant species osberved inlcuded Russian olive (Elaeagnus angustifolia), glossy buckthorn (Frangula ulnus), common buckthorn, and sumac (Rhus hirta).
ELRT-13N	30-Jul-14		No assessment of this section of the watercourse was available due to the fact that it appeared buried. Numerous culverts were identified in the assessment area and at the time of investigation water was draining towards the buried watercourse.	Water Temperature (°C): - Air Temperature (°C): - pH: - Dissolved Oxygen (mg/L) - Conductivity (µs/cm) -		Unknown	P38	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thislte (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis)
							P20	**FOM7: Fresh-Moist White Cedar-Hardwood Mixed Forest Ecosite**. Community is located along the watercourse and is dominated by white cedar (Thuja occidentalis), green ash, white pine, and bur oak.

Route	Date Assessed	Watercourse Name	Aquatic Findings	In-situ water quality readings	Fish Species	Permanent/ Intermittent/ Ephemeral	MAP ID	Terrestrial Findings
ELRT-13S	30-Jul-14		This heavily impacted watercourse flows in a southerly direction from the culvert under the 174 and is believed to be a tributary of Greens Creek. Numerous modifications to the watercourse are evident with three tile inputs draining into the pool area directly downstream from the culvert, as well as stabilisation in the areas surrounding the watecourse. It also appears that an old wooden structure has been removed from the area with lots of garbage and debris was identified throughout the assessed section. The watercourse had an average width of 1.0m and an average depth of 0.2m. The substrate consisted of a mix of cobble, gravel, clay, silt and muck in the pool area directly downstream from the culvert. Exiting the site, the watercourse flows through a CSP into another pool area before flowing into a box culvert. The banks had signs of heavy erosion and fallen trees were prominent within the assessed area.	Water Temperature (°C): 16.02 Air Temperature (°C): 21 pH: 8.11 Dissolved Oxygen (mg/L) 7.21 Conductivity (µs/cm) 2.59		Intermittent		**MAM2-2: Reed canary Grass Mineral Meadow Marsh/CUM1-1:Dry-Moist Old Fied Meadow Type Mosaic**. This community is found along the drain. Dominant species observed included reed canary grass, sow thistle, Canada goldenrod, early goldenrod (*Solidago juncea*), and cow vetch (*Vicia cracca*).
							P30	**CUM1-1: Dry-Moist Old Field Meadow Type**. Community is present as a small strip alongside the road. Dominant species observed inlcude wild carrot (Daucus carota), white sweet clover (Melilotus alba), sow thisite (Sonchus arvensis), bird's foot trefoil (Lotus corniculatus), and smooth brome (Bormis inermis).
							P29	**CUW1: Mineral Cultural Woodland Ecosite**. Community is located along watercourse. Dominant species observed inlcuded white elm, Manitoba maple, white pine, and trembling aspen.

Appendix F

2012 Terrestrial Field Data

Date Assessed	Map Reference Code	ELC Community	Description (Description based on 2012 Field work)
September 17, 2012	P6	CUT1: Mineral Cultural Thicket	The community is dominated by glossy buckthorn (*Rhamnus frangula*), and riverbank grape (*Vitis riparia*). Some scaterred trees were observed within the community and consisted of white elm (*Ulmus americana*) and cottonwood (*Populus deltoides*). Species observed within the herbaceous layer included Canada goldenrod (*Solidago canadensis*), reed canary grass (*Phalaris arundinacea*), butter and eggs (*Linaria vulgaris*), and crown vetch (*Coronilla varia*).
September 17, 2012	P2	CUM1-1: Dry-Moist Old Field Meadow Type.	Plant species composition among all the observed cultural meadow communities remained consisted throughout the study area. Species included those commonly observed in disturbed conditions such as common burdock (*Arctium minus*), comoon ragweed (*Ambrosia artemisiifolia*), chicory (*Cichorium intybus*), Canada thistle (*Cirsium arvense*)
September 17, 2012	P168	MAM2: Mineral Meadow Marsh	Community is dominated by common reed grass (*Phragmites australis*).
September 17, 2012	P12	CUT1: Mineral Cultural Thicket Ecosite	This community is dominated by glossy buckthorn.
September 17, 2012	P19	CUW1: Mineral Cultural Woodland Ecosite	This community had an open canopy dominated by American elm. The shrub layer is dominated by common buckthorn (*Rhamnus cathartica*) and staghorn sumac (*Rhus hirta*) and the ground cover layer is Kentucky bluegrass (*Poa pratensis*) and dog strangling vine (*Cynanchum rossicum*).
September 17, 2012	P17	CUM1-1: Dry-Moist Old Field Meadow Type	This community I dominated by timothy (*Phleum pratense*), vetch (*Vicia cracca*), white sweet clover (*Melilotus alba*), wild carrot (*Daucus carota*), common mullein (*Verbascum thapsus*), and dog strangling vine.
September 17, 2012	P18	FOD8-1: Fresh-Moist Poplar Deciduous Forest Type	Canopy is dominated by trembling aspen (*Populus tremuloides*) and the sub-canopy and shrub layers are dominated by trembling aspen, green ash (*Fraxinus pennsylvanica*), and glossy buckthorn.
September 17, 2012	P174	CUW1: Mineral Cultural Woodland Ecosite	Canopy is dominated by large-tooth aspen (*Populus grandidentata*), American elm, and white pine (*Pinus strobus*).
September 17, 2012	P25	FOM5-2: Dry-Fresh Poplar Mixed Type	Community is dominated by trembling aspen, white pine, white spruce (*Picea glauca*), and paper birch (*Betula papyrifera*).
September 17, 2012	P26	FOD5a: Dry-Fresh Sugar Maple Deciduous Forest Ecosite	Community is dominated by red maple (*Acer rubra*), large-tooth aspen, and white ash (*Fraxinus americana*). The sub-canopy is dominated by red maple and common buckthorn, with the shrub layer dominated by common buckthorn and choke cherry (*Prunus virginiana*).
September 17, 2012	P31	CUP3-1: Red Pine Plantation	Community is dominated by red pine (*Pinus resinosa*) with buckthorn observed within the sub-canopy and the shrub layer.

Date Assessed	Map Reference Code	ELC Community	Description (Description based on 2012 Field work)
September 17, 2012	P33	CUT1: Mineral Cultural Thicket Ecosite	Community is dominated by common buckthorn, nannyberry (*Viburnum lentago*), and staghorn sumac with scattered trees including bur oak (*Quercus macrocarpa*), and green ash. Species observed within the ground cover included Canada goldenrod, ciliolate aster (*Symphyotrichum ciliolatum*), kentucky bluegrass, and sow thistle (*Sonchus arvensis*).
September 17, 2012	P36	FOD8-1: Fresh-Moist Poplar Deciduous Forest Type	Community is dominated by white poplar (*Populus alba*).
September 17, 2012	P57	CUM1-1: Dry-Moist Old Field Meadow Type	This community is dominated by timothy, vetch, white sweet clover, wild carrot, common mullein, and dog strangling vine.
September 17, 2012	P58	FOD7-2: Fresh-Moist Green Ash Lowland Deciduous Forest Type	Community is dominated by young green ash, and common buckthorn.
September 17, 2012	P62	CUW1: Mineral Cultural Woodland Ecosite	Community is found on rocky outcrops. Dominant species observed within the canopy include Manitoba maple (Acer negundo), white cedar (*Thuja occidentalis*), and sugar maple (*Acer saccharum*).
September 17, 2012	P67, P66	MAS2-1: Cattail Mineral Shallow Marsh Type	Community was located along the road and was dominated by narrow-leaved cattail (*Typha angustifolia*).
September 19, 2012	P68, P69, P73,P74	CUM1-1: Dry-Moist Old Field Meadow Type	This community is dominated by timothy, vetch, white sweet clover, wild carrot, common mullein, and dog strangling vine. Scattered roadside planted trees were also observed throughout and consisted of blue spruce (*Picea pungens*), Russian olive (*Elaeagnus angustifolifa*), Austrian pine (*Pinus nigra*), silver maple (*Acer saccharinum*), and green ash.
September 19, 2012	P94	FOM5-2: Dry-Fresh Poplar Mixed Type	Canopy was dominated by trembling aspen, and white pine, while the sub-canopy is dominated by sugar maple, and green ash. The shrub layer was dominated by choke cherry and the ground cover layer consisted of tall goldenrod (*Solidago altissima*), common mugwort (*Artemisia vulgaris*), and immature sugar maple.

Appendix G

Terrestrial Representative Photos

Photograph 1. ↑
View of typical cultural meadow community found along the road with a small meadow marsh along the centre.

Photograph 2. ↑
View 2 of typical cultural meadow with a small meadow marsh observed along the edge of the road.

Photograph 3. ↑
View of typical reed-canary grass meadow marsh community found along the edges of smaller watercourses within the study area

Photograph 4. ↑
View of vegetation communities along Taylor Creek

Photograph 5. ↑
View of vegetation communities along the north side of Bilberry Creek

Photograph 6. ↑
Thicket and cultural meadow found along the north side of Bilberry Creek

Photograph 7. ↑
View of vegetation communities along the north side of Green's Creek

Photograph 8. ↑
View 2 of vegetation communities along the north side of Green's Creek

Photograph 9. ↑
View of wetland community at Blair road on ramp

Photograph 10. ↑
View of vegetation communities found along the south side of Green's Creek

Photograph 11. ↑
View of meadow marsh and cultural meadow communities at White Sands Golf Course and Practice Centre.

Photograph 12. ↑
View of vegetation along the south side of Bilberry Creek

Photograph 13. ↑
View of vegetation along Taylor Creek.

Photograph 14. ↑
View of confirmed Barn Swallow nesting at the Taylor Creek Culvert.

Appendix H

Plant Species List

BOTANICAL NAME	COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	ONMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS Site District 6E-7
SOURCE		GUSHAM ET AL.	GUSHAM ET AL.	GUSHAM ET AL.	NEWMASTER			NEWMASTER	
PTERIDOPHYTES	**FERNS & ALLIES**								
Preridium	*aquilinum var. latiusculum*	2	3		S5			G5T	Common
Dryopteridaceae	**Wood Fern Family**								
Athyrium	*filix-femina*	4	0		S5			G5T5	Common
Cystopteris	*tenuis*	6	5		S5			G4G5	Common
Dryopteris	*carthusiana*	5	-2		S5			G5	Common
Matteuccia	*struthiopteris*	5	-3		S5			G5	Common
Onoclea	*sensibilis*	4	-3		S5			G5	Common
Equisetaceae	**Horsetail Family**								
Equisetum	*arvense*	0	0		S5			G5	Common
Equisetum	*hyemale var. affine*	2	-2		S5			G5T5	common
Osmundaceae	**Royal Fern Family**								
Osmunda	*cinnamomea*	7	-3		S5			G5	Common
Osmunda	*regalis var. spectabilis*	7	-5		S5			G5T	Common
GYMNOSPERMS	**CONIFERS**								
Cupressaceae	**Cedar Family**								
Thuja	*occidentalis*	4	-3		S5			G5	Common
Pinaceae	**Pine Family**								
Abies	*balsamea*	5	-3		S5			G5	Common
Picea	*abies*		5	-1	SE3			G?	
Picea	*glauca*	6	3		S5			G5	Common
Picea	*mariana*	8	-3		S5			G5	
Pinus	*nigra*		-5	-1	SE2			G?	
Pinus	*resinosa*	8	3		S5			G5	Uncommon
Pinus	*strobus*	4	3		S5			G5	Common
Pinus	*sylvestris*		5	-3	SE5			G?	Rare
Tsuga	*canadensis*	7	3		S5			G5	
Taxaceae	**Yew Family**								
Taxus	*canadensis*	7	3		S5			G5	
DICOTYLEDONS	**DICOTS**								
Aceraceae	**Maple Family**								
Acer	*ginnala*		5	-2	SE1			G?	Uncommon
Acer	*negundo*	0	-2		S5			G5	Common
Acer	*rubrum*	4	0		S5			G5	Common
Acer	*saccharinum*	5	-3		S5			G5	
Acer	*saccharum*	4	3		S5			G5T?	Common
Acer X	*freemanii*								Common
Amaranthaceae	**Amaranth Family**								
Amaranthus	*retroflexus*		2	-1	SE5			G?	Common
Anacardiaceae	**Sumac or Cashew Family**								
Toxicodendron	*rydbergii*	0	0		S5			G5T	Common
Rhus	*hirta*	1	5		S5			G5	Common
Apiaceae	**Carrot or Parsley Family**								
Daucus	*carota*		5	-2	SE5			G?	Common
Pastinaca	*sativa*		5	-3	SE5			G?	Common
Sanicula	*marilandica*	5	3		S5			G5	Common

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Apocynaceae		**Dogbane Family**								
Apocynum	*androsaemifolium ssp. androsaemifolium*	Spreading Dogbane	3	5		S5			G5T?	Common
Apocynum	*cannabinum*	Indian Hemp		1		S5			G5T	Uncommon
Aquifoliaceae		**Holly Family**								
Ilex	*verticillata*	Winterberry	5	-4		S5			G5	
Araliaceae		**Ginseng Family**								
Aralia	*nudicaulis*	Wild Sarsaparilla	4	3		S5			G5	Common
Aralia	*racemosa ssp. racemosa*	Spikenard	7	5		S5			G5T?	Uncommon
Asclepiadaceae		**Milkweed Family**								
Asclepias	*syriaca*	Common Milkweed	0	5		S5			G5	Common
Cynanchum	*rossicum*	Swallow-wort				SE5			G?	Uncommon
Asteraceae		**Composite or Aster Family**								
Achillea	*millefolium var. millefolium*	Common Yarrow		3	-1	SE?			G5T?	Common
Ageratina	*altissima var. altissima*	White Snakeroot	5	3		S5			G5	Common
Ambrosia	*artemisiifolia*	Common Ragweed	0	3		S5			G5	Common
Arctium	*minus*	Common Burdock		5	-2	SE5			G?T?	Common
Artemisia	*vulgaris*	Common Mugwort		5	-1	SE5			G?	Common
Symphyotrichum	*ciliolatum*	Ciliolate Aster	6	4		S5			G5	Common
Symphyotrichum	*cordifolium*	Heart-leaved Aster	5	5		S5			G5	Common
Symphyotrichum	*ericoides*	White Heath Aster	4	4		S5			G5T?	**RS** (7*)
Symphyotrichum	*lanceolatum*	Tall White Aster	3	-3		S5			G5T?	Common
Eurybia	*macrophylla*	Large-leaved Aster	5	5		S5			G5	Common
Symphyotrichum	*novae-angliae*	New England Aster	2	-3		S5			G5	Common
Symphyotrichum	*puniceum var. puniceum*	Purple-stemmed Aster				S5			G5T?	Common
Symphyotrichum	*umbellatus var. umbellatus*	Flat-top White Aster	6	-3		S5			G5T?	
Symphyotrichum	*urophyllum*	Arrow-leaved Aster	6	5		S4			G4	
Cichorium	*intybus*	Chicory		5	-1	SE5			G?	Common
Cirsium	*arvense*	Canada Thistle		3	-1	SE5			G?	Common
Cirsium	*vulgare*	Bull Thistle		4	-1	SE5			G5	Common
Conyza	*canadensis*	Horseweed	0	1		S5			G5	Common
Eupatorium	*maculatum*	Spotted Joe-pye-weed	3	-5		S5			G5T5	Common
Euthamia	*graminifolia*	Flat-topped Bushy Goldenrod	2	-2		S5			G5	Common
Helianthus	*tuberosus*	Jerusalem Artichoke		0	-1	SE5			G5	Uncommon
Hieracium	*caespitosum*	Field Hawkweed		5	-2	SE5				**RS** (4)
Inula	*helenium*	Elecampane		5	-2	SE5			G?	Common
Prenanthes	*altissima*	Tall White Rattlesnake-root	5	3		S5			G5?	Common
Solidago	*altissima*	Tall Goldenrod	1	3		S5				Common
Solidago	*caesia*	Blue-stem Goldenrod	5	3		S5			G5	Uncommon
Solidago	*canadensis*	Canada Goldenrod	1	3		S5			G5	Common
Solidago	*flexicaulis*	Zig-zag Goldenrod	6	3		S5			G5	Uncommon
Solidago	*gigantea*	Giant Goldenrod	4	-3		S5			G5	Uncommon
Solidago	*rugosa ssp. rugosa*	Rough Goldenrod	4	-1		S5			G5T?	Common
Sonchus	*arvensis ssp. arvensis*	Field Sow-thistle				SE5			G?T?	Common
Sonchus	*asper ssp. asper*	Spiny-leaved Sow-thistle		0	-1	SE5			G?T?	Common
Tanacetum	*vulgare*	Common Tansy		5	-1	SE5			G?	Uncommon
Taraxacum	*officinale*	Common Dandelion		3	-2	SE5			G5	Common
Tragopogon	*pratensis ssp. pratensis*	Meadow Goat's-beard/Jack go to bed at noon		5	-1	SE5			G?T?	Common

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Tussilago	*farfara*	Coltsfoot		3	-2	SE5			G?	Uncommon
Xanthium	*species*									
Balsaminaceae		**Touch-me-not Family**								
Impatiens	*capensis*	Spotted Touch-me-not	4	-3		S5			G5	Common
Betulaceae		**Birch Family**								
Alnus	*incana spp. rugosa*	Speckled Alder	6	-5		S5			G5T5	Common
Betula	*alleghaniensis*	Yellow Birch	6	0		S5			G5	
Betula	*papyrifera*	White Birch		2		S5			G5	Common
Carpinus	*caroliniana ssp. virginiana*	Blue Beech	6	0		S5			G5T	
Corylus	*cornuta*	Beaked Hazel	5	5		S5			G5T	
Ostrya	*virginiana*	Hop Hornbeam - Ironwood	4	4		S5			G5	Common
Boraginaceae		**Borage Family**								
Echium	*vulgare*	Blueweed/common vipersbugloss		5	-2	SE5			G?	Common
Lithospermum	*officinale*	Common Gromwell		5	-1	SE5			G?	Common
Brassicaceae		**Mustard Family**								
Capsella	*bursa-pastoris*	Shepherd's Purse		1	-1	SE5			G?	Common
Chamaesyce	*maculata*	Spotted Spurge		4	-1	SE5			G5?	Common
Erysimum	*cheiranthoides*	Wormseed Mustard		3	-1	SE5				Common
Hesperis	*matronalis*	Dame's Rocket		5	-3	SE5			G4G5	Uncommon
Nasturtium	*officinale*	Water-cress		-5	-1	SE?			G?	Uncommon
Caprifoliaceae		**Honeysuckle Family**								
Diervilla	*lonicera*	Bush Honeysuckle	5	5		S5			G5	
Lonicera	*canadensis*	American Fly Honeysuckle	6	3		S5			G5	
Lonicera	*dioica*	Glaucous Honeysuckle	5	3		S5			G5	
Lonicera	*tatarica*	Tartarian Honeysuckle		3	-3	SE5			G?	Common
Lonicera	*xylosteum*	Fly Honeysuckle		5	-2	SE2			G?	Uncommon
Viburnum	*lentago*	Nannyberry	4	-1		S5			G5	Common
Caryophyllaceae		**Pink Family**								
Dianthus	*armeria*	Deptford Pink		5	-1	SE5			G?	common
Saponaria	*officinalis*	Bouncing-bet		3	-3	SE5			G?	common
Silene	*latifolia*	Bladder Campion				SE5			G?	Uncommon
Celastraceae		**Staff-tree Family**								
Celastrus	*scandens*	Climbing Bittersweet	3	3		S5			G5	
Convolvulaceae		**Morning-glory Family**								
Calystegia	*pubescens*	Japanese Bindweed				SE1			G?	
Convolvulus	*arvensis*	Field Bindweed		5	-1	SE5			G?	Common
Cornaceae		**Dogwood Family**								
Cornus	*altemifolia*	Alternate-leaved Dogwood	6	5		S5			G5	Common
Cornus	*amomum*	Silky Dogwood	5	-4		S5			G5T?	
Cornus	*sericea*	Red-osier Dogwood	2	-3		S5			G5	Common
Cucurbitaceae		**Gourd Family**								
Echinocystis	*lobata*	Prickly Cucumber	3	-2		S5			G5	common
Elaeagnaceae		**Oleaster Family**								
Elaeagnus	*angustifolia*	Russian Olive		4	-1	SE3			G?	Rare
Fabaceae		**Pea Family**								
Lotus	*corniculatus*	Bird's-foot Trefoil		1	-2	SE5			G?	Common
Medicago	*lupulina*	Black Medick		1	-1	SE5			G?	Common

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Melilotus	*alba*	White Sweet-clover		3	-3	SE5			G?	Common
Trifolium	*pratense*	Red Clover		2	-2	SE5			G?	Common
Trifolium	*hybridum ssp. elegans*	Alsike Clover		1	-1	SE5				common
Vicia	*cracca*	Tufted Vetch		5	-1	SE5			G?	Common
Coronilla	*varia*	Variable Crown-vetch		5	-2	SE5			G?	Uncommon
Fagaceae		**Beech Family**								
Fagus	*grandifolia*	American Beech	6	3		S5			G5	
Quercus	*macrocarpa*	Bur Oak	5	1		S5			G5	Common
Quercus	*rubra*	Red Oak	6	3		S5			G5	
Grossulariaceae		**Currant Family**								
Ribes	*cynosbati*	Prickly Gooseberry	4	5		S5			G5	
Ribes	*triste*	Wild Red Currant	6	-5		S5			G5	
Guttiferae		**St. John's-wort Family**								
Hypericum	*perforatum*	Common St. John's-wort		5	-3	SE5			G?	Common
Juglandaceae		**Walnut Family**								
Carya	*cordiformis*	Bitternut hickory	6	0		S5			G5	Common
Juglans	*nigra*	Black Walnut	5	3		S4			G5	Rare
Lamiaceae		**Mint Family**								
Glechoma	*hederacea*	Creeping Charlie		5	-2	SE5			G?	common
Lycopus	*uniflorus*	Northern Water-horehound	5	-5		S5			G5	common
Nepeta	*cataria*	Catnip		1	-2	SE5			G?	common
Prunella	*vulgaris ssp. vulgaris*	Common Heal-all		0	-1	SE3			G5T?	Common
Lythraceae		**Loosestrife Family**								
Lythrum	*salicaria*	Purple Loosestrife		-5	-3	SE5			G5	
Malvaceae		**Mallow Family**								
Abutilon	*theophrasti*	Velvet-leaf		4	-1	SE5			G?	Rare
Oleaceae		**Olive Family**								
Fraxinus	*americana*	White Ash	4	3		S5			G5	Common
Fraxinus	*nigra*	Black Ash	7	-4		S5			G5	Common
Fraxinus	*pennsylvanica*	Red Ash	3	-3		S5			G5	Common
Onagraceae		**Evening-primrose Family**								
Circaea	*lutetiana ssp. canadensis*	Enchanter's Nightshade	3	3		S5			G5T5	Common
Epilobium	*hirsutum*	Great Hairy Willow-herb		-4	-2	SE5			G?	Rare
Oenothera	*biennis*	Common Evening-primrose	0	3		S5			G5	Common ?
Oxalidaceae		**Wood Sorrel Family**								
Oxalis	*stricta*	Upright Yellow Wood-sorrel	0	3		S5			G5	Common
Plantaginaceae		**Plantain Family**								
Plantago	*rugelii*	Rugel's Plantain	1	0		S5			G5	common
Polygonaceae		**Smartweed Family**								
Polygonum	*aviculare*	Prostrate Knotweed		1	-1	SE5			G?	common
Polygonum	*lapathifolium*	Pale Smartweed	2	-4		S5			G5	common
Polygonum	*persicaria*	Lady's-thumb		-3	-1	SE5			G?	Common
Rumex	*crispus*	Curly-leaf Dock		-1	-2	SE5			G?	Common
Primulaceae		**Primrose Family**								
Lysimachia	*ciliata*	Fringed Loosestrife	4	-3		S5			G5	Common
Ranunculaceae		**Buttercup Family**								
Actaea	*pachypoda*	White Baneberry	6	5		S5			G5	common

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Anemone	*canadensis*	Canada Anemone	3	-3		S5			G5	common
Anemone	*virginiana var. virginiana*	Thimbleweed	4	5		S5			G5T	common
Clematis	*virginiana*	Virgin's-bower	3	0		S5			G5	common
Thalictrum	*pubescens*	Tall Meadow-rue	5	-2		S5			G5	common
Resedaceae		**Mignonette Family**								
Amelanchier	*arborea*	Downy Juneberry		3		S5			G5	
Amelanchier	*sanguinea*	Roundleaf Juneberry	7	5		S5?			G5	
Rhamnaceae		**Buckthorn Family**								
Frangula	*alnus*	Glossy Buckthorn		-1	-3	SE5			G?	
Rhamnus	*cathartica*	Common Buckthorn		3	-3	SE5			G?	Common
Rosaceae		**Rose Family**								
Agrimonia	*gryposepala*	Tall Hairy Agrimony	2	2		S5			G5	common
Crataegus	*species*	Hawthorn species								
Fragaria	*vesca ssp. americana*	Woodland Strawberry	4	4		S5			G5T?	Uncommon
Fragaria	*virginiana*	Virginia Strawberry	2	1		SU			G5T?	Common
Galium	*mollugo*	White Bedstraw		5	-2	SE5			G?	common
Galium	*triflorum*	Sweet-scented Bedstraw	4	2		S5			G5	common
Malus	*pumila*	Common Crabapple		5	-1	SE5			G5	Common
Potentilla	*argentea*	Silvery Cinquefoil		3	-2	SE5			G?	common
Potentilla	*norvegica ssp. norvegica*	Cinquefoil				SU			G5T?	common
Potentilla	*recta*	Rough-fruited Cinquefoil		5	-2	SE5			G?	common
Prunus	*virginiana*	Choke Cherry	2	1		S5			G5T?	Common
Rubus	*allegheniensis*	Alleghany Blackberry	2	2		S5			G5	
Rubus	*idaeus*	Red Raspberry				SE1			G5T5	Uncommon
Rubus	*occidentalis*	Thimble-berry	2	5		S5			G5	
Prunus	*nigra*	Canada Plum	4	4		S4			G4G5	
Rubus	*odoratus*	Purple Flowering Raspberry	3	5		S5			G5	Common
Rubus	*pensilvanicus*	Pennsylvania Raspberry	6	1		SU			G5	
Rubus	*pubescens*	Dwarf Raspberry	4	-4		S5			G5	
Prunus	*serotina*	Black Cherry	3	3		S5			G5	
Sorbus	*aucuparia*	European Mountain-ash		5	-2	SE4			G5	
Spiraea	*alba*	Narrow-leaved Meadow-sweet	3	-4		S5			G5	Common
Rutaceae		**Rue Family**								
Zanthoxylum	*americanum*	American Prickly-ash	3	5		S5			G5	common
Salicaceae		**Willow Family**								
Populus	*alba*	Silver Poplar		5	-3	SE5			G5	
Populus	*balsamifera ssp. balsamifera*	Balsam Poplar	4	-3		S5			G5T?	Common
Populus	*deltoides ssp. deltoides*	Eastern Cottonwood	4	-1		SU			G5T?	Common
Populus	*grandidentata*	Large-tooth Aspen	5	3		S5			G5	
Populus	*tremuloides*	Trembling Aspen	2	0		S5			G5	Common
Salix	*bebbiana*	Long-beaked Willow	4	-4		S5			G5	
Salix	*discolor*	Pussy Willow	3	-3		S5			G5	
Salix	*lucida*	Shining Willow	5	-4		S5			G5	
Salix	*petiolaris*	Slender Willow	3	-4		S5			G4	
Salix X	*rubens*	Reddish Willow		-4	-3	SE4			HYB	
Saxifragaceae		**Saxifrage Family**								
Tiarella	*cordifolia*	False Mitrewort/foamflower	6	1		S5			G5	common

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Scrophulariaceae		**Figwort Family**								
Linaria	*vulgaris*	Butter-and-eggs		5	-1	SE5			G?	Common
Verbascum	*thapsus*	Common Mullein		5	-2	SE5			G?	Common
Solanaceae		**Nightshade Family**								
Solanum	*dulcamara*	Bitter Nightshade		0	-2	SE5			G?	Common
Tiliaceae		**Linden Family**								
Tilia	*americana*	American Basswood	4	3		S5			G5	Common
Ulmaceae		**Elm Family**								
Ulmus	*americana*	White Elm	3	-2		S5			G5?	Common
Ulmus	*pumila*	Siberian Elm		5	-1	SE3			G?	Rare
Urticaceae		**Nettle Family**								
Boehmeria	*cylindrica*	False Nettle	4	-5		S5			G5	Uncommon
Violaceae		**Violet Family**								
Viola	*conspersa*	American Dog Violet	4	-2		S5			G5	Common
Vitaceae		**Grape Family**								
Parthenocissus	*inserta*	Inserted Virginia-creeper	3	3		S5			G5	
Vitis	*riparia*	Riverbank Grape	0	-2		S5			G5	Common
MONOCOTYLEDONS		**MONOCOTS**								
Alismataceae		**Water-plantain Family**								
Alisma	*plantago-aquatica*	Common Water-plantain	3	-5		S5			G5	
Araceae		**Arum Family**								
Arisaema	*triphyllum*	Small Jack-in-the-pulpit	5	-2		S5			G5T5	Common
Butomaceae		**Flowering Rush Family**								
Butomus	*umbellatus*	Flowering-rush		-5	-2	SE5			G5	Uncommon
Cyperaceae		**Sedge Family**								
Carex	*crinita*	Fringed Sedge	6	-4		S5			G5	Common
Carex	*gracillima*	Graceful Sedge	4	3		S5			G5	Common
Carex	*lacustris*	Lake-bank Sedge	5	-5		S5			G5	Uncommon
Carex	*lupulina*	Hop Sedge	6	-5		S5			G5	Common
Carex	*pensylvanica*	Pennsylvania Sedge	5	5		S5			G5	Common
Carex	*pedunculata*	Long-stalked Sedge	5	5		S5			G5	Common
Schoenoplectus	*tabernaemontani*	American Great Bulrush/softstem bulrush	5	-5		S5			G?	Common
Juncaceae		**Rush Family**								
Juncus	*articulatus*	Jointed Rush	5	-5		S5			G5	Uncommon
Juncus	*tenuis*	Path Rush	0	0		S5			G5	common
Lemnaceae		**Duckweed Family**								
Lemna	*minor*	Lesser Duckweed	2	-5		S5			G5	common
Liliaceae		**Lily Family**								
Maianthemum	*canadense*	Wild Lily-of-the-valley	5	0		S5			G5	common
Maianthemum	*racemosum ssp. racemosum*	False Solomon's Seal	4	3		S5			G5T	Common
Polygonatum	*pubescens*	Hairy Solomon's Seal	5	5		S5			G5	Common
Poaceae		**Grass Family**								
Brachyelytrum	*erectum*	Bearded Short-husk	7	5		S4S5			G5	
Bromus	*inermis ssp. inermis*	Awnless Brome		5	-3	SE5			G4G5T?	Common
Calamagrostis	*canadensis*	Blue-joint Grass	4	-5		S5			G5	Common
Elymus	*repens*	Quack Grass		3	-3	SE5			G?	Common
Glyceria	*grandis*	Tall Manna Grass	5	-5		S4S5			G5	Common

Appendix H: Plant Species List Ottawa LRT AECOM

BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS Site District 6E-7
Glyceria	*striata*	Fowl Meadow Grass	3	-5		S5			G5	Common
Hordeum	*jubatum ssp. jubatum*	Squirrel-tail Grass		-1	-1	SE5			G5T?	common
Panicum	*capillare*	Witch Grass	0	0		S5			G5	common
Phalaris	*arundinacea*	Reed Canary Grass	0	-4		S5			G5	Common
Phleum	*pratense*	Timothy		3	-1	SE5			G?	Common
Phragmites	*australis*	Common Reed	0	-4		S5			G5	Uncommon
Poa	*pratensis ssp. pratensis*	Kentucky Bluegrass	0	1		S5			G5T	common
Setaria	*pumila*	Yellow Foxtail		0	-1	SE5			G?	Common
Setaria	*viridis*	Green Foxtail			-1	SE5			G?	Common
Sorghastrum	*nutans*	Indian Grass	8	2		S4			G5	**RS** (6*)
Potamogetonaceae		**Pondweed Family**								
Potamogeton	*natans*	Common Floating Pondweed	5	-5		S5			G5	Uncommon
Potamogeton	*pectinatus*	Fennel-leaved Pondweed	4	-5		S5			G5	Common
Smilacaceae		**Catbrier Family**								
Smilax	*herbacea*	Herbaceous Carrion Flower	5	0		S4			G5	Uncommon
Sparganiaceae		**Bur-reed Family**								
Sparganium	*eurycarpum*	Broad-fruited Bur-reed	3	-5		S5			G5	common
Typhaceae		**Cattail Family**								
Typha	*angustifolia*	Narrow-leaved Cattail	3	-5		S5			G5	Common
Typha	*latifolia*	Broad-leaved Cattail	3	-5		S5			G5	Common
Typha X	*glauca*	Glaucous Cattail	3	-5		S5			HYB	Uncommon

FLORISTIC SUMMARY & ASSESSMENT		
Species Diversity		
Total Species:		**219**
Native Species:		**148** 67.58%
Exotic Species		**71** 32.42%
Total Taxa in Region (List Region, Source)		10000
% Regional Taxa Recorded		2.19%
Regionally Significant Species		0
S1-S3 Species		0
S4 Species		5
S5 Species		141
Co-efficient of Conservatism and Floral Quality Index		
Co-efficient of Conservatism (CC) (average)		**3.94**
CC 0 to 3	*lowest sensitivity*	54 36.49%
CC 4 to 6	*moderate sensitivity*	83 56.08%
CC 7 to 8	*high sensitivity*	11 7.43%
CC 9 to 10	*highest sensitivity*	0 0.00%
Floral Quality Index (FQI)		**47.92**
Presence of Weedy & Invasive Species		
mean weediness		**-1.72**
weediness = -1	*low potential invasiveness*	34 47.89%
weediness = -2	*moderate potential invasiveness*	23 32.39%

BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS Site District 6E-7
weediness = -3	*high potential invasiveness*	14	19.72%							
Presence of Wetland Species										
average wetness value		**0.90**								
upland		53	24.20%							
facultative upland		61	27.85%							
facultative		39	17.81%							
facultative wetland		43	19.63%							
obligate wetland		23	10.50%							

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Appendix I

Significant Wildlife Habitat Screening

AECOM

SCHEDULE 6E: IDENTIFICATION OF Significant Wildlife Habitat

The following presents an evaluation of wildlife habitat found within the subject lands according to the Ministry of Natural Resources Draft Wildlife Habitat Ecoregion Criteria Schedules, February 2012. It has been designed to provide guidance in identifying Candidate Significant Wildlife Habitat within Ecoregion 6E. The table below corresponds to the four categories of Significant Wildlife Habitat outlined in the Significant Wildlife Habitat Technical Guide and its Appendices. Table 1.5 contains and provides descriptions for exceptions criteria for ecoregional SWH which will be identified at an ecodistrict scale. Exceptions occur when criteria for a specific habitat are different within an ecodistrict compared to the remainder of an ecoregion or if a habitat only occurs within a restricted area of the ecoregion (MNR, 2012).

The Schedules, including description of wildlife habitat, wildlife species, and the criteria provided for determining SWH, are based on science and expert knowledge. The ELC Ecosite codes are described using the Ecological Land Classification for Southern Ontario. The information within these schedules will require periodic updating to keep pace with changes to wildlife species status in the Species at Risk in Ontario (SARO) list, or as new scientific information pertaining to wildlife habitats becomes available. Therefore, MNR will occasionally need to review and update these schedules and provide addenda. A reference document for all SWH is found after the schedules and includes citations for all ecoregional schedules.

Criteria For Significant Wildlife Habitat in Ecoregion 6E

1.1 Seasonal Concentration Areas of Animals

Seasonal Concentration Areas are areas where wildlife species occur annually in aggregations at certain times of the year, on an annual basis. Such areas are sometimes highly concentrated with members of a given species, or several species, within relatively small areas. In spring and autumn, migratory wildlife species will concentrate where they can rest and feed. Other wildlife species require habitats where they can survive winter. Examples of Seasonal Concentration Areas include deer wintering areas, breeding bird colonies and hibernation sites for reptiles, amphibians and some mammals'. Table 1.1 outlines which Seasonal Concentration Areas constitute SWH.

Table 1.1 Seasonal Concentration Areas of Animals.

Wildlife Habitat	Wildlife Species (Targeted within Ecoregion 6E)	CANDIDATE SWH		CONFIRMED SWH	Habitat Present within Route (Candidate/Confirmed)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
Waterfowl Stopover and Staging Areas (Terrestrial) **Rationale:** Habitat important to migrating waterfowl.	American Black Duck Wood Duck Green-winged Teal Blue-winged Teal Mallard Northern Pintail Northern Shoveler American Wigeon Gadwall	CUM1 CUT1 - Plus evidence of annual spring flooding from melt water or run-off within these Ecosites.	Fields with sheet water during Spring (mid March to May). • Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. • Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH. Information Sources • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities (CAs) • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects • Any mixed species aggregations of 100 or more individuals required. • The area of the flooded field ecosite habitat plus a 100-300m radius buffer dependant on local site conditions and adjacent land use is the significant wildlife habitat. • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). • SWHDSS Index #7 provides development effects and mitigation measures.	**Candidate** – Suitable habitat may be present within the agricultural fields east of RockCliff Parkway. Field Investigations were not completed during the spring melt, therefore should the location of the LRT Route run along the north side within this location **spring surveys/Stopover/Migratory Surveys** should be conducted.
Waterfowl Stopover and Staging Areas (Aquatic) **Rationale:** Important for local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the eco-district.	Canada Goose Cackling Goose Snow Goose American Black Duck Northern Pintail Northern Shoveler American Wigeon Gadwall Green-winged Teal Blue-winged Teal Hooded Merganser Common Merganser Lesser Scaup Greater Scaup Long-tailed Duck Surf Scoter White-winged Scoter Black Scoter Ring-necked duck Common Goldeneye Bufflehead Redhead	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	• Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a SWH; however a reservoir managed as a large wetland or pond/lake does qualify. • These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water); • Information Sources • Canadian Wildlife Service staff know the larger, most significant sites. Check website: http://wildspace.ec.gc.ca • Naturalist clubs often are aware of staging/stopover areas. • OMNR Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging. • Sites documented through waterfowl planning processes (eg. EHJV implementation plan)	Studies carried out and verified presence of: • Aggregations of 100 or more of listed species for 7 days, results in > 700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH • The combined area of the ELC ecosites and a 100m radius area is the SWH • Wetland area and shorelines associated with sites identified within the SWHTG Appendix K are significant wildlife habitat. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects • Annual Use of Habitat is	**Candidate** – Suitable habitat may be present along Green's Creek. **Stopover/Migratory Surveys** should be conducted in the area of Green's Creek

Wildlife Habitat	Wildlife Species (Targeted within Ecoregion 6E)	CANDIDATE SWH		CONFIRMED SWH	Habitat Present within Route (Candidate/Confirmed)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
	Ruddy Duck Red-breasted Merganser Brant Canvasback Ruddy Duck		• Ducks Unlimited projects • Element occurrence specification by Nature Serve: http://www.natureserve.org • NHIC Waterfowl Concentration Area	Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). • SWHDSS Index #7 provides development effects and mitigation measures.	
Shorebird Migratory Stopover Area **Rationale:** High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a SWH. Information Sources • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey. • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • NHIC Shorebird Migratory Concentration Area	Studies confirming: • Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period) • Whimbrel stop briefly (<24hrs) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects • SWHDSS Index #8 provides development effects and mitigation measures.	**Candidate –** Suitable habitat may be present along Green's Creek. Where vegetation removal is to occur within Candidate habitat **Stopover/Migratory Surveys** should be conducted in the area of Green's Creek
Raptor Wintering Area **Rationale:** Sites used by multiple species, a high number of individuals and used annually are most significant	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl **Special Concern:** Short-eared Owl	Combination of ELC Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM; CUT; CUS; CUW.	The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. Raptor wintering sites need to be > 20 ha with a combination of forest and upland. Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands Information Sources: • OMNR Ecologist or Biologist may be aware of locations of wintering raptors. In addition, these staff may know local naturalists that	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; • At least 10 individuals and two listed spp. • To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds. • Evaluation methods to follow	**Candidate** – Suitable habitat may be present along Green's Creek Where vegetation removal is to occur within Candidate habitat **Raptor Point counts** should be conducted within this area to confirm SWH.

Wildlife Habitat	Wildlife Species (Targeted within Ecoregion 6E)	CANDIDATE SWH		CONFIRMED SWH	Habitat Present within Route (Candidate/Confirmed)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
			may be aware of the locations of raptor wintering habitats. • NHIC Raptor Winter Concentration Area • Data from Bird Studies Canada, most notably for Short-eared Owls. • Reports and other information available from CAs.	"Bird and Bird Habitats: Guidelines for Wind Power Projects • SWHDSS Index #10 provides development effects and mitigation measures.	
Bat Hibernacula **Rationale:** Bat hibernacula are rare habitats in all Ontario landscapes.	Big Brown Bat Little Brown Myotis Eastern Pipistrelle/Tri-coloured Bat Northern Myotis Eastern Small-footed Myotis	Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. The locations of bat hibernacula are relatively poorly known. Information Sources • OMNR for possible locations and contact for local experts • NHIC Bat Hibernaculum/Nursery • Ministry of Northern Development and Mines for location of mine shafts. • Clubs that explore caves (eg. Sierra Club) • University Biology Departments with bat experts.	• All sites with confirmed hibernating bats are SWH. • The area includes 1000m radius around the entrance of the hibernaculum. • Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the "Guideline for Wind Power Projects Potential Impacts to Bats and Bat Habitats. • SWHDSS Index #1 provides development effects and mitigation measures.	**No** – Suitable habitat is not present within the study area. No caves were observed during field investigations.

Bat Maternity Colonies
 	
Rationale:
Known locations of forested bat maternity colonies are extremely rare in all Ontario landscapes.
	Big Brown Bat
	Little Brown Myotis
	Silver-haired Bat
	Northern Myotis
		Maternity colonies considered SWH are found in forested Ecosites.
		
		All ELC Ecosites in ELC Community Series:
		FOD
		FOM
			Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). Maternity roosts are not found in caves and mines in Ontario.
			• Maternity colonies located in Mature deciduous or mixed forest stands with >10/ha large diameter (>25cm dbh) wildlife trees
			• Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 or class 1 or 2.
			• Northern Myotis prefer contiguous tracts of older forest cover for foraging and roosting in snags and trees
			• Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred
			
			Information Sources
			• OMNR for possible locations and contact for local experts
				• Maternity Colonies with confirmed use by;
				  • >20 Northern Myotis
				  • >10 Big Brown Bats
				  • >20 Little Brown Myotis
				  • >5 Adult Female Silver-haired Bats
				• The area of the habitat includes the entire woodland or the forest stand ELC Ecosite containing the maternity colonies.
				• Evaluation methods for maternity colonies should be conducted following methods outlined in the "Guideline for Wind Power Projects Potential Impacts to Bats and Bat Habitats.
				• SWHDSS Index #1 provides development effects and mitigation measures.
					Candidate – Suitable habitat may be present within the forested (upland and wetland) communities.
					
					Should tree removals occur a within candidate habitat **snag density calculations** will need to take place in order to determine suitability at each location.

Wildlife Habitat	Wildlife Species (Targeted within Ecoregion 6E)	CANDIDATE SWH		CONFIRMED SWH	Habitat Present within Route (Candidate/Confirmed)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
			• University Biology Departments with bat experts.		
Bat Migratory Stopover Area **Rationale:** Stopover areas for long distance migrant bats are important during fall migration.	Hoary Bat Eastern Red Bat Silver-haired Bat	No specific ELC types.	Long distance migratory bats typically migrate during late summer and early fall from summer breeding habitats throughout Ontario to southern wintering areas. Their annual fall migrations concentrate these species of bats at stopover areas. The location and characteristics of stopover habitats are generally unknown. Information Sources • OMNR for possible locations and contact for local experts • University of Waterloo, Biology Department	• The confirmation criteria and habitat areas for this SWH are still being determined • SWHDSS Index #38 provides development effects and mitigation measures	**Unknown** – Criteria to determine significance are still being determined.
Turtle Wintering Areas **Rationale:** Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	Midland Painted Turtle **Special Concern:** Northern Map Turtle Snapping Turtle	Snapping and Midland Painted turtles, ELC Community Classes; SW, MA, OA and SA, ELC Community Series; FEO and BOO Northern Map Turtle - Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen Information Sources • EIS studies carried out by Conservation Authorities. • Local naturalists and experts, as well as university herpetologists may also know where to find some of these sites. • OMNR ecologist or biologist may be aware of locations of wintering turtles • NHIC	• Presence of 5 over-wintering Midland Painted Turtles is significant. • One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant. • The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH. • Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May). Congregation of turtles is more common where wintering areas are limited and therefore significant. • SWHDSS Index #28 provides development effects and mitigation measures for turtle wintering habitat.	**Candidate** – Suitable habitat may be present within Green's Creek, Taylor Creek, and Bilberry Creek. Where in water works are to occur within Candidate habitat, **Basking turtle surveys** should be conducted on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May)
Reptile Hibernaculum **Rationale:**	**Snakes:** Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake	For all snakes, habitat may be found in any ecosite in central Ontario other than	For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural locations. Areas of broken and fissured rock are particularly valuable	Studies confirming: • Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or;	**Candidate** – Confirmed Milksnake was confirmed on-site along Green's Creek

Wildlife Habitat	Wildlife Species (Targeted within Ecoregion 6E)	CANDIDATE SWH		CONFIRMED SWH	Habitat Present within Route (Candidate/Confirmed)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake **Special Concern:** Milksnake Eastern Ribbonsnake Lizard: **Special Concern (Southern Shield population):** Five-lined Skink	very wet ones. Talus, Rock Barren, Crevice and Cave, and Alvar sites may be directly related to these habitats. Observations of congregations of snakes on sunny warm days in the spring or fall is a good indicator. The existence of rock piles or slopes, stone fences, and crumbling foundations assist in identifying candidate SWH. For Five-lined Skink, ELC Community Series of FOD and FOM and Ecosites: FOC1 FOC3	since they provide access to subterranean sites below the frost line. Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. Information Sources • In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g.old dug wells). • Reports and other information available from CAs. • Local naturalists and experts, as well as university herpetologists may also know where to find some of these sites. • NHIC Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures. Information Sources • Reports and other information available from CAs. • Local naturalists and experts, as well as university herpetologists may also know where to find some of these sites. • OMNR ecologist or biologist may be aware of locations of wintering skinks • NHIC	individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (eg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct) . • Note: If there are Special Concern Species present, then site is SWH • Note: Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population [i.e. strong hibernation site fidelity]. Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. The the feature in which the hibernacula is located plus a 30 m buffer is the SWH • SWHDSS Index #13 provides development effects and mitigation measures for snake hibernacula. • Presence of any active hibernaculum for skink is significant. • SWHDSS Index #37 provides development effects and mitigation measures for five-lined skink wintering habitat.	Should vegetation removal or construction occur within Candidate habitat **hibernacula surveys** should be undertaken.
Colonially - Nesting Bird Breeding Habitat (Bank and Cliff) **Rationale;** Historical use and number of nests in a colony make this	Bank Swallow Cliff Swallow Northern Rough-winged Swallow	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles (Bank Swallow and N. Rough-winged Swallow). Cliff faces, bridge abutments, silos, barns (Cliff Swallows).	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation.	Studies confirming: • Presence of 1 or more nesting sites with 8 or more cliff swallow pairs or 50 bank swallow and rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50m radius habitat area from the peripheral nests	**No** – Suitable habitat was not observed within the study area. No eroding banks or exposed soils were observed.

Wildlife Habitat	Wildlife Species (Targeted within Ecoregion 6E)	CANDIDATE SWH		CONFIRMED SWH	Habitat Present within Route (Candidate/Confirmed)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
habitat significant. An identified colony can be very important to local populations. All swallow population are declining in Ontario [cxcix].		Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	Information Sources • Reports and other information available from CAs. • Ontario Breeding Bird Atlas • Bird Studies Canada; *NatureCounts* http://www.birdscanada.org/birdmon/ • Naturalist Clubs.	• Field surveys to observe and count swallow nests are to be completed during the breeding season. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects • SWHDSS Index #4 provides development effects and mitigation measures	
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) **Rationale;** Large colonies are important to local bird population, typically sites are only known colony in area and are used annually.	Great Blue Heron Black-crowned Night-Heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15 m from ground, near the top of the tree. Information Sources • Ontario Breeding Bird Atlas, colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNR). • NHIC Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries. • Reports and other information available from CAs. • MNR District Offices. • Local naturalist clubs.	Studies confirming: • Presence of 5 or more active nests of Great Blue Heron. • The edge of the colony and a minimum 300m area of habitat or extent of the Forest Ecosite containing the colony or any island <15.0ha with a colony is the SWH • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells • SWHDSS Index #5 provides development effects and mitigation measures.	**Candidate** – Suitable habitat may be present within the treed swamp communities along Green's Creek Should vegetation removal occur within Candidate habitat a **point count survey during the nesting season (April to August)** should be conducted.
Colonially - Nesting Bird Breeding Habitat (Ground) **Rationale;** Colonies are important to local bird population, typically sites are only known colony in area and are used annually.	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1;50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1 – 6; MAS1 – 3; CUM CUT CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. Information Sources • Ontario Breeding Bird Atlas, rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from CAs. • NHIC Colonial Waterbird Nesting Area • MNR District Offices. • Local naturalist clubs.	Studies confirming: • Presence of > 25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern. • Presence of 5 or more pairs for Brewer's Blackbird. • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant. • The edge of the colony and a minimum 150m area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0ha with a	**Candidate** – Suitable habitat for Brewers Blackbird may be present within the areas along Green's Creek Should vegetation clearing occur within Candidate habitat **point count surveys** should be conducted within the months of **May and June.**

Wildlife Habitat	Wildlife Species (Targeted within Ecoregion 6E)	CANDIDATE SWH		CONFIRMED SWH	Habitat Present within Route (Candidate/Confirmed)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
				colony is the SWH • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects • SWHDSS Index #6 provides development effects and mitigation measures.	
Migratory Butterfly Stopover Areas **Rationale:** Butterfly stopover areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.	Painted Lady White Admiral Special Concern Monarch	Combination of ELC Community Series; need to have present one Community Series from each landclass: Field: CUM CUT CUS Forest: FOC FOD FOM CUP Anecdotally, a candidate sight for butterfly stopover will have a history of butterflies being observed.	A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Ontario. • The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south. • The habitat should not be disturbed; fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat. • Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes. Information Sources • OMNR (NHIC) • Agriculture Canada in Ottawa may have list of butterfly experts. • Naturalist Clubs • Toronto Entomologists Association • Conservation Authorities	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct). MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day; significant variation can occur between years and multiple years of sampling should occur. • MUD of >5000 **or** >3000 with the presence of Painted Ladies or White Admiral's is to be considered significant. • SWHDSS Index #16 provides development effects and mitigation measures.	**No** – Suitable habitat is not present within the study area
Landbird Migratory Stopover Areas **Rationale:** Sites with a high diversity of species as well as high numbers are most significant.	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.on.ec.gc.ca/wildlife_e.html All migrant raptors species: Ontario Ministry of Natural Resources:	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	Woodlots need to be >10 ha in size and within 5 km of Lake Ontario. • Woodlands <2km from Lake Ontario are more significant • Sites have a variety of habitats; forest, grassland and wetland complexes. • The largest sites are more significant • Woodlots and forest fragments are important habitats to migrating birds, these features located along the shore and	Studies confirm: • Use of the woodlot by >200 birds/day and with >35 spp with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant. • Studies should be completed during spring (Apr/May) and fall	**No** – Suitable habitat is not present within the study area. Location is not within 5km of Lake Ontario.

Wildlife Habitat	Wildlife Species (Targeted within Ecoregion 6E)	CANDIDATE SWH		CONFIRMED SWH	Habitat Present within Route (Candidate/Confirmed)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
	Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)		located within 5km of Lake Ontario are Candidate SWH. Information Sources • Bird Studies Canada • Ontario Nature • Local birders and naturalist club • Ontario Important Bird Areas (IBA) Program	(Aug/Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects • SWHDSS Index #9 provides development effects and mitigation measures.	
Deer Yarding Areas **Rationale:** Winter habitat for deer is considered to be the main limiting factor for northern deer populations. In winter, deer congregate in "yards" to survive severe winter conditions. Deer yards typically have a long history of annual use by deer, yards typically represent 10-15% of an areas summer range.	White-tailed Deer	Note: OMNR to determine this habitat. ELC Community Series providing a thermal cover component for a deer yard would include; FOM, FOC, SWM and SWC. Or these ELC Ecosites; CUP2 CUP3 FOD3 CUT	• Deer yarding areas or winter concentration areas (yards) are areas deer move to in response to the onset of winter snow and cold. This is a behavioural response and deer will establish traditional use areas. The yard is composed of two areas referred to as Stratum I and Stratum II. Stratum II covers the entire winter yard area and is usually a mixed or deciduous forest with plenty of browse available for food. Agricultural lands can also be included in this area. Deer move to these areas in early winter and generally, when snow depths reach 20 cm, most of the deer will have moved here. If the snow is light and fluffy, deer may continue to use this area until 30 cm snow depth. In mild winters, deer may remain in the Stratum II area the entire winter. • The Core of a deer yard (Stratum I) is located within the Stratum II area and is critical for deer survival in areas where winters become severe. It is primarily composed of coniferous trees (pine, hemlock, cedar, spruce) with a canopy cover of more than 60%. • OMNR determines deer yards following methods outlined in "Selected Wildlife and Habitat Features: Inventory Manual" • Woodlots with high densities of deer due to artificial feeding are not significant.	No Studies Required: • Snow depth and temperature are the greatest influence on deer use of winter yards. Snow depths > 40cm for more than 60 days in a typically winter are minimum criteria for a deer yard to be considered as SWH. • Deer Yards are mapped by OMNR District offices. Locations of Core or Stratum 1 and Stratum 2 Deer yards considered significant by OMNR will be available at local MNR offices or via Land Information Ontario (LIO). • Field investigations that record deer tracks in winter are done to confirm use (best done from an aircraft). Preferably, this is done over a series of winters to establish the boundary of the Stratum I and Stratum II yard in an "average" winter. MNR will complete these field investigations. • If a SWH is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWHDSS Index #2 provides development effects and mitigation measures.	

Wildlife Habitat	Wildlife Species (Targeted within Ecoregion 6E)	CANDIDATE SWH		CONFIRMED SWH	Habitat Present within Route (Candidate/Confirmed)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
Deer Winter Congregation Areas **Rationale:** Deer movement during winter in the southern areas of Eco-region 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions	White-tailed Deer	All Forested Ecosites with these ELC Community Series; FOC FOM FOD SWC SWM SWD Conifer plantations much smaller than 50 ha may also be used.	• Woodlots will typically be >100 ha in size. Woodlots <100ha may be considered as significant based on MNR studies or assessment. • Deer movement during winter in the southern areas of Eco-region 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands. • If deer are constrained by snow depth refer to the Deer Yarding Area habitat within Table 1.1 of this Schedule. • Large woodlots > 100ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha. • Woodlots with high densities of deer due to artificial feeding are not significant. Information Sources • MNR District Offices. • LIO/NRVIS	Studies confirm: • Deer management is an MNR responsibility, deer winter congregation areas considered significant will be mapped by MNR[1]. • Use of the woodlot by white-tailed deer will be determined by MNR, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNR. • Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques, ground or road surveys or a pellet count deer density survey. • SWHDSS Index #2 provides development effects and mitigation measures.	**Candidate** – Suitable habitat may be present within the areas along Green's Creek. This woodland is over 100 hectares in size. Should vegetation removal occur within Candidate habitat surveys to confirm deer movement may need to be considered through consultation with the MNR.

Appendix I: Significant Wildlife Habitat Assessment City of Ottawa AECOM

1.2 Rare Vegetation Communities or Specialized Habitat for Wildlife

1.2.1 Rare Vegetation Communities

Rare vegetation communities often contain rare species, particularly plants and small invertebrates, which depend on such habitats for their survival and cannot readily move to or find alternative habitats. When assessing rare vegetation communities, one of the most important criteria is the current representation of the community in the planning area based on its area relative to the total landscape or the number of examples within the planning area. There are a number of criterion used to define rare vegetation communities, however the NHIC uses a system that considers the provincial rank of a species or community type as a tool to prioritize protection efforts. These ranks are not legal designations but have been assigned using the best available scientific information, and follow a systematic ranking procedure developed by The Nature Conservancy (U.S.). The ranks are based on three factors: estimated number of occurrences, estimated community aerial extent, and estimated range of the community within the province:

S1 Extremely rare - usually 5 or fewer occurrences in the province, or very few remaining hectares.
S2 Very rare - usually between 5 and 20 occurrences in the province, or few remaining hectares.
S3 Rare to uncommon - usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with some extensive examples remaining.

The setting of criteria for significant wildlife habitat (SWH) has incorporated this ranking system into its process of determining rare vegetation communities and as such, a rare vegetation community is defined to include areas that contain a provincially rare vegetation community and/or areas that contain a vegetation community that is rare within the planning area.

SWH Table 1.2.1 contains a listing of rare vegetation communities that are considered SWH for the planning area contained within Ecoregion 6E.

Table 1.2.1 Rare Vegetation Communities.

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Habitat Present (Y/N)
	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria	
Cliffs and Talus Slopes **Rationale:** Cliffs and Talus Slopes are extremely rare habitats in Ontario.	Any ELC Ecosite within Community Series: TAO CLO TAS CLS TAT CLT	A Cliff is vertical to near vertical bedrock >3m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris	Most cliff and talus slopes occur along the Niagara Escarpment. Information Sources • The Niagara Escarpment Commission has detailed information on location of these habitats. • OMNR Planner, Forester, Ecologist or Biologist • NHIC has location information on some cliff and talus occurrences, this information is available on their website (Biodiversity Explorer). • Local naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes • SWHDSS Index #21 provides development effects and mitigation measures.	**No** – Cliffs and Talus Slope communities were not observed

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Habitat Present (Y/N)
	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria	
Sand Barren **Rationale:** Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry	ELC Ecosites: SBO1 SBS1 SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always ≤ 60%.	Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. They have little or no soil and the underlying rock protrudes through the surface. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%.	Any sand barren area, no minimum size. Information Sources • OMNR Planner, Forester, Ecologist or Biologist may be aware of locations. • NHIC has location information on some sand barren occurrences, this information is available on their website (Biodiversity Explorer). • Local naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWHDSS Index #20 provides development effects and mitigation measures.	**No** – Sand Barren vegetation communities were not observed during field investigations
Alvar **Rationale:** Alvars are extremely rare habitats in Ecos-region 6E. Most alvars in Ontario are in Eco-regions 6E and 7E. Alvars in 6E are small and highly localized just north of the Palaeozoic-Precambrian contact.	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars	An Alvar site > 0.5 ha in size. Information Sources • Alvars of Ontario (2000), Federation of Ontario Naturalists. • Ontario Nature – Conserving Great Lakes Alvars. • NHIC has location information on many alvar occurrences; this information is available on their website (Biodiversity Explorer). • OMNR Ecologists or Biologists. • Local naturalist clubs. • Conservation Authorities.	Field studies identify one or more of the Alvar indicator species listed in OMNR (2000b) Appendix N should be present. Note: Alvar plant spp. list from Eco-region 6E should be used • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses • SWHDSS Index #17 provides development effects and mitigation measures.	**No** – Alvar vegetation communities were not observed during field investigations.

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Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Habitat Present (Y/N)
	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria	
		can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover[i].			
Old Growth Forest **Rationale;** Due to historic logging practices, extensive old growth forest is rare in the Ecoregion. Interior habitat provided by old growth forests is required by many wildlife species.	Forest Community Series: FOD FOC FOM	Old Growth forests are characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	Stands 30 ha or greater in size or with at least 10 ha interior habitat assuming 100 m buffer at edge of forest. Information Sources • OMNR Forest Resource Inventory mapping • OMNR Forester, Ecologist or Biologist. • Local naturalist clubs • Conservation Authorities • Sustainable Forestry Licence (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	Field Studies will determine: • If dominant trees species of the ecosite are >140 years old, then stand is Significant Wildlife Habitat • The stand will have experienced no recognizable forestry activities • The area of Forest Ecosites combined to make up the stand is the SWH. • Determine ELC Vegetation Type for forest stand • SWHDSS Index #23 provides development effects and mitigation measures.	**No** – Old Growth Forest communities were not observed during field investigations.
Savannah **Rationale:** Savannahs are extremely rare habitats in Ontario.	TPS1 TPS2 TPW1 TPW2 CUS2	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%.	No minimum size to site Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. Information Sources • NHIC has location information on many savannah occurrences; this information is available on their website (Biodiversity Explorer). • OMNR Ecologists. • Local naturalists clubs. • Conservation Authorities.	Field studies confirm one or more of the Savannah indicator species listed in Appendix N should be present. Note: Savannah plant spp. list from Ecoregion 6E should be used. • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWHDSS Index #18 provides development effects and mitigation measures.	**No** – Savannah vegetation communities were not observed during field investigations.
Tallgrass Prairie **Rationale:** Tallgrass Prairies are extremely rare	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie	No minimum size to site. Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. Information Sources	Field studies confirm one or more of the Prairie indicator species listed in Appendix N should be present. Note: Prairie plant spp. list from Ecoregion 6E should be used	**No** – Tallgrass prairie vegetation communities were not observed during field investigations.

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Habitat Present (Y/N)
	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria	
habitats in Ontario.		habitat has < 25% tree cover.	• OMNR Ecologists and Biologists. • NHIC has location information on some tallgrass prairie occurrences; this information is available on their website (Biodiversity Explorer). • Local naturalists clubs. • Conservation Authorities.	• Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWHDSS Index #19 provides development effects and mitigation measures.	
Other Rare Vegetation Communities **Rationale:** Plant communities that often contain rare species which depend on the habitat for survival.	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG. Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M The OMNR/NHIC will have up to date listing for rare vegetation communities. Information Sources • NHIC has location information on other rare vegetation types, this information is available on their website (Biodiversity Explorer) • OMNR Ecologists and Biologists. • Local naturalists clubs. • Conservation Authorities.	Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG. • Area of the ELC Vegetation Type polygon is the SWH. • SWHDSS Index #37 provides development effects and mitigation measures.	**None** – No other rare vegetation communities were observed during field investigations.

1.2.2 Specialized Habitat for Wildlife

Some wildlife species require large areas of suitable habitat for their long-term survival. Many wildlife species require substantial areas of suitable habitat for successful breeding. Their populations decline when habitat becomes fragmented and reduced in size. Specialized habitat for wildlife is a community or diversity-based category, therefore, the more wildlife species a habitat contains, the more significant the habitat becomes to the planning area. The largest and least fragmented habitats within a planning area will support the most significant populations of wildlife. The specialized habitats for wildlife that are considered as SWH are outlined in Table 1.2.2.

Table 1.2.2 Specialized Habitats of Wildlife considered SWH.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Habitat Present (Y/N)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
Waterfowl Nesting Area **Rationale:** Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4 **Note: includes adjacency to Provincially Significant Wetlands**	A waterfowl nesting area extends 120 m from a wetland (> 0.5 ha) or a wetland (>0.5ha) and any small wetlands (0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur. • Upland areas should be at least 120 m wide so that predators such as racoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites. Information Sources • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNR Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from CAs.	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or; • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWHDSS Index #25 provides development effects and mitigation measures.	**No** – Suitable habitat is not present within the study area. Upland areas located adjacent to wetland communities are not large enough in size to support breeding waterfowl.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	Osprey **Special Concern** Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water.	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area. • Some species have more than one	**Candidate** – Suitable habitat is present within the study area given its proximity to

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Habitat Present (Y/N)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
Rationale: Nest sites are fairly uncommon in Eco-region 6E and are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.		SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). Information Sources • NHIC compiles all known nesting sites for Bald Eagles in Ontario. • MNR values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data. • OMNR Ecologist or Biologist may be aware of locations of nesting raptors. In addition, these staff may know local naturalists that may be aware of the locations of raptor nests. • Sustainable Forestry Licence (SFL) companies will identify additional nesting locations through field operations. • Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented • Reports and other information available from CAs. • Local naturalists may know of other locations. • Use maps and aerial photographs to identify forests with few roads that tend to have less human disturbance.	nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH, maintaining undisturbed shorelines with large trees within this area is important. • For a Bald Eagle the active nest and a 400-800 m radius around the nest is the SWH. Area of the habitat from 400-800m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for ≥ 3 years or suspected of not being used for >5 years before being considered not significant. • Observational studies to determine nest site use, perching sites and foraging areas need to be done from mid March to mid August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects • SWHDSS Index #26 provides development effects and mitigation measures	the Ottawa River. Species can be found nesting several kilometers away from the river. Should tree removal occur within Candidate habitat, **bird observational studies** should be conducted to determine nest site use, perching sites and foraging areas (mid-March to mid-August).
Woodland Raptor Nesting Habitat **Rationale:** Nests sites for these species are rarely identified; these area sensitive habitats are often used annually by these	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3	All natural or conifer plantation woodland/forest stands >30ha with >10ha of interior habitat. Interior habitat determined with a 200m buffer • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old	Studies confirm: • Presence of 1 or more active nests from species list is considered significant. • Red-shouldered Hawk and Northern Goshawk – A 400m radius around the nest or 28 ha of suitable habitat is the SWH. • Barred Owl – A 200m radius around the nest is the SWH. • Broad-winged Hawk and Coopers	TBD

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Habitat Present (Y/N)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
species.			nest. Information Sources • OMNR Ecologist or Biologist may be aware of locations of nesting raptors. • Sustainable Forestry Licence (SFL) companies will identify additional nesting locations through field operations. • Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada. • Reports and other information available from CAs. • Use maps and aerial photographs to identify forests with few roads that tend to have less human disturbance.	Hawk, – A 100m radius around the nest is the SWH. • Sharp-Shinned Hawk – A 50m radius around the nest is the SWH. • Conduct field investigations from mid-March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. • SWHDSS Index #27 provides development effects and mitigation measures.	
Turtle Nesting Areas **Rationale;** These habitats are rare and when identified will often be the only breeding site for local populations of turtles.	Midland Painted Turtle Special Concern Species Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100m) or within the following ELC Ecosites: MAM2 MAM3 MAM4 MAM5 MAM6 MAM1 MAM2 MAM3 SAS1 SAM1 SAF1 BOO1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. Information Sources • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • NHIC • Use aerial photographs and maps to narrow the search for prime nesting areas including shoreline beaches located near weedy areas of wetlands, lake and river shorelines, road embankments near turtle habitat, and stream crossings/culverts.	Studies confirm: •Presence of 5 or more nesting Midland Painted Turtles •One or more Northern Map Turtle or Snapping Turtle nesting is a SWH. •The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100m around the nesting area dependant on slope, riparian vegetation and adjacent land use is the SWH •Travel routes from wetland to nesting area are to be considered within the SWH •Field investigations should be conducted in prime nesting season typically late spring to early summer. •SWHDSS Index #28 provides development effects and mitigation measures for turtle nesting habitat.	**Candidate** – Suitable habitat is present along vegetation communities found along Green's Creek, Taylor Creek and Bilberry Creek. Should vegetation removal or in-water works occur within Candidate habitat **turtle nesting surveys** should be conducted during nesting season (late spring to early summer)

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Habitat Present (Y/N)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
			• Skinks will nest under logs, in stumps or under loose rock in partially wooded areas • Reports and other information available from CAs. • Sightings by local Naturalist groups		
Seeps and Springs **Rationale:** Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamander spp.	Seeps/Springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system. • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species. Information Sources • Topographical Map. • Thermography. • Hydrological surveys conducted by CAs and MOE. • Local naturalists and landowners may know some locations. • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped.	Field Studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of an ELC forest ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat. • SWHDSS Index #30 provides development effects and mitigation measures	No headwaters observed within study area
Amphibian Breeding Habitat (Woodland). **Rationale:** These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians	• Presence of a wetland, lake, or pond within or adjacent (within 120m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • Local OMNR Ecologist • OMNR wetland evaluations • Local field naturalist clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm; • Presence of breeding population of 1 or more of the listed species with at least 20 individuals (adults, juveniles, eggs/larval masses). • An observational study to determine breeding/larval stages will be required during the spring (Apr-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland. • The habitat is the woodland (ELC polygons) and wetland (ELC polygons) combined. A travel corridor connecting the woodland and wetland polygons is to be included within the habitat. • SWHDSS index #14 provides development effects and mitigation measures.	**Candidate** – Suitable habitat may be present within the vegetation communities found along Green's Creek, Taylor Creek and Bilberry Creek. Should vegetation removal occur within candidate habitat **Amphibian surveys** following marsh monitoring protocol should be completed.
Amphibian	Eastern Newt	ELC Community	• Wetlands and pools (including vernal pools)	Studies confirm:	**Candidate** – Suitable

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Habitat Present (Y/N)
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
Breeding Habitat (Wetlands) **Rationale;** Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within Central Ontario landscapes.	American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Classes SW, MA, FE, BO, OA and SA.	>500m^2 (about 25m diameter) isolated from woodlands (>120m), supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNR mapping and could be important amphibian breeding habitats. • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. • Bullfrogs require permanent water bodies with abundant emergent vegetation. Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) • Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNR Ecologist or Biologist may know of populations, wetland evaluations may be a good source of information.. • Use maps or aerial photography to locate marsh habitat. • Reports and other information available from CAs.	•Presence of breeding population of 1or more of the listed salamander species or 3 or more of the listed frog or toad species and with at least 20 breeding individuals (adults, juveniles, eggs/larval masses) **or;** •Wetland with confirmed breeding Bullfrogs are significant. •The ELC ecosite wetland area and the shoreline are the SWH. •Surveys to confirm breeding to be completed during spring (Apr to June) when amphibians are migrating, calling and breeding within the wetland habitats. •If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWHDSSIndex #15 provides development effects and mitigation measures.	habitat may be present within the vegetation communities found along Green's Creek, Taylor Creek and Bilberry Creek. Should vegetation removal occur within candidate habitat **Amphibian surveys** following marsh monitoring protocol should be completed.

1.3 Habitat for Species of Conservation Concern (Not including Endangered or Threatened Species

Habitats of Species of Conservation Concern include wildlife species that are listed as Special Concern or rare, that are declining, or are featured species. Habitats of Species of Conservation Concern do not include habitats of Endangered or Threatened species as identified by the Endangered Species Act 2007. Table 1.3 assists with the identification of SWH for Species of Conservation Concern.

Table 1.3. Habitats of Species of Conservation Concern considered SWH.

Wildlife	Species	CANDIDATE SWH		CONFIRMED SWH	Habitat Present (Y/N)
		ELC Ecosite	Habitat Criteria and Information Sources	Defining Criteria	
Marsh Breeding Bird Habitat **Rationale:** Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan **Special Concern:** Black Tern Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands. • All wetland habitats are to be considered as long as there is shallow water with emergent aquatic vegetation present. • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. Information Sources • Contact OMNR, wetland evaluations are a good source of information. • Local naturalist clubs • NHIC Records. • Reports and other information available from CAs. • Ontario Breeding Bird Atlas.	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren **or** 1 pair of Sandhill Cranes; **or** breeding by any combination of 5 or more of the listed species. • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH. • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects • SWHDSS Index #35 provides development effects and mitigation measures	**Candidate** – Suitable habitat may be present within the wetlands communities associated with Green's Creek, Taylor Creek and Bilberry Creek. Should vegetation removal occur within Candidate habitat **breeding bird surveys** should occur during nesting season (May/June).
Woodland Area-Sensitive Bird Breeding Habitat **Rationale:** LARGE, NATURAL BLOCKS OF MATURE WOODLAND HABITAT WITHIN THE SETTLED AREAS OF SOUTHERN ONTARIO ARE	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren Special Concern: Cerulean Warbler Canada Warbler	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	• Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha. • Interior forest habitat is at least 200 m from forest edge habitat. Information Sources • Ask local birders for local forests that support abundant and species-rich populations of area-sensitive species. • Canadian Wildlife Service (CWS) for the location of forest bird monitoring sites and names of volunteers who might assist the planning authority in locating important areas.	Studies confirm: • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH. • Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects • SWHDSS Index #34 provides development effects and mitigation measures.	TBD

Wildlife	Species	CANDIDATE SWH		CONFIRMED SWH	Habitat Present (Y/N)
		ELC Ecosite	Habitat Criteria and Information Sources	Defining Criteria	
IMPORTANT HABITATS FOR AREA SENSITIVE INTERIOR FOREST SONG BIRDS.			• Bird Studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species • Reports and other information available from CAs.		
Open Country Bird Breeding Habitat **Rationale:** This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow **Special Concern** Short-eared Owl	CUM1 CUM2	Large grassland areas (includes natural and cultural fields and meadows) >30 ha Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years). Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species. Information Sources • Use Agricultural land classification maps with aerial photographs to determine the potential grasslands that might be candidate sites. • Ask local birders for location of grasslands that support abundant and species rich populations of area-sensitive species. • Ontario Breeding Bird Atlas • Reports and other information available from CAs.	Field Studies confirm: • Presence of nesting or breeding of 2 or more of the listed species. • A field with 1 or more breeding Short-eared Owls is to be considered SWH. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects • SWHDSS Index #32 provides development effects and mitigation measures	**No** – Suitable habitat is not present within the study area. Cultural meadows do not exceed 30 ha in size.
Shrub/Early Successional Bird Breeding Habitat **Rationale:** This wildlife habitat is declining throughout	Indicator Spp: Brown Thrasher Clay-coloured Sparrow Common Spp. Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher **Special Concern:** Yellow-	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger	Large field areas succeeding to shrub and thicket habitats>10ha in size. Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years). Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species.	Field Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species. • A field with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat. • The area of the SWH is the contiguous ELC ecosite field/thicket area.	**No** – Suitable habitat is not present within the study area. No cultural thickets were greater than 10 ha in size.

Wildlife	Species	CANDIDATE SWH		CONFIRMED SWH	Habitat Present (Y/N)
		ELC Ecosite	Habitat Criteria and Information Sources	Defining Criteria	
Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records [cxcix].	breasted Chat Golden-winged Warbler	habitat for some bird species	Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. Information Sources • Use agricultural land classification maps and recent aerial photographs to determine the amount of potential shrub and thicket habitats. • Ask local birders for location of shrub and thicket habitats that support abundant and species rich populations of area-sensitive species. • Ontario Breeding Bird Atlas • Reports and other information available from CAs.	• Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects • SWHDSS Index #33 provides development effects and mitigation measures.	
Terrestrial Crayfish; **Rationale:** Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare. [ccii]	Chimney or Digger Crayfish; (*Fallicambarus fodiens*) Devil Crawfish or Meadow Crayfish; (*Cambarus Diogenes*)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3	Meadow and edges of shallow marshes (no minimum size) identified should be surveyed for terrestrial crayfish. • Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water. • Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well formed. Information Sources • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998	Studies Confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable marsh meadow or terrestrial sites • Area of ELC Ecosite polygon is the SWH • Surveys should be done during adult breeding season (April to late June) and in late summer-early August in nearby temporary or permanent water for juveniles. Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult SWHDSS Index #36 provides development effects and mitigation measures.	**Candidate** – Suitable habitat may be present within the wetland communities found along the LRT Route. Field investigations were limited to the areas confined to the watercourses as well as roadside investigations. Wetland communities were not search for the presence of chimneys or crayfish. Should vegetation removal occur within candidate habitat **surveys should be completed to identify the presence or absence of crayfish or chimneys** during the breeding season (April to late June and in late summer-early August)
Special Concern	All Special Concern and	All plant and animal	When an element occurrence is identified within	Studies Confirm:	**Confirmed –**

Wildlife	Species	CANDIDATE SWH		CONFIRMED SWH	Habitat Present (Y/N)
		ELC Ecosite	Habitat Criteria and Information Sources	Defining Criteria	
and Rare Wildlife Species **Rationale:** These species are quite rare or have experienced significant population declines in Ontario.	Provincially Rare (S1-S3, SH) plant and animal species. Lists of these species are tracked by the Natural Heritage Information Centre.	element occurrences (EO) within a 1 or 10km grid. Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy	a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites Information Sources • Natural Heritage Information Centre will have the Special Concern and Provincially Rare (S1-S3, SH) species lists and element occurrences for these species. • NHIC Website: Biodiversity Explorer https://www.biodiversityexplorer.mnr.gov.on.ca/nhicWEB/mainSubmit.do • Ontario Breeding Bird Atlas • Expert advice should be sought as many of the rare spp. have little information available about their requirements.	• Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • Habitat form and function needs to be assessed from the assessment of vegetation types and an area of significant habitat that protects the rare or special concern species identified. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. • SWHDSS Index #37 provides development effects and mitigation measures.	Milksnake was confirmed by AECOM field staff within the vegetation communities along Green's Creek

1.4 Animal Movement Corridors

Animal Movement Corridors are elongated areas used by wildlife to move from one habitat to another. They are important to ensure genetic diversity in populations, to allow seasonal migration of animals (e.g. deer moving from summer to winter range) and to allow animals to move throughout their home range from feeding areas to cover areas. Animal movement corridors function at different scales often related to the size and home range of the animal. For example, short, narrow areas of natural habitat may function as a corridor between amphibian breeding areas and their summer range, while wider, longer corridors are needed to allow deer to travel from their winter habitat to their summer habitat.

Identifying the most important corridors that provide connectivity across the landscape is challenging because of a lack of specific information on animal movements. There is also some uncertainty about the optimum width and mortality risks of corridors. Furthermore, a corridor may be beneficial for some species but detrimental to others. For example, narrow linear corridors may allow increased access for racoons, cats, and other predators. Also, narrow corridors dominated by edge habitat may encourage invasion by weedy generalist plants and opportunistic species of birds and mammals. Corridors often consist of naturally vegetated areas that run through more open or developed landscapes. However, sparsely vegetated areas can also function as corridors. For example, many species move freely through agricultural land to reach natural areas. Despite the difficulty of identifying exact movement corridors for all species, these landscape features are important to the long-term viability of certain wildlife populations.

Animal Movement Corridors should only be identified as SWH where:

Where a Confirmed or Candidate SWH has been identified by MNR or the planning authority based on documented evidence of a habitat identified within these Criterion Schedules or the Significant Wildlife Habitat Technical Guide. The identified wildlife habitats Table 1.4.1 will have distinct passageways or rely on well defined natural features for movements between habitats required by the species to complete its life cycle.

Table 1.4.1 Animal Movement Corridors

Habitat	SPECIES	CANDIDATE SWH		CONFIRMED SWH	Habitat Present (Y/N)
		ELC Eco-sites	Habitat Criteria and Information Sources	Defining Criteria	
Amphibian Movement Corridors **Rationale:** Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	Corridors may be found in all ecosites associated with water. • Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1	Movement corridors between breeding habitat and summer habitat. Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (**Amphibian Breeding Habitat –Wetland)** of this Schedule. Information Sources • MNR District Office. • NHIC. • Reports and other information available from CAs. • Naturalist Clubs.	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. • Corridors should consist of native vegetation, roadless area, no gaps such as fields, waterways or bodies, and undeveloped areas are most significant • Corridors should be at least 200m wide with gaps <20m and if following riparian area with at least 15m of vegetation on both sides of waterway. Shorter corridors are more significant	**Candidate** – Suitable habitat may exist along Green's Creek, Taylor Creek and Bilberry Creek. This can only be determined once we have determined the significance of Amphibian Breeding Habitat Wetland (Section 1.2.2)

Habitat	SPECIES	CANDIDATE SWH		CONFIRMED SWH	Habitat Present (Y/N)
		ELC Eco-sites	Habitat Criteria and Information Sources	Defining Criteria	
				than longer corridors; however amphibians must be able to get to and from their summer and breeding habitat. • SWHDSS Index #40 provides development effects and mitigation measures	
Deer Movement Corridors **Rationale:** Corridors important for all species to be able to access seasonally important life-cycle habitats or to access new habitat for dispersing individuals by minimizing their vulnerability while travelling.	White-tailed Deer	Corridors may be found in all forested ecosites. A Project Proposal in Stratum II Deer Wintering Area has potential to contain corridors.	Movement corridor must be determined when **Deer Wintering Habitat** is confirmed as SWH from Table 1.1 from Table 1.2.2 of this schedule. • A deer wintering habitat identified by the OMNR as SWH in Table 1.1 of this Schedule will have corridors that the deer use during fall migration and spring dispersion. • Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges). Information Sources • MNR District Office. • NHIC. • Reports and other information available from CAs. • Naturalist Clubs.	• Studies must be conducted at the time of year when deer are migrating or moving to and from winter concentration areas. • Corridors that lead to a deer wintering yard should be unbroken by roads and residential areas. • Corridors should be at least 200m wide with gaps <20m and if following riparian area with at least 15m of vegetation on both sides of waterway. Shorter corridors are more significant than longer corridors. • SWHDSS Index #39 provides development effects and mitigation measures	**Candidate** – To be confirmed once Deer Wintering Habitat has been confirmed.

Appendix J

Species at Risk Habitat Screening

Taxonomy	Common Name	Scientific Name	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat (© Queen's Printer for Ontario, 2013 - Ontario Species at Risk Website ; Significant Wildlife Habitat Technical Guide; Species at Risk Registry & Ontario's Biodiversity - ROM)	Known Populations (© Queen's Printer for Ontario, 2013 - Ontario Species at Risk Website; ROM – Range Maps, SAR Webiste, MNR Publications & COSEWIC Reports)	Source Identifying Species Record	Species Habitat Present within Study Area Yes/No	Species Confirmed Through Field Investigations?	Recommendations
Plants	American Chestnut	*Castanea dentata*	END	END Schedule 1	END	The American Chestnut prefers dryer upland deciduous forests with sandy, acidic to neutral soils. In Ontario, it is only found in the Carolinian Zone between Lake Erie and Lake Huron. The species grows alongside Red Oak, Black Cherry, Sugar Maple, American Beech and other deciduous tree species. This species can be associated with the following ELC communities: **FOD** with dry sandy soil.	The American Chestnut has almost disappeared from eastern North America due to an epidemic caused by a fungal disease called the chestnut blight (Cryphonectria parasitica). In Canada, the American Chestnut is restricted primarily to southwestern Ontario. Based on information available in 2004, it was estimated that there are 120 to 150 mature trees and 1,000 or more small, young trees in the province.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Several Deciduous Forests are found along the LRT route which may provide suitable habitat.	**No** Vegetation Surveys did not result in the oservation of any species. However should trees need to be removed during detailed design a tree survey should be conducted.	Where tree removal is to occur a **tree survey** should be conducted to ensure species absence.
Fish	American Eel	*Anguilla rostrata*	END			Over the course of its life, the American Eel can be found in both salt and fresh water. In fact, some scientists consider the American Eel to have the broadest diversity of habitats of any fish species in the world.	The American Eel starts life in the Sargasso Sea in the North Atlantic Ocean and migrates along the east coast of North America. In Canada, it is found in fresh water and salt water areas that are accessible from the Atlantic Ocean. This area extends from Niagara Falls in the Great Lakes up to the mid-Labrador coast. In Ontario, American Eels can be found as far inland as Algonquin Park. Once the eels mature (10-25 years) they return to the Sargasso Sea to spawn.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Species habitat may be present within Green's Creek, and Taylor's Creek.	**No** Aquatic Assessments did not result in any observations and MNR correspondence did not identify this species within the LRT study area.	As none of the critical life history processes (reproduction, larval stage) of the American Eel take place in fresh water then timing restrictions are irrelevant; however, extra care should be taken when working in potential eel habitat.
Plants	American Ginseng	*Panax quinquefolius*	END			In Ontario, American Ginseng typically grows in rich, moist, but well-drained, and relatively mature, deciduous woods dominated by Sugar Maple (Acer saccharum), White Ash (Fraxinus americana) and American Basswood (Tilia americana). It usually grows in deep, nutrient rich soil over limestone or marble bedrock. Species can be associated with the following ELC codes: **FOD5, FOD6**	American Ginseng ranges from Louisiana and Georgia north to New England and Minnesota. In Canada, it is found in southwestern Quebec and southern Ontario.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Several Deciduous Forests are found along the LRT route which may provide suitable habitat.	**No** Vegetation Surveys did not result in the oservation of any species. However should vegetation need to be removed during detailed design a species specific survey should be conducted.	Where vegetation removal is to occur more **detailed vegetation surveys** should be conducted to ensure species asbence.
Insects	Bogbean Buckmoth	*Hemileuca sp.*	END	END Schedule 1	END	The Bogbean Buckmoth is restricted to open, chalky, low shrub fens containing large amounts of bogbean. This species can be associated with the following ELC communities: **FEO, FES**	In Canada, the Bogbean Buckmoth is restricted to two isolated sites in southeastern Ontario. This moth also occurs in northeastern New York State in wetlands near Lake Ontario.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**No** No suitable habitat is present within the LRT study area.	**No** ELC assessments did not identify any Fen vegetation communities along the LRT Route.	n/a
Plants	Butternut	*Juglans cinerea*	END	END Schedule 1	END	In Ontario, Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges. This species can be associated with the following ELC communities: **FOD** and mature hedgerows; Soil: dry rocky or moist (4, 5, 6) to fresh (2, 3).	Butternut can be found throughout central and eastern North America. In Canada, Butternut occurs in Ontario, Quebec and New Brunswick. In Ontario, this species is found throughout the southwest, north to the Bruce Peninsula, and south of the Canadian Shield.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Kemptville MNR Correspondence	**Yes** Several Deciduous Forests are found along the LRT Route which may provide suitable habitat.	**Yes** Vegetation surveys did confirm one butternut along the LRT Route at ELRT4N.	Where vegetation removal is to occur more **detailed vegetation surveys** should be conducted to confirm species asbence. Should the species be indetifed within the construction area the completion of a **Notice of Activity and Mitigation Plan** may be required under the MNR's Streamlined Approvals Process for Species at Risk.

Taxonomy	Common Name	Scientific Name	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat (© Queen's Printer for Ontario, 2013 - Ontario Species at Risk Website ; Significant Wildlife Habitat Technical Guide; Species at Risk Registry & Ontario's Biodiversity - ROM)	Known Populations (© Queen's Printer for Ontario, 2013 - Ontario Species at Risk Website; ROM – Range Maps, SAR Webiste, MNR Publications & COSEWIC Reports)	Source Identifying Species Record	Species Habitat Present within Study Area Yes/No	Species Confirmed Through Field Investigations?	Recommendations
Plants	Eastern Prairie Fringed-orchid	*Platanthera leucophaea*	END	END Schedule 1	END	The Eastern Prairie Fringed-orchid grows in wetlands, fens, swamps and tallgrass prairie. It has been found in ditches and railroad rights of way. This specie can be associated with the following ELC communities: **MAM, FEO, FES, FET, SWC, SWM, SWD, TPO, TPS** and **TPW**.	In Ontario, there are about 20 small populations in prairie habitat or fens in Simcoe, Essex and Lambton counties, and the municipality of Chatham-Kent. It's also found in tamarack swamps in the Bruce Peninsula and Ottawa area.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present within the MAM communities.	**No** Vegetation surveys did not result in the observation of the species, however should vegetation clearing be necessary species specific surveys should be conducted. Based on distribution mapping provided by the MNR the species is unlikely to be found along th LRT Route.	Where vegetation removal is to occur more **detailed vegetation surveys** should be conducted to ensure species asbence.
Birds	Golden Eagle	*Aquila chrysaetos*	END	NAR	NAR	Golden Eagles nest in remote, undisturbed areas, usually building their nests on ledges on a steep cliff or riverbank, but they will also use large trees if needed. Most hunting is done near open areas such as large bogs or tundra. During migration they could be encountered anywhere, but are most frequently seen migrating west along the shores of Lake Ontario and Erie in November. Small numbers also winter in the southern half of Ontario, most often near large deer wintering areas where carcasses might be found. This species can be associated with the following ELC communities: **FOD**	In Canada, Golden Eagles are most common in the western mountains and prairies but are also fairly widespread in Labrador and Quebec's Ungava peninsula. In Ontario, breeding Golden Eagles are presently known only from the Hudson Bay Lowland, although there is some evidence suggesting they once nested much further south. Currently there are believed to be 10 to 20 pairs in the province.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable migratory habitat may be present within the FOD along the LRT Route.	**No** Vegetation surveys conducted along the LRT Route did not identify any ledges, steeps cliffs or riverbanks within undisturbed areas as the route is along an existing busy highway. Based on distribution mapping provided by the MNR the species is unlikely to be found along th LRT Route.	Breeding bird surveys should be conducted along the LRT Route to confirm presence or asbsence of the species.
Birds	Henslow's Sparrow	*Ammodramus henslowii*	END	END Schedule 1	END	In Ontario, the Henslow's Sparrow lives in open fields with tall grasses, flowering plants, and a few scattered shrubs. It has also been found in abandoned farm fields, pastures, and wet meadows. It tends to avoid fields that have been grazed or are crowded with trees and shrubs. It prefers extensive, dense, tall grasslands where it can more easily conceal its small ground nest. This species can be associated with the following ELC communities: **TPO**, **CUM**, and **MAM**.	The Henslow's Sparrow breeds in the northeastern and east-central United States, and reaches its northeastern limit in Ontario. It was once fairly common in scattered areas of suitable habitat south of the Canadian Shield. However, steep declines since the 1960s have all but wiped this bird out as a breeding species in Ontario. A few are still seen each spring at migration hotspots such as Point Pelee National Park, and a few may breed at selected locations.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present within the CUM and agrcultural fields.	**No** Incidental Wildlife surveys did not result in any observation of the species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended that breeding bird survey be completed to confirm presence/absence. Based on distribution mapping provided by the MNR the species is unlikely to be found along th LRT Route.	**Breeding bird surveys** should be conducted along the LRT Route to confirm presence or asbsence of the species.
Molluscs	Hickorynut	*Obovaria olivaria*	END			Hickorynuts live on the sandy beds in large, wide, deep rivers – usually more than two or three metres deep – with a moderate to strong current. Mussels filter water to find food, such as bacteria and algae. Mussel larvae must attach to a fish, called a host, where they consume nutrients from the fish body until they transform into juvenile mussels and then drop off. In Canada, the fish host of the Hickorynut is the Lake Sturgeon. Presence of the fish host is one of the key features determining whether a body of water can support a healthy Hickorynut population.	The Hickorynut is found within the Great Lakes – St. Lawrence basin and the Mississippi River basin. In Canada, the Hickorynut is found in sporadic locations within the Great Lakes and St. Lawrence basin, from Lake Huron to Quebec City. In Ontario, it is found in the Mississagi River and the Ottawa River.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present within the watercourses along the LRT Route.	**No** Aquatic Assessments did not result in any observations of the species. Watercourses within the study area are too small, and shallow.	n/a

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Mammals	Little Brown Myotis (Bat)	*Myotis lucifugus*	END			Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access many roosting areas. Little brown bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing. this species can be associated with the following ELC codes: **FOD, CUW**	The little brown bat is widespread in southern Ontario and found as far north as Moose Factory and Favourable Lake. Outside Ontario, this bat is found across Canada (except in Nunavut) and most of the United States.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Kemptville MNR Correspondence	**Yes** Suitable habitat may be present within several of the observed FOD, and CUW.	**No** Species specific surveys were not conducted for this species, however some cavity trees were observed within the study area. Should tree removal need to occur species specific surveys will need to be conducted.	Where tree removal is proposed, a **cavity tree survey** should be conducted to assess habitat potential within the area. Should cavity trees be confirmed the activity may require the completion of a Notice of Activity and Mitigation Plan under the MNR's new Streamlined approvals process for Species at Risk.
Birds	Loggerhead Shrike	*Lanius ludovicianus*	END	END Schedule 1	END	In Ontario, the Loggerhead Shrike prefers pasture or other grasslands with scattered low trees and shrubs. It lives in fields or alvars (areas of exposed bedrock) with short grass, which makes it easier to spot prey. It builds its nest in small trees or shrubs and hunts by waiting patiently in tree branches until it swoops down and attacks its unsuspecting prey – usually large insects, such as grasshoppers. Loggerhead Shrikes also require spiny, multi-branched shrubs where they can impale prey before eating it. Barbed wired fencing can also be used for this. Can be associated with the following ELC communities: **SWT**, **CUM**, **CUT**, **ALO** and **ALS**.	The Loggerhead Shrike currently breeds in central and western North America. Until the 1970s, the Loggerhead Shrike could be found at many locations throughout southern Ontario and other parts of northeastern North America, but it has declined dramatically. Although the occasional bird is still found within the broader former range, most remaining Loggerhead Shrikes are now found in two core grassland habitats - the Carden Plain north of Lindsay, and the Napanee Limestone Plain. Every fall these birds migrate to the southern United States for the winter.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present within the CUM communities observed	**No** Incidental widlife surveys did not result in the observation of the species, nor did we observe any large open grasslands during ELC surveys. It is unlikely for this species to be found within the study area.	**Breeding bird surveys** should be conducted along the LRT Route to confirm presence or asbsence of the species.
Mammals	Mountain Lion or Cougar	*Puma concolor*	END			The Cougar lives in large, undisturbed forests or other natural areas where there is little human activity. The forest must support plenty of white-tailed deer, which is an important food source for the Cougar.	The species has a very wide range, encompassing large areas of North, Central and South America. In Ontario, Cougars are most likely believed to live in northern Ontario because of the remoteness of the habitat. However, there have been many reports from the southern part of the province. Cougars found in Ontario may be escaped or released pets, animals dispersing from western North America, native animals or a combination of those factors. The population size is unknown.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may exist within the larger tracts of forest associated with Green's Creek.	**No** Given the disturbed nature of the vegetation communities found along Highway 174, it is unlikely for Cougars to be present.	n/a
Mammals	Northern Myotis (Bat)	*Myotis septentrionalis*	END	No Status	END	The Northern Long-eared Bat uses hibernation sites such as caves and mines in the winter and roosting and nursery colonies in tree cavities and manmade structures in the summer. This species can be associated with the following ELC codes: **CUW, FOD, and SWD**	In Canada the Northern Long-eared Bat is found in Newfoundland, Nova Scotia, Quebec and Ontario.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present within the FOD, and CUW communities.	**No** Species specific surveys were not conducted for this species, however some cavity trees were observed wihtin the study area. Should tree removal be required species specific surveys will need to be conducted.	Where tree removal is to occur, a **cavity tree survey** should be conducted to assess habitat potential within the area. Should cavity trees be confirmed the activity may require the completion of a Notice of Activity and Mitigation Plan under the MNR's new Streamlined approvals process for Species at Risk.

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Insects	Rapids clubtail	*Gomphus quadricolor*	END			The Rapids Clubtail is typically found in clear, cool medium-to-large rivers with gravel shallows and muddy pools. Larvae occupy quiet muddy pools. Adult males perch on exposed rocks and other projections in the rapids. Males are quite territorial and make short flights over the water, repeatedly returning to the same perch. Adult females typically inhabit forests along riverbanks, and only visit shallows and pools when they are ready to mate and lay eggs. This species can be associated with the following ELC codes: **OAO**	The Rapids Clubtail is a globally rare to uncommon species found throughout eastern North America. Within this range the species and its habitat are locally distributed and there are large areas where the species does not occur. Most populations of the Rapids Clubtail are located in the U.S. Midwest, but range extends from northern Alabama and Georgia to southern Ontario, and from Maine to eastern Minnesota. In Ontario, the Rapids Clubtail has only been found in four rivers in southern and eastern Ontario: the Thames, Humber, Credit and Mississippi.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may present within the watercourses along the LRT Route.	**No** Aquatic assessments determined all watercourses within the study area to be small, warm water. Based on distribution mapping provided by the MNR the species is unlikely to be found along th LRT Route.	n/a
Birds	Red Knot *rufa* subspecies	*Calidris canutus rufa*	END			The Red Knot rufa subspecies only occurs in Ontario during migration, where it may feed and rest on beaches. They prefer open beaches, mudflats, and coastal lagoons, where they feast on molluscs, crustaceans, and other invertebrates. This species can be associated with the following ELC codes: **BBO**	Red Knot rufa subspecies breeds within the central Canadian Arctic. The coastal mudflats along the southwest coast of Hudson Bay and James Bay in northern Ontario are very important staging sites (where birds stop to refuel) during both spring and fall migration. They are also regularly seen in small numbers during the fall in southern Ontario, usually along Great Lakes beaches and mudflats. Occasionally, large flocks have been seen in spring at select eastern Ontario beaches, such as Presqu'ile Provincial Park and Amherst Island, when birds flying non-stop from Delaware Bay to James Bay are forced to land because of bad weather.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**No** Suitable habitat is not present along the LRT Route.	**No** ELC and Aquatic assessments did not identify any Open Beach vegetation communities along the LRT Route.	n/a
Insects	Rusty-patched Bumble Bee	*Bombus affinis*	END	END Schedule 1	END	This species, like other bumble bees, can be found in open habitat such as mixed farmland, urban settings, savannah, open woods and sand dunes. The most recent sightings have been in oak savannah, which contains both woodland and grassland flora and fauna. This species can be associated with the following ELC codes: **TPS1, TPS2, SD CUS, CUM, CUW**	The Rusty-patched Bumble Bee was once widespread and common in eastern North America, found from southern Ontario south to Georgia and west to the Dakotas. The species has suffered rapid, severe decline throughout its entire range since the 1970s with only a handful of specimens collected in recent years in Ontario. The only sightings of this bee in Canada since 2002 have been at The Pinery Provincial Park on Lake Huron.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present within the cultural meadow and cultural woodland communities.	**No** Incidental widlife surveys did not result in the observation of the species along the LRT Route. Based on distribution mapping provided by the MNR the species is unlikely to be found along th LRT Route.	n/a

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Reptiles	Spotted Turtle	*Clemmys guttata*	END			The Spotted Turtle is semi-aquatic and prefers ponds, marshes, bogs and even ditches with slow-moving, unpolluted water and an abundant supply of aquatic vegetation. They are found in different types of wetlands throughout the province, depending on the types of habitats that are available. Females dig their nests in sunny locations where there is not a lot of woody vegetation. This species usually hibernates in wetlands or seasonally wet areas associated with structures including overhanging banks, hummocks, tree roots, or aquatic animal burrows. This species can be associtaed with the following ELC codes: **MAM, OAO**	In Canada, the Spotted Turtle is found primarily in Ontario along the north shore of Lake Erie, in the Georgian Bay area and in scattered locations throughout southern and eastern Ontario. Over the last 30 to 40 years, Spotted Turtles have declined significantly and are no longer found at several sites in southern Ontario. It is difficult to estimate the Ontario population size, but recent data suggests there are approximately 2000 individual Spotted Turtles spread throughout several small, scattered populations. Of the handful of known populations, only a few are large enough to ensure long-term survival.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may exist within the onsite watercourses as well as the marsh communities along the LRT Route.	**No** Aquatic and Vegetation assessments conducted along watercourses did not result in any observation of the species. Watercourses did not contain a large amount of aquatic vegetation and are not considered unpolluted. Therefore it is unlikely to be found within along the LRT Route, however turtle surveys were not conducted.	Where watercourses are to be disturbed a **Spring Turtle Basking Surveys** should be completed to ensure presence/absence of the species within the construction area. Where species are confirmed a relocation plan may be required with the installation of exclusionary fencing.
Reptiles	Wood Turtle	*Glyptemys insculpta*	END			The Wood Turtle prefers clear rivers, streams or creeks with a slight current and sandy or gravelly bottom.It spends more time on land and the shores of water- courses than other native Ontario turtles. Wooded areas are essential habitat for the Wood Turtle, but they are found in other habitats, such as wet meadows, swamps and fields. Wood Turtles overwinter on stream bottoms. This species can be associated with the following ELC Codes: **MAM, SWD, OAO**	In Ontario, Wood Turtles have been found in three separate regions of the province. Studies are underway to determine more accurately the size and extent of these populations and threats they're facing. The Wood Turtle is found in isolated patches from Nova Scotia and New Brunswick south to Virginia, and west through southern Quebec and Ontario to Minnesota and northeastern Iowa.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present within the watercourses, and marsh communities along the LRT Route.	**No** Aquatic assessments and incidental wildlife observations did not result in the observation of this species. Watercourses along the route are not considred clear and undisturbed.	Where watercourses are to be disturbed a **Spring Turtle Basking Survey** should be completed to ensure presence/absence of the species within the construction area. Where species are confirmed a relocation plan may be required with the installation of exclusionary fencing.
Birds	Barn Swallow	*Hirundo rustica*	THR	No Status	THR	Nearly all nests are made on man-made structures such as barns, garages, sheds, boat houses, bridges, road culverts, eaves and warfs. Farmlands or rural areas; forages over open country especially near bodies of water. Foraging habitat for this species can be associated with the following ELC codes: **TPO**, **CUM1**, **MAM**, **MAS**, **OAO**, **SAS1**, **SAM1**, **SAF1**; containing or adjacent structures that are suitable for nesting.	Barn Swallow can be found throughout all of southern and central Ontario and part of northern Ontario.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Atlas of Breeging Bird Seach Kemptville MNR Correspondence	**Yes** Suitable habitat may exist along the LRT Route.	**Yes** Vegetation surveys did confirm a Barn Swallow nest at the structure found over ELRT2S, Taylor Creek	Where bridges are to be altered **Barn Swallow surveys** are to be conducted prior to any construction activities to confirm presence/ absence of nests. In the event structures are to be altered during the breeding bird season **(May1st to July 31st)** Swallow netting may need to be installed on those structures with confirmed Barn Swallow activity prior to the breeding season. These structures may also require the completion of a **Notice of Activity and Mitigation Plan** under the MNR's new streamlined approvals process.

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Reptiles	Blanding's Turtle	*Emydoidea blandingii*	THR	THR Schedule 1	THR	Freshwater lakes, permanent or temporary pools, slow-flowing streams, marshes, swamps; prefers shallow water, organic soil & dense vegetation; nest in loose substrates, including sand, organic soil, gravel, cobblestone; overwinter in permanent pools that average about 1 m in depth, or in slow-flowing streams or in bogs; basks on logs, stumps, or banks. This species can be associated with the following ELC communities: **SWT2**, **SWT3**, **SWD**, **SWM**, **MAS2**, **SAS1**, **SAM1**, where open water is present.	The Blanding's Turtle is found in and around the Great Lakes Basin, with isolated populations elsewhere in the United States and Canada. In Canada, the Blanding's Turtle is separated into the Great Lakes-St. Lawrence population and the Nova Scotia population. Blanding's Turtles can be found throughout southern, central and eastern Ontario.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Kemptville MNR Correspondence	**Yes** Suitable habitat may exist within watercourses and marsh communities.	**No** Aquatic and incidental wildlife surveys did not result in the observation of the species. Aquatic assessments determined watercourses to contain an insufficient amount of aquatic vegetation. Given the proxitmy to the Ottawa River species specific surveys should be conducted.	Where watercourses are to be disturbed a **Spring Turtle Basking Survey** should be completed to ensure presence/absence of the species within the construction area. Where species are confirmed a relocation plan may be required with the installation of exclusionary fencing.
Birds	Bobolink	*Dolichonyx oryzivorus*	THR	No Status	THR	Nests primarily in forage crops, particularly hayfields and pastures, dominated by a variety of species such as clover, tall grasses and broadleaved plants; also occurs in wet prairie, graminoid, peatlands and abandoned fields; generally requires tracts of grassland >5 ha. Also nests in lightly grazed pastures, fallow and abandoned fields and shallow grassy marshes. This species can be associated with the following ELC communities: **TPO**, **TPS**, **CUM1** and **MAM2**.	In Ontario, Bobolink is widely distributed throughout most of the province south of the boreal forest. It could also potentially be found in the north where suitable habitat exists.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Atlas of Breeging Bird Seach Kemptville MNR Correspondence	**Yes** Suitable habitat may exist within agricultural fields and cultural meadows along the LRT Route.	**No** Incidental Wildlife surveys did not result in any observation of the species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended that breeding bird survey be completed to confirm presence/absence.	Where agricultural field and cultural meadow dominated by grasses are to be disturbed a **breeding bird survey** should be conducted to confirm presence or absence of the species. Should a species be confirmed the activity may require the completion of a **Notice of Activity and Mitigation** Plan under the MNR's new Streamlined Approvals process for Species at Risk.
Birds	Cerulean Warbler	*Dendroica cerulea*	THR	SC Schedule 1	END	Species breeding habitat consists of large tracts of mature deciduous forests with tall trees and an open understory. This species can be found in both wet bottomland forests and upland areas. This species can be associated with the following ELC codes: **FOD** and **SWD**. Mature forests with an open understory are also required.	The Cerulean Warbler's breeding range extends from extreme southwestern Quebec and southern Ontario west to Minnesota and Nebraska and south to Texas and other Gulf states across to North Carolina. In southern Ontario, populations appear to be separated into two distinct bands: one from southern Lake Huron to western Lake Ontario, and further north, the other from the Bruce Peninsula and Georgian Bay area to the Ottawa River.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may exist within the forest associated with Green's Creek.	**No** Incidental Wildlife surveys did not result in any observation of the species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended for breeding bird survey be completed to confirm presence/absence. Based on distribution mapping provided by the MNR the species is unlikely to be found along th LRT Route.	Where vegetation removal is required a **breeding bird survey** should be completed to confirm presence or absence of the species.
Fish	Channel Darter	*Percina copelandi*	THR	THR Schedule 1	THR	In Ontario, the Channel Darter lives in clean streams and lakes with sandy or gravel bottoms. During the breeding season in late spring, it prefers riffle areas with fairly fast moving water but spends the winter in deeper, calmer water. It eats mostly aquatic insect larvae from the bottom of the stream. This species can be associated with the following ELC communities: OAO	In Canada, the Channel Darter only lives in Ontario and Quebec. In Ontario, it is found in several locations from the St. Clair and Detroit rivers to Lake Erie, and in tributaries of eastern Lake Ontario and the St. Lawrence and Ottawa rivers.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may exist within the study area within the watercourses	**No** Watercourses were deemed unsutable habitat during aquatic assessments.	n/a

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Birds	Chimney swift	*Chaetura pelagica*	THR	THR Schedule 1	THR	Formerly nested in the trunks of large, hollow trees. Today, mainly use chimneys or abandoned buildings as nesting sites. May forage over wide variety of habitats. It requires dead trees >30 cm for roosting and possibly nesting. Where swifts observed foraging only, is not Significant habitat. Foraging habitat for this species can be associated with the following ELC codes: **TPO**, **CUM1**, **MAM**, **MAS**, **OAO**, **SAS1**, **SAM1**, **SAF1** containing or adjacent structures with suitable nesitng habitat (i.e. chimnies).	In Ontario, the Chimney Swift is most widely distributed in the Carolinian zone in the south and southwest portions of the province, however has been detected throughout most of the province south of the 49th parallel.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Atlas of Breeging Bird Seach	**Yes** Suitable habitat may exist along the LRT Route.	**No** Incidental Wildlife surveys did not result in any observation of the species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended that breeding bird survey be completed to confirm presence/absence.	Where vegetation removal is required a **Breeding Bird Survey** should be completed to confirm presence or absence of the species.
Birds	Eastern Meadowlark	*Sturnella magna*	THR	No Status	THR	Eastern Meadowlarks breed primarily in moderately tall grasslands, such as pastures and hayfields, but are also found in alfalfa fields, weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown fields, or other open areas. Small trees, shrubs or fence posts are used as elevated song perches.Minimum area of grassland required is about 5 ha. This species can be associated with the following ELC codes: **TPO**, **TPS**, **CUM1**, **MAM2** and **MAS2**.	In Ontario, the Eastern Meadowlark's current breeding range extends from the southwestern part of the province more or less continuously north to include southern Algoma, Sudbury and Nipissing districts. It also occurs in a northern pocket of agricultural lands associated with the Little Clay Belt in Timiskaming District.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Kemptville MNR Correspondence	**Yes** Suitable habitat may exist along the LRT Route within the cultural meadows and agricultural fields.	**No** Incidental Wildlife surveys did not result in any observation of the species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended that breeding bird survey be completed to confirm presence/absence.	Where vegetation removal is required a **Breeding Bird Survey** should be completed to confirm presence or absence of the species.
Reptiles	Eastern Musk Turtle (Stinkpot)	*Sternotherus odoratus*	THR	THR Schedule 1	SC	Eastern Musk Turtles are found in ponds, lakes, marshes and rivers that are generally slow-moving have abundant emergent vegetation and muddy bottoms that they burrow into for winter hibernation. Nesting habitat is variable, but it must be close to the water and exposed to direct sunlight. Nesting females dig shallow excavations in soil, decaying vegetation and rotting wood or lay eggs in muskrat lodges, on the open ground or in rock crevices. This species can be assocaited with the following ELC communities: **MAS**, **OAO, SAS**, **SAM** and **SAF**. Nesting habitat can be any upland areas adjacent these area that are exposed to direct sunlight.	This species is known to occur along the southern edge of the Precambrian (Canadian) Shield, close to the edges of Lake Huron, Lake Erie, and Lake Ontario. The most northern locations were recorded in Hull and Pontiac counties in Quebec, just north of the Ottawa River.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may exist within the watercourses and marsh communities	**No** Aquatic and incidental wildlife surveys did not result in this observation of the species. Aquatic assessments detemrined watercourses to not contain a sufficient amount of aquatic vegetation. However, given the proximity to the Ottawa River species specific surveys should be conducted.	Where watercourses are to be disturbed a **spring turtle nesting survey** should be completed to ensure presence/absence of the species within the construction area. Where species are confirmed a relocation plan may be required with the installation of exclusionary fencing.
Birds	Eastern Whip-poor-will	*Caprimulgus vociferus*	THR	THR Schedule 1	THR	The Eastern Whip-poor-will is usually found in areas with a mix of open and forested areas, such as savannahs, open woodlands or openings in more mature, deciduous, coniferous and mixed forests. It forages in these open areas and uses forested areas for roosting (resting and sleeping) and nesting. It lays its eggs directly on the forest floor, where its colouring means it will easily remain undetected by visual predators. This species can be associated with the following ELC communities: **CUS, CUW, FOD, FOM, FOC**	The Eastern Whip-poor-will's breeding range includes two widely separate areas. It breeds throughout much of eastern North America, reaching as far north as southern Canada and also from the southwest United States to Honduras. In Canada, the Whip-poor-will can be found from east-central Saskatchewan to central Nova Scotia and in Ontario they breed as far north as the shore of Lake Superior. Although Eastern Whip-poor-wills were once widespread throughout the central Great Lakes region of Ontario, their distribution in this area is now fragmented. The Whip-poor-will migrates to Mexico and Central America, where it stays throughout the cold Canadian winter.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may exist along the LRT Route within the forest and cultural woodland communities.	**No** Incidental Wildlife surveys did not result in any observation of this species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended for breeding bird survey be completed to confirm presence/absence.	Where vegetation removal is required a **Breeding Bird Survey** should be completed to confirm presence or absence of the species.

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Lichens	Flooded Jellyskin	*Leptogium rivulare*	THR			Flooded Jellyskin is mainly found growing on the bark at the base of trees that are periodically flooded, typically during the spring. The trees are species that can withstand substantial flooding such as: Black Ash, Red Maple, American Elm and more rarely, Balsam Poplar. It can also be found growing on rocks that are subject to similar periodic flooding. Species can be associated with the following ELC codes: **SWD**	Flooded Jellyskin is found in eastern North America, Western Europe and Tanzania. In Canada, there are seven published populations (of which two are historic) of Flooded Jellyskin in Ontario and one in Manitoba. However, recent surveys for Flooded Jellyskin by the Ministry of Natural Resources have identified additional populations in Ontario, which are being reviewed by the Natural Heritage Information Centre.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may exist along the LRT Route within the swamp communities.	**No** Vegetation surveys did not result in the observation of this species.	Where tree removal is to occur, the area should be search to confirm presence/absence of the species.
Mammals	Grey Fox	*Urocyon cinereoargenteus*	THR			In Ontario, the Grey Fox lives in deciduous forests and marshes. Grey Fox dens are usually found in dense shrubs close to a water source but they will also use rocky areas, hollow trees, and underground burrows dug by other animals. This species will live in many types of habitat provided there is sufficient shelter and prey availability. Species can be associated with the following ELC codes: **SWD, MAM**	The range of the Grey Fox extends across much of the United States, where it is relatively common. In Canada, it is found only in Ontario and Manitoba. In Ontario, its historic range is across the southernmost portions of the province. In recent years, this range has been reduced to west of Lake Superior in the Rainy River District and on Pelee Island in west Lake Erie. There have been occasional sightings and reports of the Grey Fox close to the U.S. border in the Niagara, Thousand Islands and Windsor areas.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may exist along the LRT Route.	**No** Incidental wildlife surveys did not result in the observation of this species, and based on range mapping provided on the MNR's website the species is unlikely to be found along the LRT Route.	n/a
Fish	Lake Sturgeon (Great Lakes-Upper St. Lawrence River population)	*Acipenser fulvescens*	THR	No Status	THR	The Lake Sturgeon typically inhabits the bottoms of shallow areas of large freshwater lakes and rivers, from which it migrates every year to swift-flowing water to spawn. This species can be associated with the following ELC communities: **OAO**. Large lakes/rivers required.	Various populations of the Lake Sturgeon are found west to the North Saskatchewan River in Alberta, and east to Cap Brûlé, Quebec in the St. Lawrence River. To the north, it is found as far as Fort George River in Quebec on the eastern side of James Bay, and the Seal River on the western side of Hudson Bay just north of Churchill, Manitoba. In Ontario, the Lake Sturgeon is found in all the Great Lakes, and in all drainages of the Great Lakes and of Hudson Bay.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**No** Suitable habitat is not present along the LRT Route.	**No** Watercourse are too small to support Lake Sturgeon populations	n/a
Birds	Least Bittern	*Ixobrychus exilis*	THR	THR Schedule 1	THR	In Ontario, the Least Bittern is found in a variety of wetland habitats, but strongly prefers cattail marshes with a mix of open pools and channels. This bird builds its nest above the marsh water in stands of dense vegetation, hidden among the cattails. The nests are almost always built near open water, which is needed for foraging. This species eats mostly frogs, small fish, and aquatic insects. Can be associated with the following ELC communities: **MAS2-1**, **MAS3-1**, **SA**, **OAO**.	In Ontario, the Least Bittern is mostly found south of the Canadian Shield, especially in the central and eastern part of the province. Small numbers also breed occasionally in northwest Ontario. This species has disappeared from much of its former range, especially in southwestern Ontario, where wetland loss has been most severe. In winter, Least Bitterns migrate to the southern United States, Mexico and Central America.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Atlas of Breeging Bird Seach	**Yes** Suitable habitat may exist along the LRT Route within the marsh communities.	**No** Incidental Wildlife surveys did not result in any observation of this species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended that marsh breeding bird survey be completed to confirm presence/absence. Wetland communities observed during field investigations are relatively small in size and unlikely to support Least bittern.	Where wetlands are to be disturbed **Marsh Breeding Bird Surveys** should be conducted to confirm presence/absence of the species.

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Reptiles	Spiny Softshell	*Apalone spinifera*	THR	THR Schedule 1	THR	Spiny Softshells are highly aquatic turtles that rarely travel far from water. They are found primarily in rivers and lakes but also in creeks and even ditches and ponds near rivers. Key habitat requirements are open sand or gravel nesting areas, shallow muddy or sandy areas to bury in, deep pools for hibernation, areas for basking, and suitable habitat for crayfish and other food species. These habitat features may be distributed over an extensive area, as long as the intervening habitat doesn't prevent the turtles from traveling between them. This species can be associated with the following ELC communities: **OAO** with sandy shores	In Canada, the Spiny Softshell is found only in Quebec and southwestern Ontario in the Lake St. Clair, Lake Erie and western Lake Ontario watersheds. The majority of Spiny Softshells in Ontario are found in the Thames and Sydenham rivers and at two sites in Lake Erie. The size of the home range of this turtle depends on availability of habitat features such as nesting and hibernation sites. Some turtles travel up to 30 kilometres in a year from one part of their home range to another.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**No** Suitable habitat is not present along the LRT Route.	**No** Watercourses are not large enough to support Spiny Softshell. Based on distribution mapping provided by the MNR the species is unlikely to be found along th LRT Route.	n/a
Birds	Bald Eagle	*Haliaeetus leucocephalus*	SC	No Status	Not at Risk	Bald Eagles nest in a variety of habitats and forest types, almost always near a major lake or river where they do most of their hunting. While fish are their main source of food, Bald Eagles can easily catch prey up to the size of ducks, and frequently feed on dead animals, including White-tailed Deer. They usually nest in large trees such as pine and poplar. During the winter, Bald Eagles sometimes congregate near open water such as the St. Lawrence River, or in places with a high deer population where carcasses might be found. This species can be associated with the following ELC communities: **FOC**, **FOM**, **FOD**, **SWC**, **SWM** and **SWD**. Nests typically located near major bodies of water.	Bald Eagles are widely distributed throughout North America. In Ontario, they nest throughout the north, with the highest density in the northwest near Lake of the Woods. Historically they were also relatively common in southern Ontario, especially along the shore of Lake Erie, but this population was all but wiped out 50 years ago. After an intensive re-introduction program and environmental clean-up efforts, the species has rebounded and can once again be seen in much of its former southern Ontario range.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present along the LRT Route given its proximity to the Ottawa River.	**No** Incidental wildife observation did not result in the observation of this species. Given the proximity to the Ottawa River, which does provide suitable habitat it is recommeded that breeding bird surveys be conducted where tree removal is to occur.	Where tree removal is to occur, **breeding bird surveys** should be conducted to confirm presence/absence of this species.
Birds	Black Tern	*Chlidonias niger*	SC	No Status	Not at Risk	They build floating nests in loose colonies in shallow marshes, especially in cattails. In winter they migrate to the coast of northern South America. Nesting habitat for this species can be associated with the following ELC codes: **MAS2-1** and **OAO**. These two communities must be present immediatly adjacent each other and with sufficient water to provide suitable habitat.	In Ontario, Black Terns can be found scattered throughout the province, but mainly breed in the marshes along the edges of the Great Lakes.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Atlas of Breeging Bird Seach	**Yes** Suitable habitat may be present along the LRT Route.	**No** Incidental wildlfie and aquatic assessments did not result in the observation of the species. It is unlikely that any of the watercourses provide suitable habitat as they are all considered relatively small and none had a high abundance of cattail along their shorelines.	n/a
Fish	Bridle Shiner	*Notropis bifrenatus*	SC			Bridle Shiners prefer clear, unpolluted streams, rivers and lakes which have an abundance of aquatic vegetation. These vegetated areas provide suitable spawning habitat and places to feed and hide from predators. Bridle Shiners prefer warm water habitats where the bottom is either sand, silt or organic debris, which is necessary for the establishment of aquatic vegetation.	The Bridle Shiner is found in eastern North America, extending from eastern Ontario east to Maine and south to South Carolina. In Ontario, it has been identified at 17 sites in the eastern Lake Ontario drainage and the St. Lawrence River.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present within the watercourses along the LRT Route.	**No** Aquatic assessments did not result in the observation of the species. Watercourses were determined to be disturbned warm water and unvegetated in nature.	n/a

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Birds	Canada Warbler	*Wilsonia canadensis*	SC	THR Schedule 1	THR	The Canada Warbler breeds in a variety of wet deciduous and coniferous forests that have a dense, well developed, shrub layer. This species can be associated with the following ELC communities: **FOC3**, **FOC4**, **FOM6**, **FOM7**, **FOM8**, **FOD6**, **FOD7**, **FOD8**, **FOD9**, **SWC**, **SWM** and **SWD**. A well-developed shrub layer within these communities is required.	Breeding habitat for the Canada Warbler occurs primarily in the Boreal Shield, extending north into the Hudson Plains and south into the Mixedwood Plains. In Ontario it is most abundant along the southern edge of the Canadian Shield.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Atlas of Breeging Bird Seach	**Yes** Suitable habitat may be present along the LRT Route.	**No** ncidental Wildlife surveys did not result in any observation of the species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended for breeding bird survey be completed to confirm presence/absence.	Where tree removal is to occur **Breeding Bird Surveys** are to be conducted to confirm presence/absence of the species.
Birds	Common nighthawk	*Chordeiles minor*	SC			The Common Nighthawk nests in a wide range of open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. Can be associated with the following ELC codes: **SD, BB, RB, CUM, MAM, FOM, FOC**	In Ontario, the Common Nighthawk can be found throughout the province except for the coastal regions of James Bay and Hudson Bay.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Atlas of Breeging Bird Seach	**Yes** Suitable habitat may exist along the study area within the cultural meadow, forest and marsh communities.	**No** Incidental Wildlife surveys did not result in any observation of this species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended that breeding bird survey be completed to confirm presence/absence.	Where tree removal is to occur **Breeding Bird Surveys** are to be conducted to confirm presence/absence of the species.
Reptiles	Eastern Ribbonsnake	*Thamnophis sauritus*	SC	SC Schedule 1	SC	The Eastern Ribbonsnake is semi-aquatic species that is almost always associated with water. The wetland and shoreline habitats that this species inhabits are generally near upland forests where their overwintering and birthing sites. This species can be associated with the following ELC communities: **FOC**, **FOM**, **FOD**, **SWC**, **SWM**, **SWD**, **MAS**, **OAO**, **SAS**, **SAM** and **SAF**. Both upland forested areas and areas with year round standing or flowing water required.	In Ontario the Northern Ribbonsnake can be found in various locations across southern Ontario such as Rondeau Provincial Park, the Bruce Peninsula, Manitoulin Island and various locations between Georgian Bay and Kingston Ontario.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present along the LRT Route within several of the vegetaiton communities found adjacent to the watercourses.	**No** Incidental wildlife surveys did not result in the observation of this species. Species specific surveys were not conducted for this species.	Where vegetation is to be removed adjacent to watercourses the area should be cleared of the presence of snakes prior to construction and exclusion fencing installed to deter species from entering the site.
Mammals	Eastern Wolf	*Canis lupus lycaon*	SC			The Eastern Wolf lives in forests – deciduous and mixed forests in the southern part of their range, and mixed and coniferous forests further north. Wolf packs require relatively large areas of unbroken forest, with home ranges as large as 500 square kilometres. This species can be associated with the following ELC codes: **FOD, FOM, FOC**	There are probably fewer than 500 Eastern Wolf in Canada, with most living in central Ontario and western Quebec, and with the highest population densities found in Algonquin Provincial Park.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**No** Suitable habitat is not present along the LRT Route.	**No** Forested habitats are not large enough to support this species.	n/a

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Birds	Golden-winged Warbler	*Vermivora chrysoptera*	SC			Golden-winged Warblers prefer to nest in areas with young shrubs surrounded by mature forest – locations that have recently been disturbed, such as field edges, hydro or utility right-of-ways, or logged areas. Species can be associated with the following ELC codes: **CUT, CUM**	The Golden-winged Warbler is found in southern Saskatchewan, Manitoba, Ontario, and Quebec, as well as the north-eastern United States. In Ontario, these birds breed in central-eastern Ontario, as far south as Lake Ontario and the St. Lawrence River, and as far north as the northern edge of Georgian Bay. Golden-winged Warblers have also been found in the Lake of the Woods area near the Manitoba border, and around Long Point on Lake Erie. Golden-winged Warblers spend the winter in Central America, some Caribbean islands, and the northern part of South America.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present along the LRT Route.	**No** Incidental Wildlife surveys did not result in any observation of the species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended for breeding bird survey be completed to confirm presence/absence. Based on distribution mapping provided by the MNR the species is unlikely to be found along th LRT Route.	Where vegetation is to be removed **Breeding Bird Surveys** should be conducted to confirm presence/absence of the species.
Reptiles	Milksnake	*Lampropeltis triangulum*	SC	SC Schedule 1	SC	The Milksnake can be found in a range of habitats including rocky outcrops, fields and forest edges. In southern Ontario, it is often found in old farm fields and farm buildings where there is an abundance of mice. The Milksnake hibernates underground, in rotting logs or in the foundations of old buildings. This species can be associated with the following ELC communities: **CUM**, **FOD** and **FOC.**	The Milksnake range extends from Quebec and Maine south to Alabama and Georgia, and west to Minnesota and Iowa. In Ontario, it is widespread and locally common in southern Ontario, and can be found as far north as Lake Nipissing and Sault Ste. Marie.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Kemptville MNR Correspondence	**Yes** Suitable habitat may be present along the LRT Route.	**Yes** Species was observed during field investigations conducted in 2012 along Green's Creek.	Should vegetation be removed in the vacinity of Green's Creek a Species specific survey should be conducted to clear the construction area of the species and install exclusion fencing to deter the species from re-entering the site during construction.
Insects	Monarch	*Danaus plexippus*	SC			Throughout their life cycle, Monarchs use three different types of habitat. Only the caterpillars feed on milkweed plants and are confined to meadows and open areas where milkweed grows. Adult butterflies can be found in more diverse habitats where they feed on nectar from a variety of wildflowers. Monarchs spend the winter in Oyamel Fir forests found in central Mexico.	The Monarch's range extends from Central America to southern Canada. In Canada, Monarchs are most abundant in southern Ontario and Quebec where milkweed plants and breeding habitat are widespread. During late summer and fall, Monarchs from Ontario migrate to central Mexico where they spend the winter months. During migration, groups of Monarchs numbering in the thousands can be seen along the north shores of Lake Ontario and Lake Erie.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Kemptville MNR Correspondence	**Yes** Suitable habitat may be present along the LRT Route within the cultural meadows.	**No** Incidental wildlife surveys did not result in the observation of the species. Species specific surveys were not conducted for this species.	n/a
Fish	Northern Brook Lamprey	*Ichthyomyzon fossor*	SC	SC Schedule 1	SC	The Northern Brook Lamprey inhabits clear, coolwater streams. The larval stage requires soft substrates such as silt and sand for burrowing which are often found in the slow-moving portions of a stream. Adults are found in areas associated with spawning, including fast flowing riffles comprised of rock or gravel. Spawning occurs in May and June. The males construct small, often inconspicuous, nests by picking up pebbles with their mouths and moving them to form the rims of shallow depressions. The sticky eggs are deposited in the nest and adhere to the substrate.	The Northern Brook Lamprey lives in the eastern United States in the upper Mississippi and southern Hudson Bay drainages, ranging from Manitoba and the Great Lakes region south to Missouri, and east to the St. Lawrence River in Quebec. In Ontario, it lives in rivers draining into Lakes Superior, Huron and Erie, and the Ottawa River.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present along the LRT Route within Greens Creek.	**No** Aquatic Assessments did not result in any observations and MNR correspondence did not identify this species within the LRT study area.	n/a

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Reptiles	Northern Map Turtle	*Graptemys geographica*	SC	SC Schedule 1	SC	Species inhabits large bodies of water with soft bottoms, and aquatic vegetation. Can be found basking on logs or rocks as well as beaches and grassy edges. Usually uses soft soil or clean dry sand for nest sites, and may nest at some distance from water. Its home range size is larger for females (about 70 ha) than males (about 30 ha) and includes hibernation, basking, nesting and feeding areas. Their aquatic corridors (e.g. stream) are required for movement. Species is not readily observed. Can be associated with the following ELC communities: **OAO**, **SA**.	In southern Ontario, the Northern Map Turtle is found primarily on the shores of Georgian Bay, Lake St. Clair, Lake Erie and Lake Ontario. It can also be found along larger rivers including the Thames, Grand and Ottawa.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Kemptville MNR Correspondence	**No** Suitable habitat is not present along the LRt Route.	**No** Watercourses are not large enough nor do they contain large amounts of aquatic vegetation to support Northern Map turtles.	Where watercourses are to be disturbed a **Spring Turtle Basking Survey** should be completed to ensure presence/absence of the species within the construction area. Where species are confirmed a relocation plan may be required with the installation of exclusionary fencing.
Birds	Olive-sided flycatcher	*Contopus cooperi*	SC			The Olive-sided Flycatcher is most often found along natural forest edges and openings. It will use forests that have been logged or burned, if there are ample tall snags and trees to use for foraging perches. Olive-sided Flycatchers' breeding habitat usually consists of coniferous or mixed forest adjacent to rivers or wetlands. In Ontario, Olive-sided Flycatchers commonly nest in conifers such as White and Black Spruce, Jack Pine and Balsam Fir. Species can be associated with the following ELC codes: **FOC, FOM**	The Olive-sided Flycatcher has a broad breeding range across Canada and the western and northeastern United States. Just over half the range is found in Canada, where it breeds in every province and territory except Nunavut. Its breeding population is most dense along the west coast from southern British Columbia to California. In Ontario, it is widely distributed throughout the central and northern areas of the province.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may exist along the study area within the mixed and coniferous forests along watercourses.	**No** Incidental Wildlife surveys did not result in any observation of this species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended that breeding bird survey be completed to confirm presence/absence.	Where vegetation is to be removed **Breeding Bird Surveys** should be conducted to confirm presence/absence of the species.
Birds	Peregrine Falcon	*Falco peregrinus*	SC	SC Schedule 1	SC	The Peregrine Falcon typically nests on tall steep cliff ledges that are close to large bodies of water. This species can also be located in urban areas with tall buildings where they will nest on the ledges of tall buildings. This species can be associated with the following ELC communities: **CLO**.	The eastern subspecies of the Peregrin Falcon is widely distributed and can be found anywhere east of the Rocky Mountains and south of the tree line.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may exist along the LRT Route.	**No** Incidental Wildlife surveys did not result in any observation of this species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended that breeding bird survey be completed to confirm presence/absence.	Where vegetation is to be removed **Breeding Bird Surveys** should be conducted to confirm presence/absence of the species.
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	SC	THR Schedule 1	THR	The Red-headed Woodpecker is found in a wide variety of habitats, including open oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, as well as along beaver ponds and brooks. The open areas favoured by this species usually contain a high density of dead or unhealthy trees for roosting, and where holes can easily be made for nesting. Can be associated with the following ELC codes: **TPO, TPS, CUW, FOD1, FOD2, FOD4-1, FOD6, FOD7, and FOD9.**	The Red-headed Woodpecker is found across southern Ontario, where it is widespread but rare. Outside Ontario, it lives in Alberta, Saskatchewan, Manitoba and Quebec, and is relatively common in the United States.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present along the LRT Route.	**No** Incidental Wildlife surveys did not result in any observation of this species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended that breeding bird survey be completed to confirm presence/absence. Based on distribution mapping provided by the MNR the species is unlikely to be found along th LRT Route.	Where vegetation is to be removed **Breeding Bird Surveys** should be conducted to confirm presence/absence of the species.

Taxonomy	Common Name	Scientific Name	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat (© Queen's Printer for Ontario, 2013 - Ontario Species at Risk Website ; Significant Wildlife Habitat Technical Guide; Species at Risk Registry & Ontario's Biodiversity - ROM)	Known Populations (© Queen's Printer for Ontario, 2013 - Ontario Species at Risk Website; ROM – Range Maps, SAR Webiste, MNR Publications & COSEWIC Reports)	Source Identifying Species Record	Species Habitat Present within Study Area Yes/No	Species Confirmed Through Field Investigations?	Recommendations
Fish	River Redhorse	*Moxostoma carinatum*	SC	SC Schedule 1	SC	River Redhorses inhabit moderate to large rivers where the current is fast, and the bottom is composed of stones, rubble and bedrock with very little siltation. In Canada, River Redhorses are found only in southern Ontario and southwestern Quebec. It has been reported historically from the Ausable River.	The River Redhorse lives in scattered locations through central and eastern North America including Ontario and Quebec. In Ontario, it has been found in the Bay of Quinte, and the Trent, Grand, Thames, Ottawa, Mississippi, and Madawaska rivers.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**No** Suitable habitat is not present along the LRT Route.	**No** Aquatic assessments detemrined the watercourses did not contain suitable habitat characterstics.	n/a
Birds	Short-eared Owl	*Asio flammeus*	SC	SC Schedule 1	SC	The Short-eared Owl lives in open areas such as grasslands, marshes and tundra where it nests on the ground and hunts for small mammals, especially voles. This species can be associated with the following ELC communities: **TPO, CUM, MAM**	The Short-eared Owl has a world-wide distribution, and in North America its range extends from the tundra south to the central United States. In Ontario, the species has a scattered distribution, found along the James Bay and Hudson Bay coastlines, along the Ottawa River in eastern Ontario, in the far west of the Rainy River District, and elsewhere in southern Ontario, at places such as Wolfe and Amherst Islands near Kingston. Most northern populations are migratory, moving southward in the winter.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may be present along the LRT Route.	**No** Incidental Wildlife surveys did not result in any observation of the species. Breeding bird surveys were not conducted as part of this scope of work. It is recommended for breeding bird survey be completed to confirm presence/absence.	Where vegetation is to be removed **Breeding Bird Surveys** should be conducted to confirm presence/absence of the species.
Fish	Silver Lamprey (Great Lakes – Upper St. Lawrence River population)	*Ichthyomyzon unicuspis*	SC			Silver lampreys require clear water so they can find fish hosts, relatively clean stream beds of sand and organic debris for larvae to live in, and unrestricted migration routes for spawning. Their use of different kinds of habitat throughout their lives (rivers for spawning and early development, and lakes for adults) makes them vulnerable to changes in their environment.	Outside Ontario, the silver lamprey is found in tributaries that feed the St. Lawrence River in Quebec and New York west through to Manitoba and tributaries of the Nelson River. Silvery lampreys are also found in the upper Mississippi River tributaries.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**No** Suitable habitat is not present along the LRT Route mainly due to numerous barriers to migration along the majority of the watercourses.	**No** Aquatic assessments detemrined the watercourses to not contain suitable habitat characterstics.	n/a
Reptiles	Snapping turtle	*Chelydra serpentina*	SC	SC Schedule 1	SC	Snapping Turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. This species can be associated with the following ELC communities: OAO	The Snapping Turtle's range extends from Ecuador to Canada. In Canada this turtle can be found from Saskatchewan to Nova Scotia. It is primarily limited to the southern part of Ontario. The Snapping Turtle's range is contracting.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa) Kemptville MNR Correspondence	**Yes** Suitable habitat may be present along the LRT Route within the watercourses.	**No** Incidental wildlife surveys did not result in the observation of the species. Species specific surveys were not conducted for this species.	Where watercourses are to be disturbed a **Spring Turtle Basking Survey** should be completed to ensure presence/absence of the species within the construction area. Where species are confirmed a relocation plan may be required with the installation of exclusionary fencing.
Insects	West Virginia White	*Pieris virginiensis*	SC			The West Virginia White lives in moist, deciduous woodlots. This butterfly requires a supply of toothwort, a small, spring-blooming plant that is a member of the mustard family, since it is the only food source for larvae. This species can be associated with the following ELC codes: **FOD**	The West Virginia White is found from Quebec and Ontario south through New England and the Appalachian region to Georgia. Although common in parts of the United States, this butterfly is rare in Ontario, where it has been seen at about 50 sites. The majority of sites in the province are in central and southern Ontario, but it also extends north to Manitoulin and St. Joseph islands. The largest populations are in the western Lake Ontario region.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may exist along the LRT Routes within the forested communities.	**No** Incidental wildlife surveys did not result in the observation of the species. Species specific surveys were not conducted for this species.	n/a

Taxonomy	Common Name	Scientific Name	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat (© Queen's Printer for Ontario, 2013 - Ontario Species at Risk Website ; Significant Wildlife Habitat Technical Guide; Species at Risk Registry & Ontario's Biodiversity - ROM)	Known Populations (© Queen's Printer for Ontario, 2013 - Ontario Species at Risk Website; ROM – Range Maps, SAR Webiste, MNR Publications & COSEWIC Reports)	Source Identifying Species Record	Species Habitat Present within Study Area Yes/No	Species Confirmed Through Field Investigations?	Recommendations
Birds	Yellow Rail	*Coturnicops noveboracensis*	SC	SC Schedule 1	SC	The Yellow Rail can typically be found in marshes dominated by sedges, grasses, and rushes with little or no standing water (generally 0-12 cm water depth), and where the substrate remains saturated throughout the summer. They can also be found in damp fields and meadows, on the floodplains of rivers and streams, in the herbaceous vegetation of bogs, and at the upper levels (drier margins) of estuarine and salt marshes. Nesting habitats typically have a dry mat of dead vegetation from previous growing seasons. A greater diversity of habitat types is used during migration and winter than during the breeding season. In winter, the rails are known to use coastal wetlands and rice fields. Can be associated with the following ELC codes: **MAM, MAS, CUM, SWD and FOD7.**	In Ontario, it is mainly found in the Hudson Bay Lowlands region, and is only found in localized marshes in southern Ontario.	Species at Risk in Ottawa - as of January 2013 (List Received from the City of Ottawa)	**Yes** Suitable habitat may exist aong the LRT Route within the marsh communities.	**No** Incidental widlife surveys did not result in the observation of the species. Marsh communities observed during ELC surveys did not find suitable habitat dominated by sedge, rushed and grasses. Most marsh communties were dominated by cattail.	n/a

Glossary

EXP	ESA - Extripated - A species that no longer exists in the wild in Ontario but still occ SARA - Extripated - a wildlife species that no longer exists in the wild in Canada, but exists
END	ESA - Endangered - A species facing imminent extinction or extirpation in Ontario SARA - Endangered - a wildlife species that is facing imminent extirpation or extinction.
THR	ESA - Threatened - A species that is at risk of becoming endangered in Ontario if limiting SARA - Threatened - a wildlife species that is likely to become endangered if nothing is
SC	ESA - Special Concern (formerly Vulnerable) - A species with characteristics that make it sensitive to human SARA - Special Concern - a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
OMNR	Ontario Ministry of Natural Resources
ESA	Endangered Species Act
SARA	Species at Risk Act (Federal)
Schedule 1	The official list of species that are classified as extirpated, endangered, threatened, and of special concern.
Schedule 2	Species listed in Schedule 2 are species that had been designated as endangered or threatened, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.
Schedule 3	Species listed in Schedule 3 are species that had been designated as special concern, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.
COSEWIC	Committee on the Stauts of Endangerd Wildlife in Canada - a committee of experts that assesses and designates which wild species are in some danger of disappearing from Canada.

Annex B-4. Geotechnical Inventory

Houle Chevrier Engineering

Geotechnical Inventory
Environmental Assessment Study
Eastern Light Rail Transit Facility
Blair Station to Trim Road
Ottawa, Ontario

a GEMTEC company

Houle Chevrier Engineering

Submitted to:

AECOM Canada Ltd.
1150 Morrison Drive
Ottawa, Ontario
K2H 8S9

Geotechnical Inventory
Environmental Assessment Study
Eastern Light Rail Transit Facility
Blair Station to Trim Road
Ottawa, Ontario

August 26, 2015
Project: 14-275

Houle Chevrier Engineering Ltd. • 32 Steacie Drive • Ottawa, Ontario • K2K 2A9 • www.hceng.ca

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1.0 INTRODUCTION

This report presents an inventory of the expected soil, bedrock and groundwater conditions for the extension of the proposed Light Rail Transit (LRT) facility from Blair Station to Trim Road. The purpose of this report was to identify the general soil, bedrock and groundwater conditions within the current study area using available sources of information.

This work was carried out for AECOM Canada Ltd. in accordance with a Houle Chevrier Engineering Ltd. (HCEL) proposal dated February 26, 2014.

2.0 DESCRIPTION OF PROJECT AND SITE

As identified in the 2013 Transportation Master Plan (TMP), consideration is being given to extending the proposed Light Rail Transit (LRT) facility further east to Orleans. The alignment for the Eastern LRT is envisioned along the Ottawa Road 174 (OR 174) road corridor between Blair Station and Trim Road. Consideration is being given to locating the Eastern LRT north of OR 174, south of OR 174, or within the median (i.e., between the eastbound/westbound lanes).

The optimal solution for the Eastern LRT will likely include construction of railway infrastructure, transit stations, culvert/bridge structures and possibly grade separation of existing intersections. Relatively high embankments may be required to be constructed or widened.

The current study area is roughly identified as the lands within the OR 174 corridor between Blair Station and Trim Road. The approximate limits of the study area are shown on Figure 1.

The study area consists of relatively low lying lands with ground level typically increasing south of OR 174. Along portions of OR 174 bedrock outcrops are also present (e.g., at the Champlain Street overpass and the pedestrian bridge at Place D'Orléans Station).

Several creeks and watercourses, which drain into the Ottawa River, are crossed by the OR 174 corridor. The height of the slopes adjacent to the creeks is significant, exceeding 10 metres in some areas. As such, high roadway embankments are present at the creek crossings.

Land use within the study area consists of a mixture of residential (subdivisions and single houses), commercial and farm developments, and includes the Orleans community. Portions of the study area are also currently undeveloped.

3.0 METHODOLOGY

The available soil, bedrock and groundwater information was collected and collated to provide information on the subsurface conditions within the study area. This information was obtained from the following sources:

- Geological Survey of Canada surficial geology, drift thickness and bedrock geology maps;
- Ontario Geological Survey bedrock geology maps;
- Available topographic information and aerial photographs;
- Available borehole and geotechnical reports from the City of Ottawa, Ministry of Transportation Ontario, and Houle Chevrier Engineering Ltd. files;
- Historical Land Use Inventory
- Intera Report; and
- City of Ottawa aquifer vulnerability report.

4.0 GENERAL SUBSURFACE CONDITIONS

4.1 Overview

The soils within the study area were deposited on bedrock during and after the last period of glaciation some 10,000 to 12,000 years ago. Glacial till and sand deposits typically overlie bedrock within the study area and were deposited during the period of glaciation. These deposits are in turn overlain by marine deposits composed of silt and silty clay (commonly referred to as Leda clay), which were deposited while the area was subsequently flooded by the Champlain Sea. These fine marine sediments, found in layers up to 60 metres thick, are by common usage referred to as Leda clay, although sometimes they consist almost completely of silt size particles. Differential uplift of the earth's crust due to the retreat of the glacier ended the marine period and subsequent sediments were deposited in estuarine environments followed by near fresh water to lacustrine conditions.

Surficial geology maps indicate that most of the study area is underlain by deposits of silt and clay of marine origin. Along the existing OR 174 corridor, shallow Paleozoic bedrock is mapped in localized areas near Bearbrook Road and Place D'Orléans Shopping Centre. Shallow glacial till deposits are mapped in the transition areas between shallow Paleozoic bedrock and the deposits of silt and clay of marine origin. Alluvial deposits of clay, silt, sand, and gravel also exist in localized areas within the study area (i.e., near the OR 174 crossing of Billberry Creek and along the banks of the Ottawa River between Tenth Line Road and Trim Road). A plan showing the general overburden conditions within the study area is provided on Figure 2.

Drift thickness maps indicate that the overburden within the study area is highly variable, and typically ranges from about 3 to 100 metres, being thinnest near the areas where shallow bedrock is mapped (i.e., near Bearbrook Road and Place D'Orléans Shopping Centre). A plan showing the general trends in overburden thickness is provided on Figure 3.

Bedrock geology maps of the study area indicate that the bedrock type varies from interbedded limestone and dolostone, limestone, dolostone, and interbedded limestone and shale. Several east-west aligned faults are mapped within the study area. The bedrock faults in these rock formations are not currently active. A plan showing the bedrock types that are mapped within the study area is provided on Figure 4.

Our experience in the study area generally agrees with the overall soil, drift thickness and bedrock mapping. It should be recognized that localized soil conditions can differ from those given in geology maps.

The following sections provide an overview of the soil and bedrock.

4.2 Silty Clay

Deposits of silty clay and silt of marine origin (commonly referred to as Leda Clay) are mapped throughout the study area.

Based on our experience in this area, it is expected that the upper part of the silty clay is weathered to a very stiff to stiff, grey brown crust. Below the weathered zone, the silty clay generally is grey and red-grey in colour. The grey and red-grey silty clay typically has a high moisture content, is compressible, and relatively weak. Based on our previous experience, the grey and red-grey silty clay within the study area has a firm to stiff consistency.

The silty clay and silt deposits are both highly sensitive to disturbance and frost susceptible. Furthermore, the softer silty clay can compress (settle) under excessive stress, which should be considered for any embankment filling.

4.3 Alluvial Deposits

Alluvial deposits exist in localized areas within the study area (i.e., near the OR 174 crossing of Billberry Creek and along the banks of the Ottawa River between Tenth Line Road and Trim Road). These deposits could vary greatly in composition from sand and gravel, to clay and silt.

4.4 Glacial Till

Shallow glacial till deposits are mapped within the study area in the transition areas between shallow Paleozoic bedrock and deposits of silt and clay of marine origin. Furthermore, it is expected that the silty clay deposits are underlain by glacial till.

The glacial till can be described as a sandy silt or silty sand with variable amounts of clay, gravel, cobbles and boulder size material.

4.5 Bedrock

Drift thickness maps indicate that the bedrock surface is located between 3 and 100 metres below ground surface. Furthermore, bedrock outcrops exist within the study area at the Champlain Street overpass and the pedestrian bridge at Place D'Orléans Station.

Along Regional Road 174 between Blair Station and Trim Road, the bedrock type varies from interbedded limestone and dolostone (Gull River formation), limestone (Bobcaygeon formation), dolostone (Oxford formation), and interbedded limestone and shale (Lindsay formation). Several east-west aligned faults are mapped within the study area. The bedrock faults in these bedrock formations are not currently active.

4.6 Groundwater Levels

The groundwater depth is expected to be variable and likely reflects the local topography. In low lying areas, such as along the Ottawa River, the groundwater level is expected to be near or at ground surface. In areas of higher topographic relief, the groundwater level could be up to about 3 metres below ground surface.

The groundwater levels are expected to be higher during wet periods of the year, such as the early spring, or following periods of heavy precipitation. The groundwater levels are also likely influenced by surface water levels in the rivers, streams, and creeks.

4.7 Existing Borehole Information

Existing borehole information is available from the following sources:

- Ontario Ministry of Transportation files;
- Houle Chevrier Engineering Ltd. files; and
- City of Ottawa files

The above borehole information will be used during route selection and preliminary design and is not included in this report. The locations of the boreholes from previous reports are provided on Figure 5.

5.0 SLOPES AND RAVINES

5.1 Overview

The study area consists of relatively low lying lands with ground level typically increasing south of OR 174. Existing slopes are present along the banks of the Ottawa River and along water courses located south of the Ottawa River. These water courses, such as Green's Creek, Billberry Creek, and many of their tributaries, outlet into the Ottawa River. The creeks and tributaries are crossed by OR 174 with high embankments at the creek crossings.

As previously indicated, surficial geology maps suggest that most of the study area is underlain by deposits of silt and clay. The formation of the natural slopes within the study area can be attributed to erosion of the silt and clay particles by flowing water. As the silt and clay particles are eroded, the rivers, creeks, and streams become wider and deeper, and slopes develop along the banks. Eventually, the natural erosion processes lead to shallow slope failures along the banks followed by deeper failures of the subsequent steeper/higher valley slopes. These natural processes continue as the valley slopes reach a stable slope configuration. Erosion of the silt and clay particles (i.e., deepening of the valley) continues until a material which is relatively resistant to erosion is reached (i.e., glacial till or bedrock). Notwithstanding, ongoing erosion/slope failures of the silt and clay deposits continues to occur as mature rivers, creeks, and streams meander.

5.2 Slope Inventory

5.2.1 Methodology

The slope profiles for areas of potential instability along OR 174 between Blair Station and Trim Road were obtained from contour information available from the City of Ottawa topographic mapping.

The following presents an overview of information gathered from City of Ottawa topographic mapping. The locations of the slopes considered in this study are provided on Figure 6.

5.2.2 Existing Slopes

A description of the slopes considered within the study area, based on our review of available topographic information, is summarized in Table 5.1.

Table 5.1 – Summary of Existing Slopes

Area	Embankment Side Slopes	Watercourse	Slope Geometry		Preliminary Slope Stability Assessment[3]
			Approximate Height (metres)	Overall Inclination from Horizontal (Degrees)	
1	Both[1]	Unknown Creek	10 to 12	30	Unstable
2	Both[1]	Green's Creek	5 to 7	20	Adequately Stable
3	North Side	Billbery Creek	6 to 8	20 to 25	Marginally Stable to Adequately Stable
4	North Side	None	3 to 5	10 to 15	Adequately Stable
5	Both[1]	Stormwater Management Facility	8 to 10	25	Marginally Stable
6	North Side	Unknown Creek	6 to 8	20 to 25	Marginally Stable to Adequately Stable
7	Both[1]	Unknown Creek	10 to 15	20 to 25	Unstable

Notes:

1) Embankment side slopes on both sides indicates an elevated roadway platform. Likely a fill section of the roadway constructed to cross a ravine or watercourse.
2) Slope geometry obtained from contour information available from the City of Ottawa topographic mapping.
3) A preliminary assessment of the stability of the existing slopes, in their current configuration, is based on slope geometry from topographic mapping in conjunction with existing slope stability charts (assuming the slopes are composed entirely of fully saturated silty clay). It should be noted that this information is intended for preliminary design and discussion purposes only.

5.3 Bedrock Outcropping

Bedrock outcropping is present on both sides of OR 174 at the Champlain Street overpass and the pedestrian bridge at Place D'Orléans Station. It is not presently known if the Champlain Street bridge is founded on the surface of the bedrock cropping (i.e., spread footings) or below the surface of the bedrock (i.e., deep foundations such as caissons).

5.4 Impacts of Existing Slopes

5.4.1 Slope Setback Requirements

According to Ontario Ministry of Natural Resources (MNR) policy and the City of Ottawa requirements, a safe setback is required for development adjacent to unstable slopes. The safe setback line is called the Erosion Hazard Limit. In accordance with the Ministry of Natural

Resources (MNR) Technical Guide “Understanding Natural Hazards” dated 2001, the Erosion Hazard Limit consists of the following three components:

1) Stable Slope Allowance: Portion of the setback that ensures safety, if slumping or slope failure occurs.

2) Toe Erosion Allowance: Portion of the setback that ensures safety of the top of the slope in the event that the river or stream erodes or weakens the banks.

3) Erosion Access Allowance: Portion of the setback needed to ensure that there is a large enough safety zone for people and vehicles to enter and exit an area during an emergency, such as a slope failure or flood. Typically, it is also included where construction vehicle access is required to repair a failed slope.

The area between the ‘Erosion Hazard Limit’ (i.e., safe setback distance) and the crest of the slope is called ‘Hazard Lands’. The development within Hazard Lands is restricted. In accordance with MNR policy and City of Ottawa requirements, Hazard Lands should not be developed with permanent structures, roadway areas, or any other valuable infrastructure.

5.4.2 Slope Stability Considerations

In accordance with MNR policy and City of Ottawa requirements, infrastructure for the Eastern LRT should be located beyond the Erosion Hazard Limit (i.e., outside of the Hazard Lands). Given that the proposed Eastern LRT will be positioned within the existing OR 174 corridor, it is likely not practicable to locate the Eastern LRT beyond the Erosion Hazard Limit. As such, it may be necessary to construct the Eastern LRT within the Hazard Lands. For this case, slope stabilization work will be necessary to minimize the risk of future slope failures negatively impacting on the proposed works. Slope stabilization may involve, but not limited to:

- Slope flattening by moving the crest and/or toe of the existing slope. Typically used for widening existing roadway embankments over ravines/watercourses (i.e., increasing the footprint of the existing roadway embankment);
- Slope buttressing by constructing a large berm at the toe of the existing slope using imported granular material, well graded blast rock, or earth fill materials;
- Slope reinforcement by excavating portions of the slope and rebuilding with compacted granular materials reinforced with plastic or steel grid reinforcement. In this case, the existing slope geometry (i.e., height and inclination) is maintained.
- Slope stabilization with retaining walls.

For slope stabilization alternatives which widen the base of an existing embankment above deposits of sensitive silty clay, some differential settlement along the width of the embankment should be expected due to consolidation settlement of the silty clay deposits below the newly widened portion. For this case, the settlement below the newly widen portion will be greater than the settlement of the existing embankment. Differential settlement could be problematic for buried structures (i.e., culverts) located along the base of the embankment. The magnitude of the settlement will depend on the consolidation characteristics and thickness of the native silty clay deposits. In order to maintain stress levels in the underlying silty clay to acceptable levels, the use of lightweight fill materials (e.g. expanded polystyrene blocks) could be considered in embankment construction.

Based on our preliminary slope stability assessment, the majority of the slopes observed within the study area are considered to be unstable to marginally stable. As such, the Erosion Hazard Limit defined by the MNR will apply. Therefore, allowance should be made for construction of slope stabilization works.

5.5 Impacts of Bedrock Outcrops

At the Champlain Street overpass and the pedestrian bridge at Place D'Orléans Station, near vertical bedrock outcropping was observed in close proximity to the existing roadway. As such, bedrock removal will likely be required in the event that the Eastern LRT will be located north or south of OR 174. Bedrock removal may impact the existing foundations for the Champlain Street overpass and the pedestrian bridge at Place D'Orléans Station.

6.0 GROUNDWATER WELLS AND AQUIFER VULNERABILITY

6.1 Groundwater Wells

A Ministry of Environment (MOE) Water Well Records search was carried out for the study area. The locations of the water wells are shown on the Water Well Location Plan, Figure 7. As indicated on the plan, there are concentrations of water wells south of OR 174 east of Tenth Line Road.

The presence of water wells is important in the overall planning since there is potential that the existing wells may be impacted during the construction due an encroachment onto land containing the well or to a lesser extent from nearby construction activities, such as bedrock removal.

6.2 Aquifer Vulnerability

6.2.1 Waterloo Hydrogeologic and CH2M Hill Study – City of Ottawa

A study of the aquifer vulnerability in the City of Ottawa was carried out by Waterloo Hydrogeologic and CH2M Hill Canada Ltd. The results of that study are provided in their report titled: “Preliminary Evaluation of Relative Aquifer Vulnerability: City of Ottawa”, dated April 4,

2001. The goal of that study was to assess the relative vulnerability of aquifers to contamination in the City of Ottawa in order that sensitive areas can be identified, and more detailed evaluations of these areas can be planned and implemented.

The intrinsic vulnerability of an aquifer is based on the assessment of the spatial distribution of physical and hydrologic attributes such as soils, the unsaturated zone media, aquifer properties, and the recharge rate. The specific vulnerability of an aquifer is based on the assessment of the risk of the system becoming exposed to contamination. According to the report, large scale, long term potential sources of contamination may be associated with agricultural activities and road salting, while smaller scale point source contamination may be associated with waste disposal sites, industrial activity, and private septic systems. Road salting may introduce sodium and chloride contamination into the aquifer, which could impact on water supply wells.

The aquifer vulnerability assessment in their report was based on the concept of the DRASTIC method, which is designed to assess the general pollution potential of any area greater than about 40 hectares. DRASTIC assesses the vulnerability of the aquifer to a generic contaminant, which is introduced at the surface. This generic contaminant has the mobility of water and infiltrates from the ground surface through precipitation. DRASTIC is primarily intended to be used in groundwater resource allocation and in land use planning activities, and provides a relative, rather than absolute ranking of intrinsic aquifer vulnerability. The DRASTIC method for assessing intrinsic aquifer vulnerability to contamination is based on seven (7) different hydrogeology characteristics, as follows:

Depth to water table
Recharge (net)
Aquifer media
Soil media
Topography
Impact to vadose zone media
Conductivity

Each of these factors is assigned a DRASTIC rating between 1 and 10. High DRASTIC ratings represent high aquifer vulnerability while low ratings represent less intrinsic pollution potential due to that factor. Each factor is then assigned a weight to represent its importance in determining aquifer vulnerability; parameter weights range from 1 to 5.

The results of their intrinsic vulnerability assessment are reproduced in Appendix A. Their study indicates low to medium vulnerability zones between Old Montreal Road and Jeanne d'Arc Boulevard.

7.0 HISTORICAL LAND USE

7.1 Historical Land Use Inventory

Records from the City of Ottawa Historical Land Use Inventory (HLUI) were provided to us as part of this study.

The HLUI records indicate the presence of a number of gasoline service stations, automobile repair shops, dry cleaning facilities, and other industries in proximity to the site that could potentially contribute to environmental contamination. Based on a review of the HLUI information, the significant uses within the study area and in proximity to the study area are listed in Table 7.1.

Table 7.1 – HLUI Information

Company Name	Location	Facility Type	Approximate Years of Operation Under One or More Company Names
Jim's Golden Eagle Service Station	1150 Cyrville Road	Gasoline Service Station	1970, 1980
Ugire Labrie Service Station	Cyrville Road	Motor Vehicle Repair Shop	1953, 1959
Rick's Auto Repairs	1493 Cyrville Road	Motor Vehicle Repair Shop	1980, 1998
BSC Inc.	1456 Cyrville Road	Industrial Chemicals Industries	1998, 2001
James Harris Auto Trim	1454 Cyrville Road	Motor Vehicle Repair Shop	1979
Maaco Auto Painting & Bodyworks	1440 Cyrville Road	Motor Vehicle Repair Shop	1979 to 2005
Zeke's Garage	1323 Labrie Avenue	Motor Vehicle Repair Shop	1980
1374520 Ontario Inc.	1401 Star Top Road	Gasoline Service Station	1998 to 2005
AABCO Transmission Service	1108 Cadboro Road	Motor Vehicle Repair Shop	2001, 2005
MGD Auto Repairs	1108 Cadboro Road	Motor Vehicle, Wholesale	2001, 2005

Company Name	Location	Facility Type	Approximate Years of Operation Under One or More Company Names
J.J. Shea Co. Limited	Ogilvie Road	Petroleum Products, Wholesale	1994
Ogilvie Gas Bar	1154 Ogilvie Road	Gasoline Service Station	1998
Ogilvie Service Centre	1459 Ogilvie Road	Motor Vehicles, Wholesale	1972 to 2001
AAMCO Transmissions	1900 Ogilvie Road	Motor Vehicle Repair Shop	1980 to 1998
Petro Canada	1970 Ogilvie Road	Gasoline Service Station	2001 to 2005
Browns Cleaners	1980 Ogilvie Road	Laundries and Cleaners	2001
Top Value Gas Mart	2026 Ogilvie Road	Gasoline Service Station	1998
Pioneer Petroleums	2026 Ogilvie Road	Gasoline Service Station	2001, 2005
Cleanaway Limited	2036 Ogilvie Road	Laundries and Cleaners	1970 to 1980
George B. Kelly Service Station	2050 Ogilvie Road	Gasoline Service Station	1970
Primus Automotive	1900 City Park Drive	Motor Vehicle Repair Shop	1998
New York Cleaners	2061 Meadowbrook Road	Laundries and Cleaners	1998, 2001
Mr. Gas	2039 Meadowbrook Road	Gasoline Service Station	2005
Canadian Government Building	Bank of Green's Creek, south of Ottawa Road 174	Other Chemical Products Industry Factory blew up in August 2001	1885-1901
Top Value Gas Mart	1430 Blair Place	Gasoline Service Station	1998
Sketchley Cleaners	1938 Montreal Road	Laundries and Cleaners	1994 to 2001
1577854 Ontario Inc.	2050 Montreal Road	Motor Vehicle Repair Shop	1977 to 2005

Company Name	Location	Facility Type	Approximate Years of Operation Under One or More Company Names
Ogilvie Cleaners	Ogilvie Road	Laundries and Cleaners	1994
Petro-Canada	2073 Montreal Road	Gasoline Service Station	1980, 2005
Beaconwood Service Station	2075 Montreal Road	Motor Vehicle Repair Shop	1980, 1998
Gulf Service Station	2084 Montreal Road	Gasoline Service Station	1970 to 1980
Sunoco Inc.	2180 Montreal Road	Gasoline Service Station	2001, 2005
Ben's Auto Service	5450 Canotek Road	Motor Vehicle Repair Shop	2001 to 2005
JC Drouin Complete Auto Care	5450 Canotek Road	Motor Vehicle Repair Shop	1998
Queensway Automotive Physicians	5510 Canotek Road	Motor Vehicle Repair Shop	1998
Gas Tops	1011 Polytek Street	Gasoline Service Station	1998
Bert's Auto Repair	5509 Canotek Road	Motor Vehicle Repair Shop	1998
Hillary Cleaners	5515 Canotek Road	Laundries and Cleaners	2001
Sketchley Cleaners	5303 Canotek Road	Laundries and Cleaners	1998 to 2001
Road Star Auto Boutique Centre	5340 Canotek Road	Motor Vehicle Repair Shop	1998, 2001
Canotek Auto Services	5330 Canotek Road	Motor Vehicle Repair Shop	2001 to 2005
Charboneau Auto Parts & Installation	5370 Canotek Road	Motor Vehicle Repair Shop	1998 to 2001
Law-Rel Chemicals	915 Rainbow Street	Chemical Manufacturer, Auto Body Supplies, Chrome cleaner	1970-1980

Company Name	Location	Facility Type	Approximate Years of Operation Under One or More Company Names
Petro-Canada	6208 Jeanne D'Arc Boulevard	Gasoline Service Station	1979 to 2005
Jaubin Auto Sales	17 Youville Drive	Motor Vehicle Repair Shop	1976
Mr. Gas	1420 Youville Drive	Gasoline Service Station	2005
Maxwell's Auto Repair	1455 Youville Drive	Motor Vehicle Repair Shop	2001, 2005
John Rivard	Orleans Industrial Park	Motor Vehicle Repair Shop	1974
The Dry Cleaner	1226 Orleans Boulevard	Laundries and Cleaners	2001
Spic & Span-Valetor-Cash Cleaners	1101 Champlain Street	Laundries and Cleaners	1994 to 2001
Spar-Kleen	1241 Cousineau Street	Motor Vehicle Repair Shop	2001, 2005
Ultramar	1797 St. Joseph Boulevard	Gasoline Service Station	2005
Krown Rust Control Centre	1807 St. Joseph Boulevard	Other Motor Vehicle Service	2001 to 2005
Canadian Tire Gas Bar	1901 St. Joseph Boulevard	Gasoline Service Station	1998
Chevrolet Dealership and Service Centre	1875 St. Joseph Boulevard	Not stated	2006
661701 Ontario Inc.	1951 St. Joseph Boulevard	Gasoline Service Station	2005
Midas Auto SVC Experts	1951 St. Joseph Boulevard	Motor Vehicle Repair Shop	2001, 2005
172965 Canada Limited	1980 St. Joseph Boulevard	Motor Vehicle Repair Shop	2001 to 2005
Mr. Lube	1976 St. Joseph Boulevard	Gasoline Service Station	2001, 2005
123627 Canada Inc.	1988 St. Joseph Boulevard	Gasoline Service Station	1980 to 2005
Carrefour Dry Cleaners	2034 St. Joseph Boulevard	Laundries and Cleaners	2001

Company Name	Location	Facility Type	Approximate Years of Operation Under One or More Company Names
Speedy Muffler King	2523 St. Joseph Boulevard	Motor Vehicle Repair Shop	2001, 2005
Gary's Automotive	2656 St. Joseph Boulevard	Motor Vehicle Repairs Shop	2001, 2005
Brothers Real Estate Limited	2688 St. Joseph Boulevard	Gasoline Service Station	2005
Pioneer Gas	2712 St. Joseph Boulevard	Gasoline Service Station	2005
Champlain Cleaners	2864 St. Joseph Boulevard	Laundries and Cleaners	2000, 2001
Shell Canada Products	2975 St. Joseph Boulevard	Gasoline Service Station	2001, 2005
Orleans Auto Parts Limited	3003 St. Joseph Boulevard	Gasoline Service Station	1996 to 2001
Christie Dry Cleaning Depot	3013 St. Joseph Boulevard	Laundries and Cleaners	1996
Chri-Syl Holdings Limited	3017 St. Joseph Boulevard	Gasoline Service Station	2005
Jean Marc Vinette	3006 St. Joseph Boulevard	Motor Vehicle Repair Shop	2005
Petro-Canada	3055 St. Joseph Boulevard	Gasoline Service Station	1996 to 2005
Spic & Span Cleaners	8154 Jeanne D'Arc Boulevard	Laundries and Cleaners	2001, 2003
Mr. Gas Limited	815 Taylor Creek Park	Gasoline Service Station	1996, 2001
Mr. Gas Limited	1270 Trim Road	Gasoline Service Station	2005
Province of Ontario	N.E. Corner of Trim Road and Regional Road 17	Motor Vehicle, Wholesale	1999
Lionel Laurin	992 Old Montreal Road	Gasoline Service Station	2005

Most of the above sites are located relatively far from the study area and are not a significant concern.

Based on the information in the HLUI, there are no obvious environmental issues that would preclude any of the design options.

A Phase I ESA will be carried out as part of the review of the preferred alternative to assess the potential for contamination.

7.2 Historical and Active Landfills

Two landfills within the study area, designated as Cu-13 and Cu-22, are described in the report titled "Old Landfill Management Strategy, Phase I, Identification of Sites, City of Ottawa, Ontario", dated October 2004, which was prepared by Golder Associates Ltd. Details for these landfills are provided in Table 7.2.

Table 7.2 – Details of Landfills Cu-13 and Cu-22

Site I.D. (HLUI #)	Site Name	Category of Owner	Comments
Cu-13 (HLUI #6470)	Petrie Island Waste Dump	City of Ottawa	Competed in early 1970's. Adjacent to River
Cu-22 (HLUI #6469)	Un-named waste disposal site – St-Joseph Boulevard	City and Private	Completed pre-1970's Buildings within 50 m of site

Landfill Cu-22 is located on the south side of OR 174 between 10th Line Road and Trim Road, and is a potential environmental concern. Widening within the landfill could encounter landfill waste, which would require disposal at another landfill. Furthermore, groundwater downgradient of the existing landfill could be contaminated. Groundwater pumped from temporary excavations during the construction may require offsite disposal and/or treatment.

7.3 Intera Report

A report titled "Mapping and Assessment of Former Industrial Sites, City of Ottawa", dated July 1988 prepared by Intera Technologies Ltd. was reviewed for the purposes of this report. The report provides an inventory and assessment of former industrial sites in the City of Ottawa from 1850 to 1984 that would have likely produced or handled hazardous waste and materials.

The report does not identify any landfill or former industrial sites near the study area that would present a significant environmental risk.

We trust that this inventory report is sufficient for your current requirements. If you have any questions concerning this information or if we can be of further assistance to you on this project, please call.

Johnathan A. Cholewa, Ph.D., P.Eng.

Andrew Chevrier, M.Eng., P.Eng.
Principal

PROJECT ID 60323982
CREATED BY M. Tracey
LAST MODIFIED MT 23 09 2014

AECOM
www.aecom.com

DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 500 1,000 2,000
metres

1:40,000

LEGEND

- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Wards \ Quartier
- Railways \ Chemin de fer
- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale
- Watercourse \ Courant
- Parks \ Parcs
- Lot Fabric \ Propriété
- Urban Area \ Zone Urbaine

Data sources:
Base Data: (c) 2014 City of Ottawa, Land Information Ontario & Statistics Canada

STUDY AREA

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
1

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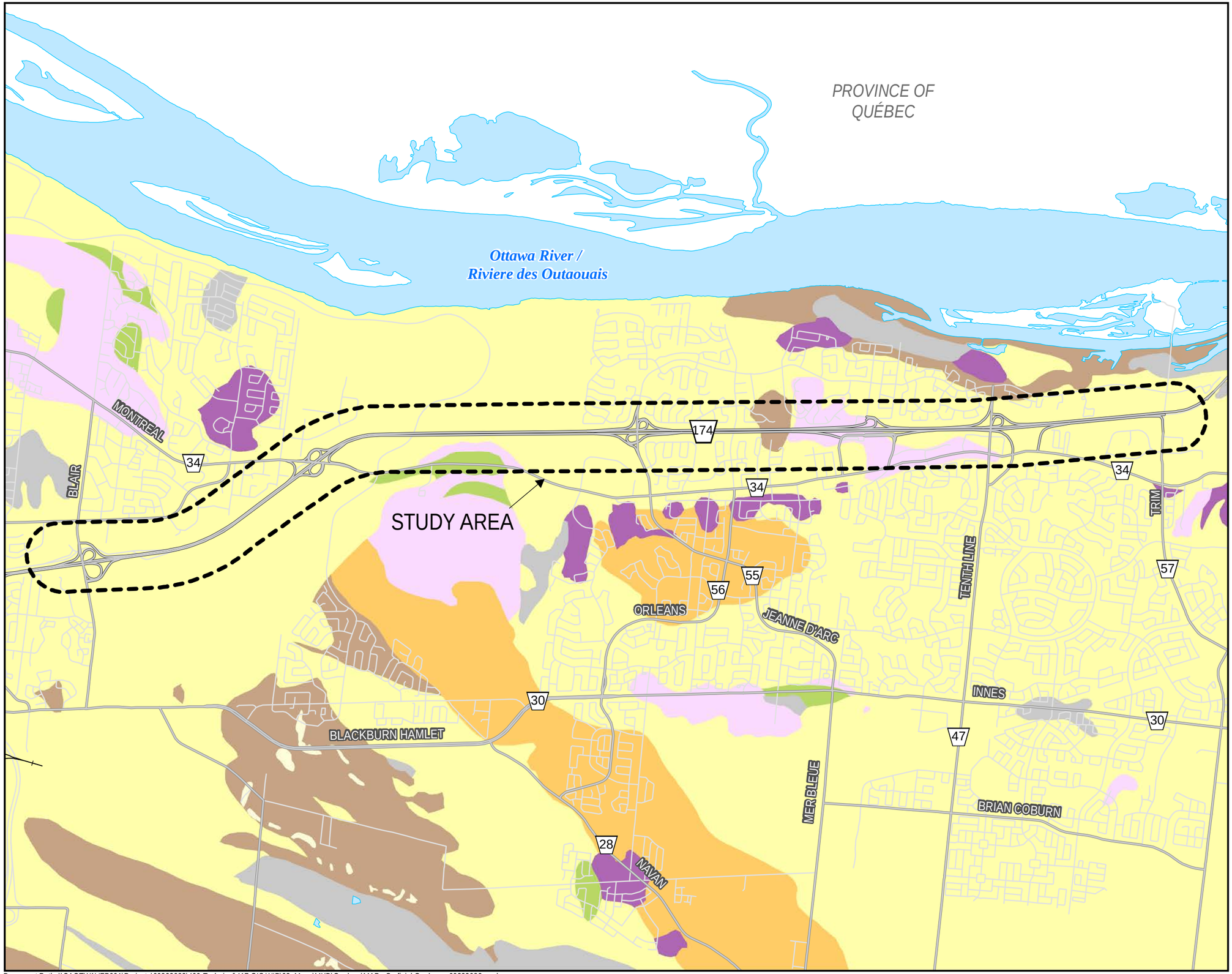

PROJECT ID 60323982
CREATED BY M. Tracey
LAST MODIFIED MT 25 09 2014

AECOM
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DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 500 1,000 2,000
metres

1:40,000

Surficial Geology

- 20: Organic deposits
- 19: Modern alluvial deposits
- 18: Colluvial deposits
- 17: Eolian deposits
- 12: Older alluvial deposits
- 11a: Deltaic deposits
- 10a: Glaciomarine deposits
- 5b: Stone-poor, carbonate-derived silty to sandy till
- 3: Paleozoic bedrock

Background Information

- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Railways \ Chemin de fer
- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale

Data sources:
Base Data: (c) 2014 City of Ottawa, Land Information Ontario & Statistics Canada

SURFICIAL GEOLOGY

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
2

ANSI B

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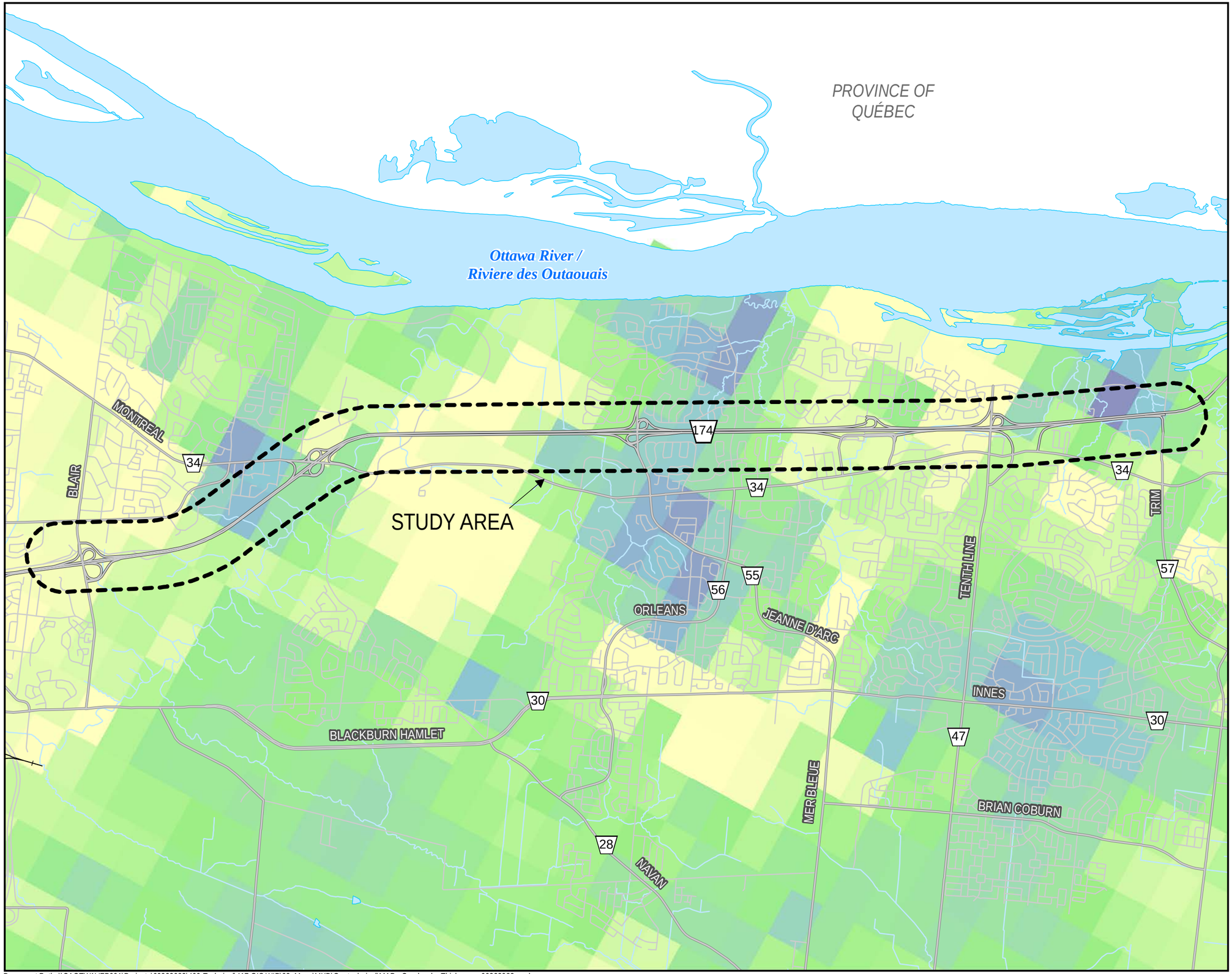

PROJECT ID 60323982
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LAST MODIFIED MT 23 09 2014

AECOM
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DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 500 1,000 2,000
metres

1:40,000

Drift Thickness (m)

High : 262

Low : 0

Background Information

- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Railways \ Chemin de fer
- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale
- Watercourse \ Courant

Data sources:
Base Data: (c) 2014 City of Ottawa, Land Information Ontario & Statistics Canada

OVERBURDEN THICKNESS

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
3

ANSI B

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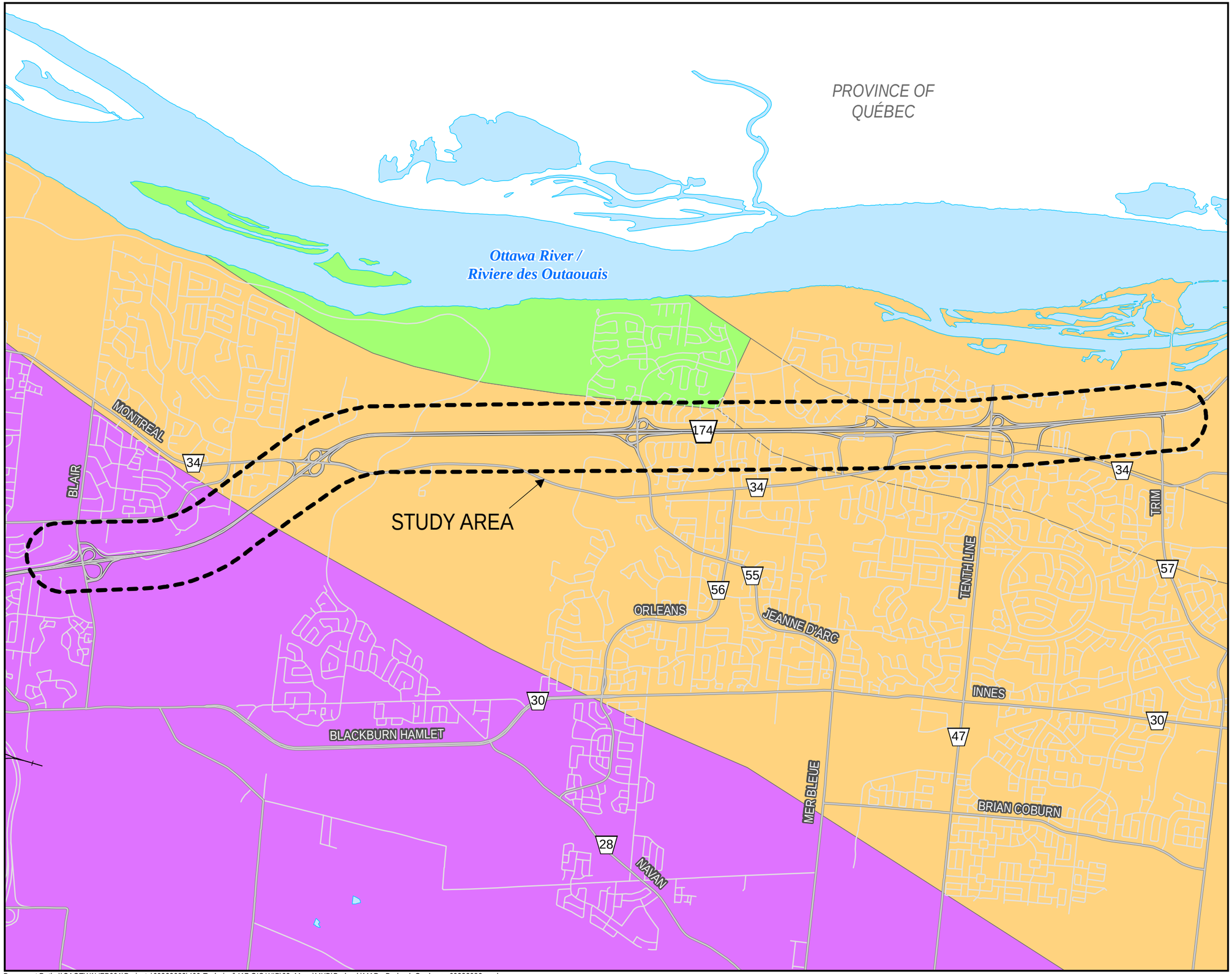

PROJECT ID 60323982
CREATED BY M. Tracey
LAST MODIFIED MT 25 09 2014

AECOM
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DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 500 1,000 2,000
metres

1:40,000

Bedrock Geology

- Dolostone, sandstone
- Limestone, dolostone, shale, arkose, sandstone
- Shale, limestone, dolostone, siltstone

Background Information

- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Railways \ Chemin de fer
- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale

Data sources:
Base Data: (c) 2014 City of Ottawa, Land Information Ontario, Statistics Canada & Ministry of Northern Development and Mines

BEDROCK GEOLOGY

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
4

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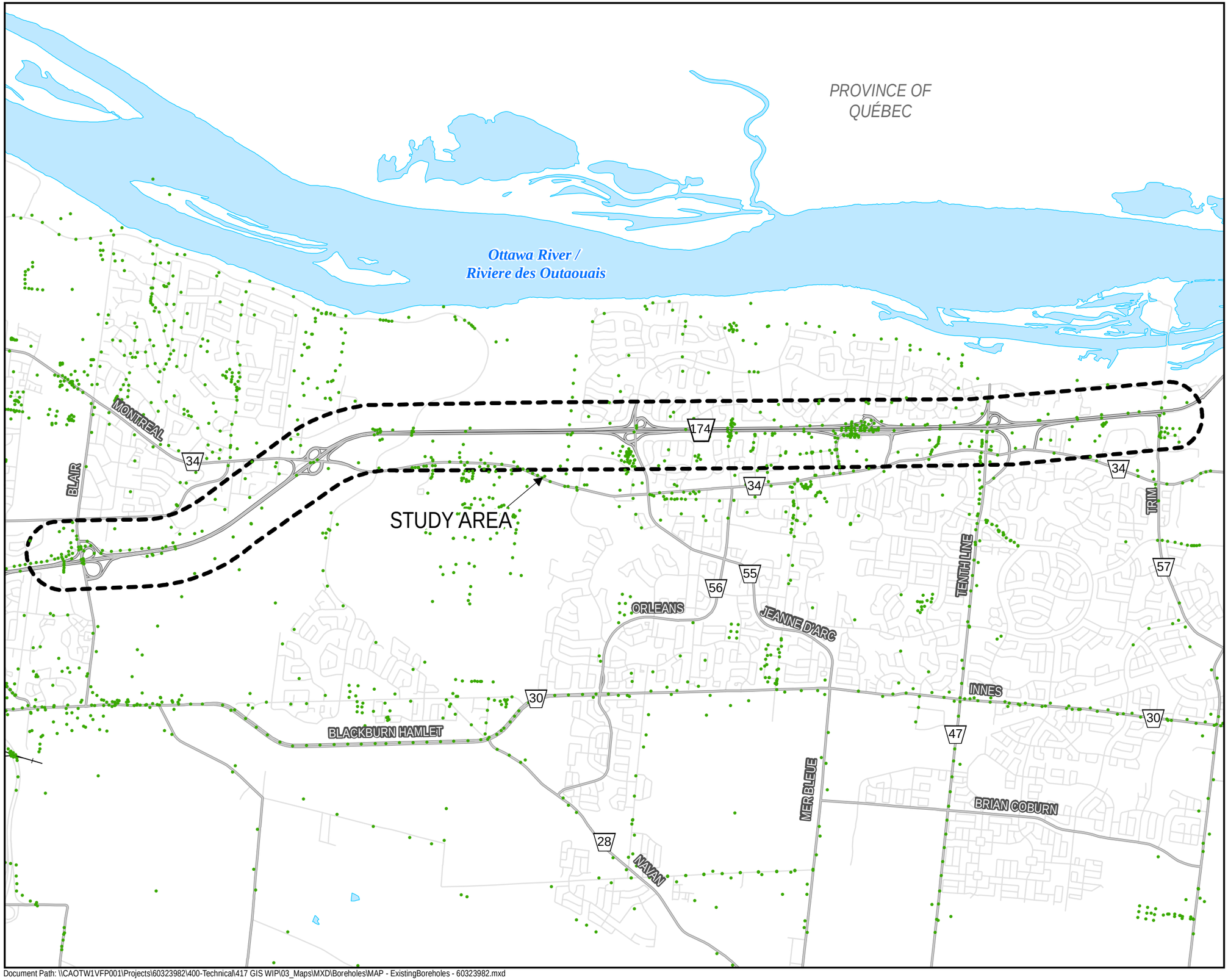

PROJECT ID 60323982
CREATED BY M. Tracey
LAST MODIFIED MT 25 09 2014

AECOM
www.aecom.com

DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 500 1,000 2,000
metres

1:40,000

Borehole Information

- Geotechnical Boreholes \ Forages Géotechniques

Background Information

- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Railways \ Chemin de fer
- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale

Data sources:
Base Data: (c) 2014 City of Ottawa, Land Information Ontario, Statistics Canada & Ministry of Northern Development and Mines

EXISTING BOREHOLE INFORMATION

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
5

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ANSI B

PROJECT ID 60323982
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LAST MODIFIED MT 25 09 2014

AECOM
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DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 500 1,000 2,000
metres

1:40,000

PROVINCE OF QUÉBEC

Ottawa River / Riviere des Outaouais

MONTREAL

BLAIR

174

34

Area 1

Area 2

STUDY AREA

Area 3

Area 4

Area 5

Area 6

Area 7

TRIM

TENTH LINE

57

56

55

ORLEANS

JEANNE D'ARC

INNES

30

47

BLACKBURN HAMLET

MER BLEUE

BRIAN COBURN

28

NAVAN

Slope Stability

- Unstable Slopes \ Pentes instables
- Major Slope Areas \ Zone de pente importante

Background Information

- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Railways \ Chemin de fer
- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale

Data sources:
Base Data: (c) 2014 City of Ottawa, Land Information Ontario, Statistics Canada & Ministry of Northern Development and Mines

UNSTABLE SLOPES

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
6

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ANSI B

PROVINCE OF QUÉBEC

Ottawa River / Riviere des Outaouais

STUDY AREA

MONTREAL

BLAIR

ST. JOSEPH BLVD

ORLEANS

JEANNE D'ARC

TENTH LINE

TRIM

INNES

BLACKBURN HAMLET

MER BLEUE

BRIAN COBURN

NAVAN

34 174 34 34 55 56 57 30 47 30 28

PROJECT ID 60323982
CREATED BY M. Tracey
LAST MODIFIED MT 25 09 2014

AECOM
www.aecom.com

DATUM NA 1983, PROJECTION TRANSVERSE MERCATOR

0 500 1,000 2,000
metres

1:40,000

Well Records

- Well Records \ Emplacement des Puits

Background Information

- Study Area \ Zone D'étude
- Waterbody \ Plan D'eau
- Railways \ Chemin de fer
- Highway \ Autoroute
- Arterial Road \ Route Principale
- Local Road \ Route Locale

Data sources:
Base Data: (c) 2014 City of Ottawa, Land Information Ontario, Statistics Canada & Ministry of Northern Development and Mines

LOCATION OF WELLS

Client
City of Ottawa

Report Title
Eastern Light Rail Transit (Blair to Trim) Planning and Environmental Assessment Study

Site Address
Ottawa East

Figure
7

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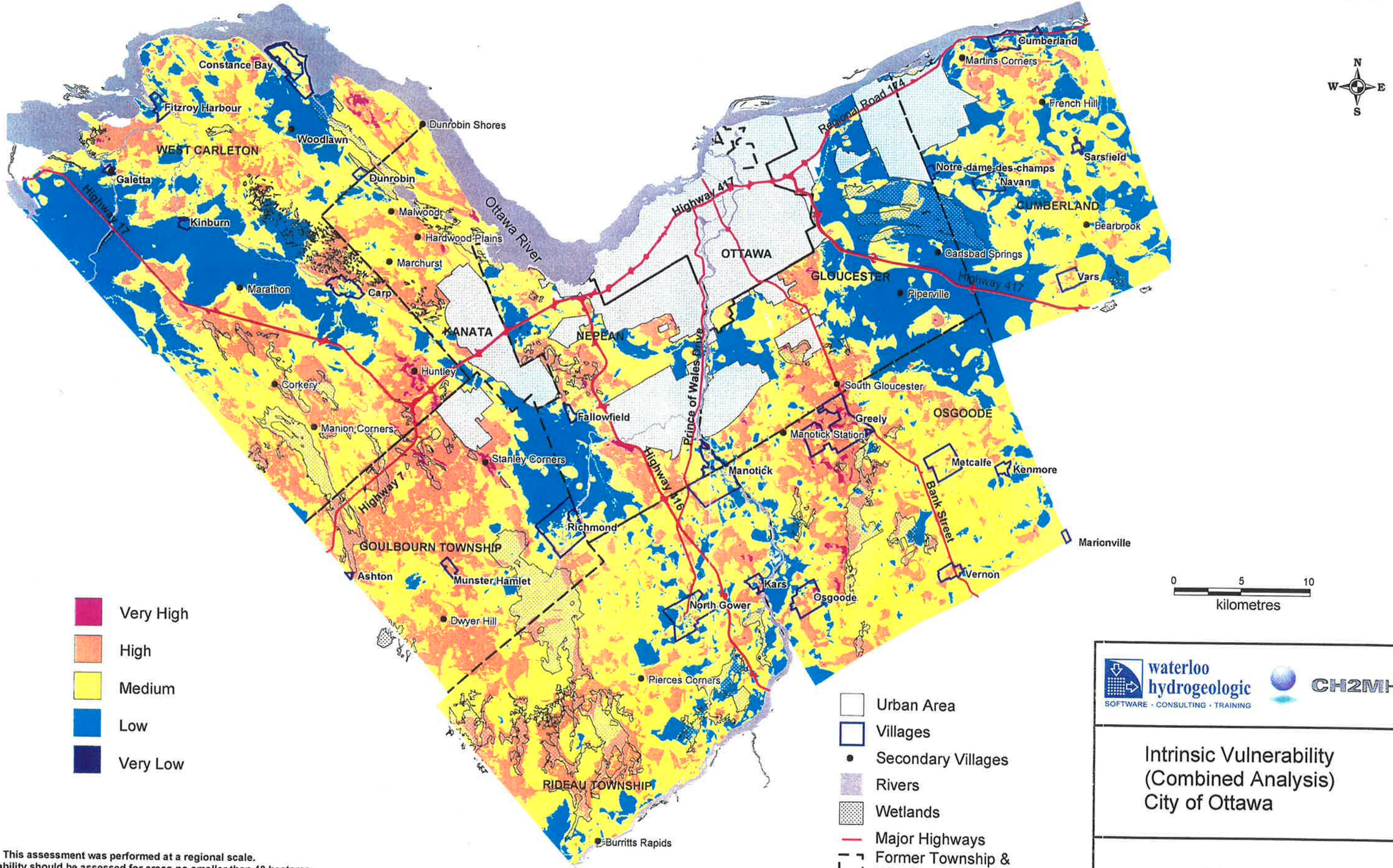
APPENDIX A

Aquifer Vulnerability Mapping



NOTE: This assessment was performed at a regional scale.
Vulnerability should be assessed for areas no smaller than 40 hectares.
Former Township & City Boundaries prior to amalgamation on January 1, 2001

waterloo hydrogeologic
SOFTWARE · CONSULTING · TRAINING

CH2MHILL

Intrinsic Vulnerability (Combined Analysis) City of Ottawa

Figure 2

geotechnical

environmental

hydrogeology

materials testing & inspection

experience • knowledge • reliability