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Infrastructure Master Plan

Western Annex in the Town of Perth

November, 2019



Prepared for: Town of Perth
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Perth, Ontario
K7H 1H9

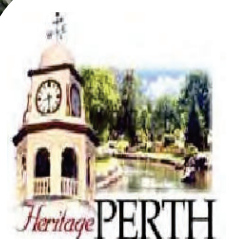


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1 INTRODUCTION

Jp2g Consultants Inc. was retained by the Town of Perth (hereafter referred to as The Town) to complete an Infrastructure Master Plan for the Western Annexed Area of Perth. This project will develop a framework for transportation, water supply, sanitary sewer and stormwater servicing for the study area and provide the Town with an understanding of both the short- and long-term opportunities and constraints associated with the development of this unique area.

1.1 Background

In 2009 the Town of Perth annexed two (2) parcels along the western limits known locally, and hereby referred to, as the Perth Golf Course and the Tayview property (Sales Barn Site) formerly in Tay Valley Township. A detailed description of these properties is provided in Section 1.2. The annexation process was initiated by private landowners interested in new development on their properties to be serviced with piped municipal sewage and water services from the Town. In September 2014, a revised Official Plan for Perth was adopted by Council through By-Law 3304-14. This revised plan added these additional lands to the Land Use Schedule and proposed policies to guide development based on conceptual plans prepared by the landowners.

Concurrently, the Town of Perth had appealed the Lanark County Sustainable Communities Official Plan (SCOP), as amended and approved by Ministry of Municipal Affairs and Housing (MMAH) May 28, 2013. The SCOP had projected slow growth rates for Perth and had not included the annexed lands on the County Schedule 'A'. The Town was concerned that the population projections could affect its anticipated development, as the County is the approval authority for plans of subdivision and condominium. In addition, the Town of Perth had conducted extensive studies, was undertaking repairs to the sanitary sewage collection system, and was proposing an Environmental Assessment to address the limited sewage treatment capacity – a servicing issue which would limit development in the annexed lands.

After negotiations through the Ontario Municipal Board (OMB), Minutes of Settlement dated May 27, 2015 were executed by the Town, the County and MMAH in June 2015. As a result, Amendment No. 4 to the SCOP and modifications to the Town OPA No. 14 were processed concurrently and approved by the County of Lanark on February 10, 2016.

The results designated a portion of the Western Annexed Area for future residential development. As part of the SCOP update under OPA No. 8 and No. 9 and a concurrent Town of Perth OPA No. 16 the revised urban boundary of Perth was recognized in the SCOP Schedule 'A' as a Settlement Area and the developable lands were designated Residential on Schedule A to the Town Official Plan in order to accommodate the Town's population allocation of 8085 persons by the year 2038.

The preparation of this Infrastructure Master Plan included agency and public consultations as detailed in Section 7.0 of this report. A key agency was the Rideau Valley Conservation Authority (RVCA) given the floodplain and wetland issues. A draft of this report was filed January 31, 2019 and August 8, 2019 for their review, this report has addressed their comments throughout.

1.2 Study Area

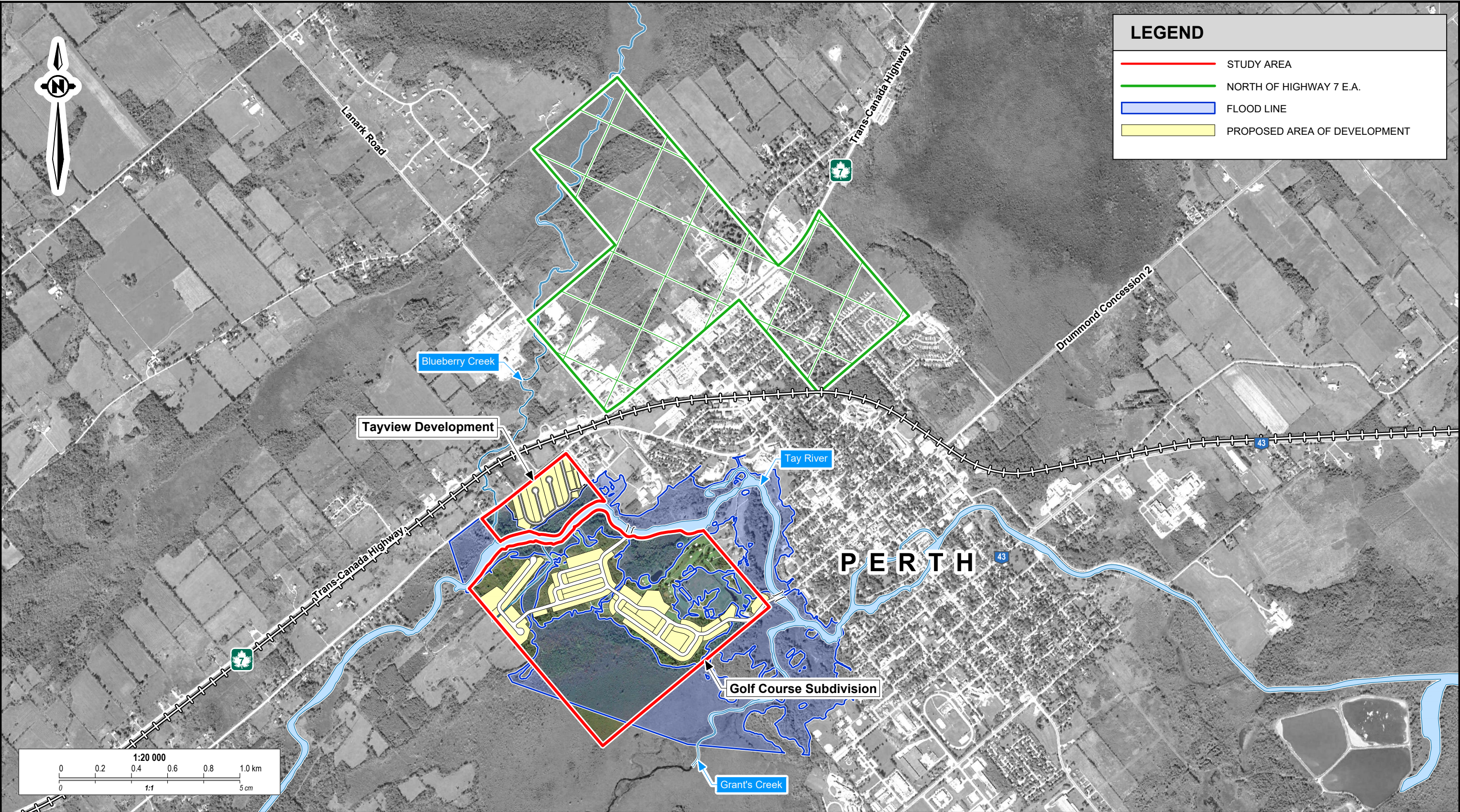
The Western Annexed Area comprises two (2) private landholdings bisected by the Tay River. According to Town records the Perth Golf Course property is approximately 300 ha, and the Tayview property is 35 ha. Note that both properties are subject to the 1:100 year flood plain of the Tay River, shown as the blue line in **Figure 1-1**.

The Perth Golf Course (141 Peter Street) first opened in 1890 and is presently a public golf course providing an 18 hole layout with practice facilities, a main clubhouse roughly 396 m² (4250 sq.ft) in size, a junior clubhouse, and other smaller accessory buildings. The original 3-hole course was constructed on pasture lands adjacent to the Tay River and was later expanded to 9-holes as the Links O'Tay Golf & Country Club in 1921. Another 9 holes were added in 2000. The Golf Course property is comprised of multiple "islands in the flood plain", and as such, is identified in the Official Plan as a Special Study Area. The southerly limits of the property are bounded by Grant's Creek Provincially Significant Wetland (PSW). Currently, the only access to the golf course is via a narrow, two-lane bridge where Peter St crosses the Tay River. This bridge also carries the municipal drinking and wastewater services for the golf course, including a 75 mm diameter PVC watermain and a 100 mm diameter sewer forcemain connected to the manhole on Peter Street at Lustre Lane. The Town's Water Treatment Plant is located across the Tay River from the northeast corner of the site. Any future development or discharges into the Tay River upstream of the water supply intake are subject to the Mississippi-Rideau Source Protection Plan policies enforced by the Rideau Valley Conservation Authority.

The Tayview property (183 Christie Lake Road) currently has two (2) large, metal-roof barns surrounded by open field with treed vegetation along the Tay River. The Tayview property is located between Christie Lake Road and the Tay River, adjacent to the County of Lanark Administration complex which also includes the Public Works Building (99 Christie Lake Rd) and the Lanark Lodge long term care facility (115 Christie Lake Rd). In 2013 a Development/Landscape Master Plan was prepared for the County lands (Tocher Heybloom Design Inc. 2013) to consider future development, protection of natural features, and improvement to access and connectivity. These County lands and the Perth Community Care Centre (101 Christie Lake Rd) are located in Tay Valley Township. Perth municipal services, comprising a 150 mm diameter watermain and a 200 mm diameter sewer, extend onto the properties from Inverness Avenue. The Tayview property has 590 metres of frontage on Christie Lake Road (County Road No. 6); note that entrance permits are required from the County as the road authority. The westerly portion of the property is bounded by the outlet of Blueberry Creek into the Tay River and the associated flood plain.

1.3 Municipal Class Environmental Assessment Process

All municipal infrastructure projects are subject to Ontario's Environmental Assessment Act. The requirements of the Act can be met by following the appropriate Class Environmental Assessment (EA) process. This project was undertaken in accordance with the October 2000 last updated 2015 version of the Municipal Class Environmental Assessment document prepared by the Municipal Engineers Association. The document outlines a streamlined process for project works that have predictable environmental impacts.





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Infrastructure Master Plan Western Annexed Area

Town of Perth

Study Area

DESIGNED: D.N. / K.M.		PROJECT No.: 2161774A
DRAFTED: R.W.		REVISION DATE: 2019-11-05
CHECKED: D.N.	APPROVED: K.M.	REVISION No.:
SCALE: As shown		FIGURE: 1-1

The Municipal Class Environmental Assessment (Class EA) is a planning process developed to promote the protection, conservation and wise management of the environment and local ecosystems through comprehensive planning and informed decision-making. This process ensures that potential natural, social and economic environmental effects are considered during the planning of the project, and that effective protection and risk mitigation measures are included. It allows for input and approval from the public, interest groups, municipalities, review agencies, and other stakeholders, in order to balance potentially conflicting stakeholder concerns, achieve informed decision-making and ensure compliance with all public policy and regulatory requirements. The Class EA process involves the following five (5) phases:

- Phase 1: Identification of the problem or opportunity.
- Phase 2: Identification of the alternative solutions and selection of a preferred solution
- Phase 3: Identification of the alternative design concepts for the preferred solution and selection of the preferred design concept.
- Phase 4: Preparation of the Environmental Study Report and review.
- Phase 5: Detailed design of preferred design concept, construction, and project management.

The Municipal Class EA process divides projects into categories or schedules, depending on the scope of anticipated environmental impacts:

- **Schedule A/A+** projects involve minor maintenance or modifications to existing facilities. For sewer and water, typical maintenance activities within existing road allowances can be implemented without further EA Act approval. Projects of this nature have only minor environmental impacts and are considered pre-approved.
- **Schedule B** projects include improvements and minor expansions to existing facilities. These projects have the potential for greater environmental impacts and the proponent is required to proceed through Phases 1, 2, and 5 of the Municipal Class EA Process. The proponent must undertake the mandatory screening and consultation with public, agency, and stakeholder groups prior to implementation. If the process identifies an issue that cannot be resolved, the project may be “bumped-up” by a Part II Order to a Schedule ‘C’ or an individual EA.
- **Schedule C** projects include construction of new facilities or major expansions of existing facilities. Projects of this nature have the potential for significant environmental effects and must proceed through the prescribed planning and documentation procedures specified in the Municipal Class EA process. If concerns are raised that cannot be resolved as part of the class EA process, the project may be “bumped-up” by a Part II Order to an individual EA.

A Master Plan considers a group of projects within an overall system or integrated system such as municipal infrastructure for a development area, prior to dealing with project specific issues. Specific projects identified to provide municipal infrastructure (roads, bridges, active transportation, water, sanitary sewer and stormwater management facilities) to service the Western Annexed lands may be categorized as Schedule A, A+, B or C projects. At a minimum, Master Plans address Phases 1 and 2 of the Municipal Class EA process. The intent of the Master Plan is to comprehensively identify the access and servicing needs and establish long range development planning based on a broad review of infrastructure alternatives. Key features of a Master Plan are:

1. The scope of study is broad and usually includes an analysis of the system components in order to outline a framework for future work and development.
2. The recommendations will include works which are distributed geographically throughout the study area to be implemented over an extended period of time.
3. Includes the principles of environmental assessment planning under the EA Act
 - consultation with affected parties early and throughout the planning process
 - consideration of a reasonable range of alternatives
 - identification and consideration of the effects of each alternative on the environment
 - systematic evaluation of alternatives in terms of advantages and disadvantages
 - provision of clear and complete documentation

By planning this way, the need and justification for individual projects and the associated broader context, are better defined (MEA, 2014). This Infrastructure Master Plan for the Western Annexed Area developed under the Municipal Class EA process includes a level of investigation, consultation and documentation sufficient to fulfill the requirements for Schedule B projects. Therefore, the notice of completion of the Master Plan will become the Notice of Completion for the Schedule B projects within it. Any Schedule C projects would have to fulfill Phases 3 and 4 of the Municipal Class EA prior to implementation.

The development of this Master Plan provided opportunities for agency and public input on future development plans for the Town of Perth – see Section 7.0 of this report for more details. Unlike the Municipal Class EA documents for specific projects, the Master Plan is not subject to an appeal to the Minister requesting the Town comply with Part II of the EA Act. Specific Schedule B projects within the Plan or Schedule C Projects which are subject to Phases 3 and 4 of the Municipal Class EA would be subject to appeal.

2 PROJECT BACKGROUND AND JUSTIFICATION

2.1 Planning Context

The following provides a description on how the proposed Infrastructure Master Plan is consistent with provincial policies and conforms to both the County and Town Official Plans.

2.1.1 Provincial Policy Statement

The 2014 Provincial Policy Statement (PPS) provides policy direction on matters of provincial interest related to land use planning and development. In this regard the Infrastructure Master Plan must be consistent with the policies contained within three (3) main objectives when identifying and evaluating transportation and servicing options.

1. Building Strong, Healthy Communities
 - Promoting efficient development and land use patterns which sustain financial well-being
 - Promoting cost-effective development patterns and standards to minimize land consumption and servicing costs
 - Planning to promote economic development and competitiveness

- To provide for an appropriate range and mix of housing types and densities required to meet projected requirements
 - Promoting healthy, active communities by providing for active transportation and recreational opportunities
 - Providing infrastructure in a coordinated, efficient and cost-effective manner
 - Providing transportation systems which are safe, energy efficient and meet projected needs.
2. Wise Use and Management of Resources
- Natural features and areas shall be protected
 - Protect, improve or restore the quality and quantity of water
 - Conserve significant archaeological and cultural resources
3. Protecting Public Health and Safety
- Directing development outside hazardous lands subject to flooding

2.1.2 Lanark County Sustainable Communities Official Plan (SCOP)

The SCOP Schedule 'A' Land Use Designations was amended under OPA No. 4 by County Council on January 13, 2016 to include a portion of the annexed areas within the Town of Perth municipal boundaries and the Settlement Area (new servicing areas) proposed by the Town of Perth. The SCOP Schedule 'A' also illustrated the Tay River flood plain limits and the Provincially Significant Wetland limits within the study area, and the registered Tay River Pathway.

Not all of the Western Annexed Area study area was within the Perth Settlement Area, which allows development on full municipal services. A SCOP update was required to include the additional lands within the servicing area, as discussed in the following sections.

2.1.3 Official Plan (OPA No. 14)

The Town of Perth Official Plan (OPA No. 14) was adopted by Council September 9, 2014 as a result of their 5-year review of the former Official Plan, May 2000 as amended. The revised Official Plan included both text and schedule amendments intended to be consistent with the PPS, 2014, the Lanark County SCOP, and the Town's direction for growth and development (including addition of the annexed areas).

The Town's background information and proposed growth projections for OPA No. 14 were contrary to the MMAH approved population projections in the Lanark County SCOP which were based on historical trends. The Town believed that growth had been stagnated primarily due to the unavailability of developable greenfield sites prior to the 2009 annexation and (at the time) limited sanitary sewage servicing capacity. The revised OPA No. 14 included a modified settlement area boundary that reflects the high-growth scenario which added and removed lands from the Urban Settlement Area to achieve the Town's development objectives. Policy modifications included changing the Future Urban Service Area designation to a Special Study Area and included policies for lands designated Special Study Area outside the Urban Settlement Area. A summary of OPA No. 14 policy changes including Schedule 'A' for OPA No. 14 is included in **Appendix A**.

To reflect the development concepts for the Western Annexed Lands, the housing allocation and servicing requirements, the *Town of Perth Schedule 'A' Land Use Designations And Overlays Per Comprehensive Update Amendment No. 14* illustrated the following:

The Golf Course lands are designated Parks and Open Space, Residential Area and Special Study Area. The Residential Area and a strip of Special Study Area is within the Urban Settlement Boundary. The property is surrounded by an Environmental Protection Area comprising flood plain constraints, natural heritage feature (NHF) and provincially significant wetland (PSW).

The Tayview property is designated New Residential Area (within the Urban Settlement Area) Special Study Area and Environmental Protection Area comprising flood plain constraint, NHF and PSW.

Key policies which affect the study area include:

1.2.17 – The Town’s vision embraces the concept of sustainable development through land use and infrastructure development decisions and operational practices that integrate human needs with the natural and built environment. Land use approvals and infrastructure redevelopment decisions will include sustainable design measures for transportation, infrastructure, waste management, energy systems, and will strive for the efficient use of natural resources and preservation of historic, cultural and natural heritage features. This vision intends to be adaptive to innovative design and human activities that support sustainability.

3.2.A – Land supporting approximately 1,000 housing units is designated in the proposed plan layouts and available for residential development. The existing residential designation distribution for the study area is:

Golf Course	120 units
Tayview	70 units

The remaining lands intended to be encompassed in the urban service area for longer term growth are included in the Special Study Area on Schedule “A”.

5.2F – Council may consider development in the New Residential Area designation prior to the development of existing Residential areas of the Town when the proponent submits a comprehensive plan and supporting studies.

8.8.1 – Lands within the Special Study Area designation will be needed to accommodate future residential and neighbourhood development in years beyond the planning horizon of the Plan and are not included in the urban settlement boundary. A comprehensive review of the Plan to consider inclusion of these lands in the urban settlement boundary will be undertaken in accordance with the PPS, in conjunction with the comprehensive review of growth through an update of the SCOP.

8.8.2 – Provides a range of permitted uses for lands within the Special Study Area but outside the Urban Settlement Boundary.

8.8.3 – Permits all forms of residential development, neighbourhood commercial uses, institutional and community service uses, and parks and open spaces for lands within the Special Study Area and within the Urban Settlement Boundary.

2.1.4 Official Plan (OPA No. 16)

In 2017 Lanark County initiated Amendment No. 8 of the SCOP which was to amend the text and Appendix 2 of the SCOP to update the population projections for the municipalities in the County to the year 2038. Population projections were prepared on behalf of the County by Metro Economics, which were reviewed by staff and County council representatives. As a result it was recommended that 20% of the projected growth from the 5 most rural municipalities be allocated to the fully urban municipalities of Carleton Place and Perth. Amendment No. 9 of the SCOP redesignated the lands within the municipal boundary of the Town of Perth to Settlement Area.

The Town of Perth Official Plan (OPA No. 16) was adopted by Council on April 16, 2019 to reflect an increase of population to 8085 by 2038 within an expanded Urban Settlement Boundary including the annexed lands North of Highway 7, the lands in the Western Annex and infill development. The County Council approved Amendments No. 8 and No. 9 and the Town OPA No. 16 on June 12, 2019. A copy of OPA No. 16 is included in **Appendix A**.

Specifically OPA No. 16 as it effects the study area

- extends the Urban Settlement Boundary to encompass all lands within the limits of Perth
- redesignated the Special Study Area lands to New Residential on the Tayview property
- redesignated the Special Study Area lands to Future Development on the Golf Course property

The former Section 8.8 Special Study Area Designated policies are replaced with Future Development Designation policies, as follows in part:

8.8.1 (...the lands) are needed for long term infrastructure planning and may be needed to accommodate future residential development in years beyond the planning horizon of the Plan. Lands within this designation will be considered for residential development whenever a comprehensive review of the Plan is undertaken....

8.8.2 ... the following range of uses may be permitted: ... existing..., ...agricultural..., uses permitted in the Parks and Open Place designation..., and uses accessory to the permitted use.

8.8.3 The policies include:

- a. Lands within the Future Development designation have been subject to detailed infrastructure design and incorporated into the long-term infrastructure planning for the Town. These lands will be required to accommodate future development at urban densities including: all forms of residential development, neighbourhood commercial uses, institutional and community service uses, and parks and open space uses. Future planning work will be required to determine the preferred land use mix.
- b. Future uses on the lands subject to this designation will be required to be serviced by municipal water supply sanitary, sewer and stormwater management facilities.
- c. Any new use that would limit the potential future use of the land or which would impede extension of municipal services or the extension of development in a form that would be compact and contiguous with development on adjacent lands currently designated for development shall not be permitted.
- d. The impact of development on Natural Heritage Features and other areas subject to the policies under Section 8.6 must be considered prior to any change in this designation.

2.2 Population Growth Projections

The estimated population of the Town is approximately 6,360 people. Based on the demographic profile and population projections developed to support the Lanark County SCOP (Stantec 2011) the Table 2-1 provides a summary of anticipated growth for Perth using a 2006 base population of 5,907.

Table 2-1 - County Population Projections for Perth

Estimate	2011	2016	2021	2026	2031
Low	6,021	6,128	6,275	6,439	6,597
Medium	6,079	6,251	6,423	6,595	6,767
High	6,249	6,590	6,932	7,274	7,615

Strategic Projections Inc. prepared population projects in support of Perth's OPA No. 14 as amended in a report entitled Town of Perth Projections to 2041 (SPI, 2014). In comparison the SPI figures for 2031 were:

- Low: 5860 based on no growth reflecting trends in the growth of its population over the last quarter century
- Medium: 8180 based on half the growth in the high projection
- High: 10,500 based on steady growth recognizing the Town's policies and infrastructure commitments and that population growth in the area has been significant and are projected to be directed to the urban area

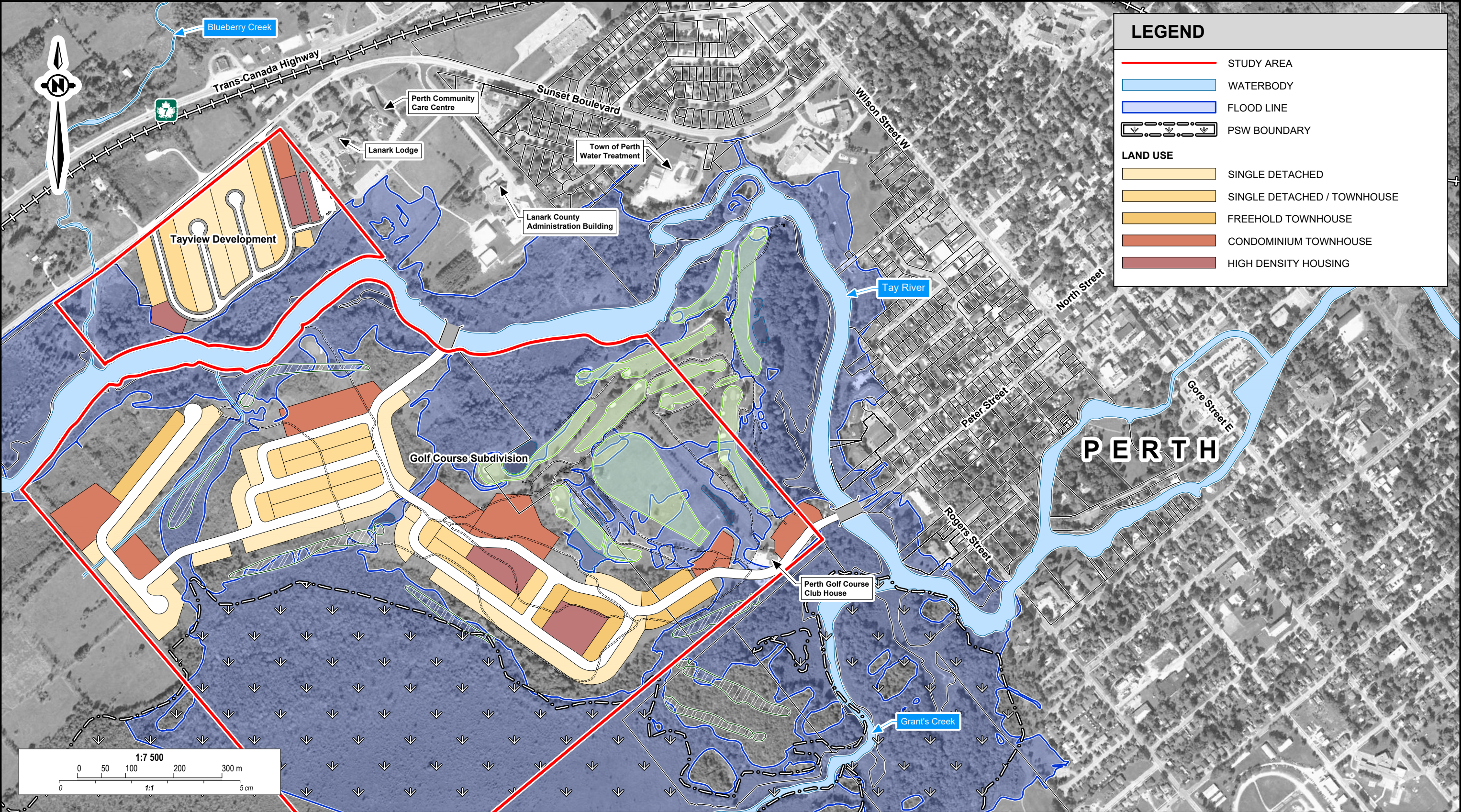
Metro Economics prepared population projections for Lanark County based on the 2016 census data (population 5930) and various historical growth, employment and migration factors for the periods 2041 and 2071.

	<u>2041</u>	<u>2071</u>
Low	6000	6100
Base	6000	6200
High	6100	6300

County Council approved a 2038 population for Perth of 8025 based on a reallocation of population growth from the rural municipalities in the County which is reflected in SCOP Amendment No. 8.

2.3 Future Development

The study area is characterized by two (2) distinct properties located on opposite sides of the Tay River. The Town OPA No. 14 and 16 designated the developable lands for residential growth, which comprises property above the regulatory flood elevation and outside the PSW limits. Future development must provide safe, reliable road ingress and egress; ensure sufficient municipal services; and retain and enhance the connectivity of pathways and active transportation networks in the area. The proposed communities are shown in **Figure 2-1**.





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Infrastructure Master Plan Western Annexed Area
Town of Perth

Community Concept Plan

DESIGNED: D.N. / K.M.		PROJECT No.: 2161774A	
DRAFTED: R.W.		REVISION DATE: 2019-11-05	
CHECKED: D.N.	APPROVED: K.M.	REVISION No.:	
SCALE: As shown		FIGURE: 2-1	

2.3.1 Perth Golf Course Lands

Based on a Concept Plan prepared by McIntosh Perry Consulting Engineers Ltd. dated April 2, 2012, the first ten (10) holes of the existing golf course are to be retained and would form the northeasterly portion of the property. The plan illustrates a mix of single detached, townhouse, and medium-density residential dwellings with an estimated total of 650 residential units proposed. The portion of the site presently in the Residential Area designation on Schedule A of the Official Plan has potential for 120 units.

2.3.2 Tayview Properties

Based on a Concept Plan prepared by McIntosh Perry Consulting Engineers Ltd. dated April 15, 2001, the development proposes a mix of residential, commercial and institutional uses. The proposal includes 113 residential units, a 120 +/- unit senior apartment complex, and a commercial block. The easterly portion of the Tayview property is in the Residential Area designation on Schedule A of the Official Plan, which would have potential for approximately 70 of the intended 230 residential units.

2.4 Development North of Highway 7

The Town of Perth commissioned Dillon Consulting Ltd. To prepare an Infrastructure Master Plan for Area North of Highway 7, completed in October 2013. The Area North of Highway 7 is shown on **Figure 1-1**. The study addresses the potential for development in the area north of Highway 7 and east of Lanark Road. The preferred alternatives for water and wastewater (as it pertains to this Infrastructure Master Plan) are described below:

- Water Servicing – Install a watermain network throughout the study area with an elevated storage tank to provide fire flow capacity in addition to balancing and contingency volume
- Wastewater Servicing – Construct a gravity sewer network with a central collection point which will drain to a sanitary pump station and will then pump the wastewater to the existing sanitary sewer on Drummond Road.

Because the difference in timing of construction and occupation of the North of Highway 7 development and the Western Annex development is not known, analysis will consider development of the Western Annex proceeding both before and after the North of Highway 7 site.

3 INVENTORY OF EXISTING ENVIRONMENT

3.1 Natural Heritage Features

The following natural heritage feature descriptions are based on published reports, available data sources and site reconnaissance. In support of the findings, consultations were conducted with RVCA and MNR and a natural heritage field survey was completed on October 12, 2016 to identify potential development constraints within the study area. Further analysis and reporting on a number of the environmental features is detailed within the evaluation of design alternatives.

3.1.1 Air Environment and Birds

Weather and Precipitation

The daily average temperatures in Perth ranged from -9.8°C to 20°C, historically with an average annual precipitation of 876.2mm (Government of Canada, 2019). Based on weather data from the Drummond Centre weather station for the years 1981 to 2010 the lowest recorded temperature of -36°C occurred on January 27, 1994; the highest recorded temperature of 37.5°C occurred on August 3, 1998.

The climate is changing, and a contributor to that change is anthropogenic greenhouse gas (GHG) emissions. The Town of Perth (Perth, 2017) recognizes that the GHG emissions must be reduced to reduce the risk in the future.

GHG emissions are associated with urban development. This includes the release of methane from sewage and solid waste treatment, CO₂ from space heating and automotive uses, the loss of carbon sequestration from vegetation, and the release of sequestered carbon from soils.

Emissions can be curtailed, and the effects of climate change can be mitigated and adapted to. Wherever possible, the efforts to accomplish these things will be identified and promoted.

A detailed analysis should be included in future design studies to address both the reduction in greenhouse gas intensity and the flexibility of the system to adapt to climate change. This can be qualitative at this time, knowing the degree of refinement that will be available throughout the design process associated with subdivision planning.

Noise and Vibration - Bird Species at Risk

A Natural Area and Features Information Request form was submitted to the Ministry of Natural Resources and Forestry (MNRF) office in Kemptville. Their response letter dated August 11, 2016 indicated that there is potential for Chimney Swift, Eastern Meadowlark, Barn Swallow, Bobolink, Least Bittern and Whip-poor-will on or in the area surrounding the site. All of these bird species are listed as threatened under the Endangered Species Act. In addition, MNRF has also identified the following Special Concern birds that have potential to occur on or in the area surrounding the site: Common Nighthawk, Eastern Wood-Pewee, Golden-winged Warbler and Wood Thrush.

The Perth Golf Course property comprises a variety of habitat for bird species. In reference to the Environmental Impact Statement for the Perth Golf Course Community Concept (McIntosh Perry, 2012) the following bird species were observed: Song Sparrow, Hermit Thrush, Black-billed Cuckoo, Chipping Sparrow, American Robin, Swamp Sparrow, Green Heron, Killdeer, Red-eyed Vireo, Yellow-bellied Sapsucker, Whitebreasted Nuthatch, Black-capped Chickadee, Blue Jay, American Crow, Rose-breasted Grosbeak, American Redstart, Yellow Warbler, American Goldfinch, Cedar Waxwing, Eastern Wood Pewee (Special Concern), Common Grackle, Red-winged Blackbird, Common Yellowthroat, Downy Woodpecker, House Wren, Pileated Woodpecker, Northern Waterthrush, American Woodcock, Osprey, Great Blue Heron, Warbling Vireo, Ovenbird, Chimney Swift (Threatened), Common Moorhen, Baltimore Oriole, Mourning Dove, Brown-headed Cowbird, Black-throated Blue Warbler, Great-crested Flycatcher, Canada Goose, Northern Flicker, Brown Thrasher, European Starling, Gray Catbird, Blackpoll Warbler, Blackburnian Warbler, Scarlet Tanager, Yellowthroated Vireo, Veery, Wild Turkey, Black-and-white Warbler, Eastern Kingbird, Belted Kingfisher, Least Flycatcher, Tree Swallow, Barn Swallow (Threatened),

Mallard, Blue-winged Teal, Yellow-rumped Warbler, Turkey Vulture, Red-tailed Hawk and Spotted Sandpiper.

The Tayview property comprises mainly cultural meadow with riparian vegetation on the shoreline of the Tay River and Blueberry Creek. Similar bird species are expected.

3.1.2 Water Environment and Aquatic Flora/Fauna

The Tay River, Blueberry Creek, Grant's Creek and the associated Grant Creek Wetland (PSW), as well as unevaluated wetlands along the Tay River, are the dominant water environmental features on and in proximity to the study area as shown on **Figure 3-1**.

Tay River / Blueberry Creek / Grant's Creek

The Tay River is located along the northern and eastern property limits of the Perth Golf Course property while Grant's Creek travels along the southeastern property boundary of the Perth Golf Course. The Tayview site is located to the north of the Tay River. Blueberry Creek crosses over the western portion of the Tayview site.

The water quality of the Tay River as reported in the Rideau Valley Conservation Authority's Tay River Subwatershed Report 2011 has been rated as fair at a sampling site located in close proximity to the subject lands (Rogers Road). This report also indicates that water samples obtained from this sampling site have in the past exhibited some parameters to be in exceedance of the Provincial Water Quality Objectives (PWQOs), however, the average concentrations of total phosphorous, total Kjeldahal Nitrogen, E.coli and metals are all below the PWQOs.

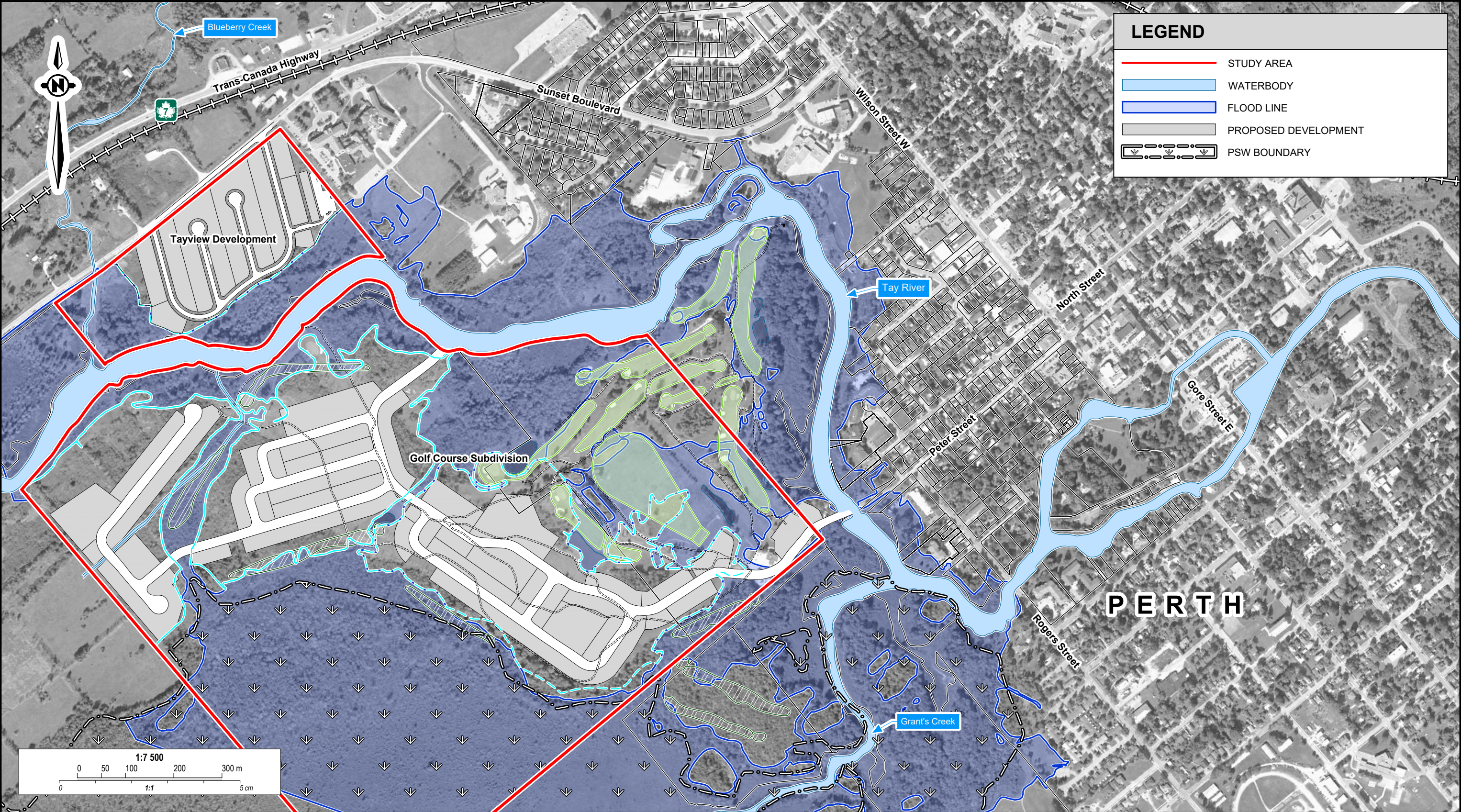
Two of the access options described in Section 5.1.1 of this report is to use the existing Peter Street golf course access and construct a new bridge across the Tay River. Should a new bridge be constructed in this area, RVCA advises in their March 22, 2019 letter that significant engineering, hydraulic analysis of the floodplain, consideration of the ecological impact of the bridge and a permit will be required when construction is contemplated. All new lot lines are to respect the 30m fish habitat setback from the normal high water mark of waterbodies adjacent to the development.

Grant's Creek Wetland – Provincially Significant Wetland (PSW)

The Grant's Creek Wetland is a large wetland which is designated as a provincially significant wetland (PSW). The majority of the Grant's Creek Wetland is located to the south of the subject lands; however, a small portion of the wetland is located on the southern corner of the site.

The portion of the Grant's Creek PSW on the subject lands has been classified in the Environmental Impact Statement (McIntosh Perry 2012) as comprising a red maple deciduous forest (SWD3-1), a black ash mineral deciduous swamp (SWD2-1), a Fresh-moist sugar maple deciduous forest (FOD6), a sweet gale organic thicket swamp (SWT3-6), and a willow organic thicket swamp (SWT3-1). These communities are shown on **Figure 3-2** and described in **Appendix B**.

As some of the proposed lots, stormwater facilities and infrastructure will be located on adjacent lands to the PSW, permits will need to be obtained from RVCA. RVCA also states in their March 22, 2019 letter that the proposed stormwater facility and it's impacts on the PSW will need to be assessed.





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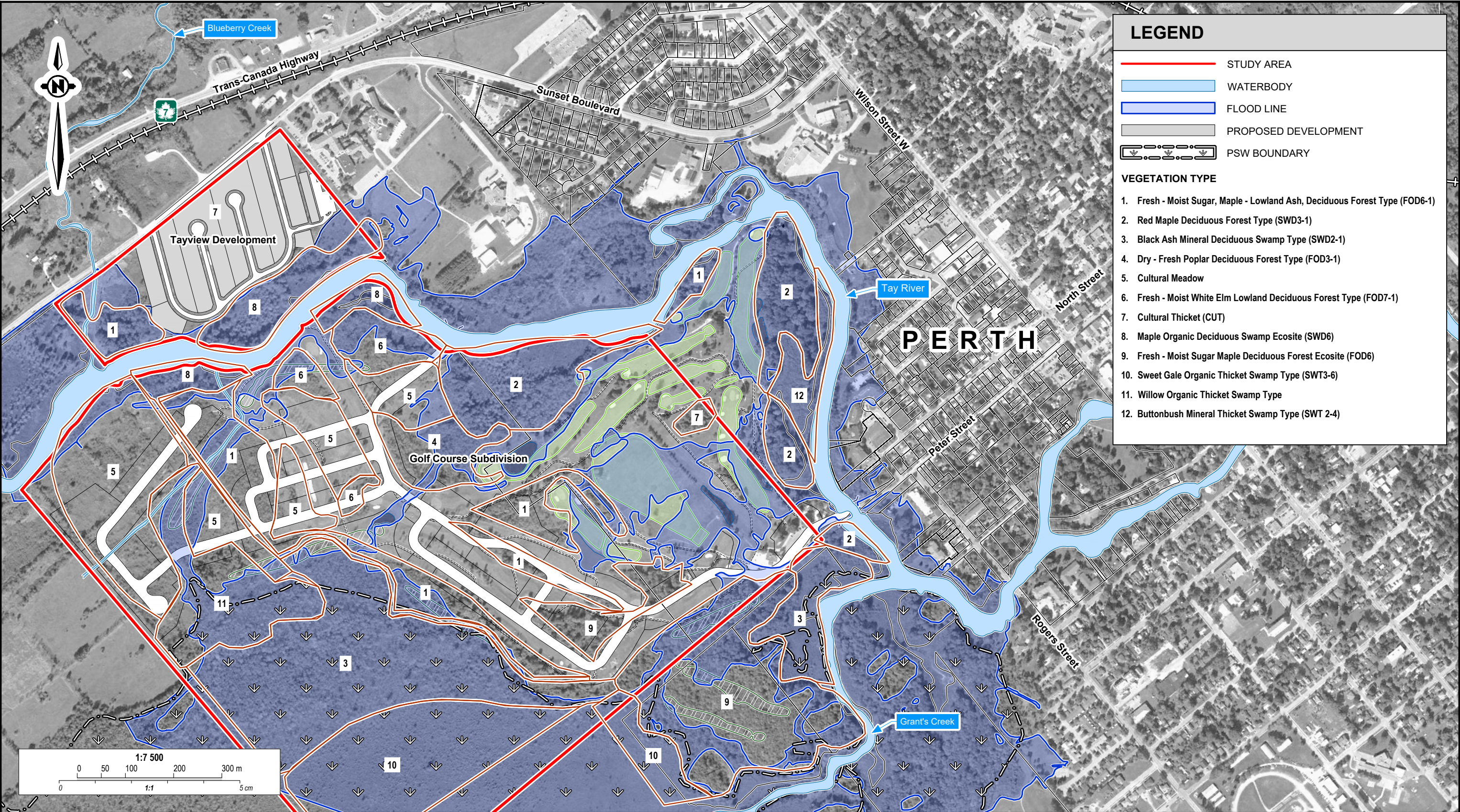
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Infrastructure Master Plan Western Annexed Area

Town of Perth

Water Environmental Features

DESIGNED: D.N. / K.M.	PROJECT No.: 2161774A
DRAFTED: R.W.	REVISION DATE: 2019-11-05
CHECKED: D.N.	APPROVED: K.M.
SCALE: As shown	REVISION No.:
FIGURE: 3-1	





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Infrastructure Master Plan Western Annexed Area

Town of Perth

Vegetation Communities

DESIGNED: D.N. / K.M.		PROJECT No.: 2161774A
DRAFTED: R.W.		REVISION DATE: 2019-11-05
CHECKED: D.N.	APPROVED: K.M.	REVISION No.:
SCALE: As shown		FIGURE: 3-2

Unevaluated Wetlands

Unevaluated wetlands are located on the southern shore of the Tayview property and the northern shore of the Golf Course property. The boundary of the unevaluated wetlands on the Golf Course property has been delineated by McIntosh Perry in their 2012 EIS report. The wetland boundaries for the unevaluated wetlands located on the Tayview property should also be delineated in an EIS. Development should be directed outside of these unevaluated wetlands to preserve these features. Both wetlands are to be evaluated prior development of adjacent lands.

Fish Habitat

The MNRF have indicated in their letter dated August 11, 2016 that fish species reported to occur in Grant's Creek include Banded killifish, Blacknose shiner, Bluegill, Brook stickleback, Brown bullhead, Central mudminnow, Common shiner, Emerald shiner, Golden shiner, Johnny darter, Lepomis hybrids, Northern pike, Pumpkinseed, Rock bass, Shorthead redhorse, Smallmouth bass, White sucker, and Yellow bullhead.

The fish surveys conducted by McIntosh Perry on the Tay River in May 2010 which revealed: Central mudminnow, Brook stickleback, Rock bass, Pumpkinseed, Bluegill, Golden shiner, Banded killifish, Blacknose shiner, Brown bullhead, White sucker, Common shiner, Smallmouth bass, Northern pike and Shorthead redhorse. No vulnerable, threatened or endangered fish species were identified.

In addition, a fish survey was completed on Blueberry Creek in April and June 2010 which revealed: Johnny darter, Brown bullhead, Yellow bullhead, Pumpkinseed, Blacknose shiner, Common shiner, Emerald shiner, Shorthead redhorse, White sucker, Rock bass, Bluegill and Central mudminnow. No vulnerable, threatened or endangered fish species were identified.

The RVCA provided in their March 22, 2019 letter the following list of fish species based on their records:

- The Grants Creek Catchment – Central stoneroller, Iowa darter, Spotfin shiner, and Spottail shiner.
- The Tay River – Black crappie, Blackchin shiner, Brassy minnow, Bullhead catfish hybrids, Common carp, Greater redhorse, Shorthead redhorse, Sunfish family, Tadpole madtom, and Walleye.

Both Grants Creek and Tay River – Banded Killifish, Blacknose dace, Blacknose shiner, Bluegill, Bluntnose minnow, Brook stickleback, Brown bullhead, Burbot, Carps and minnows, Central mudminnow, Common shiner, Creek chub, etheostoma sp., Fallfish, Fathead minnow, Golden shiner, Hornyhead chub, Largemouth bass, Logperch, Longnose dace, Northern pike, Northern redbelly dace, Pumpkinseed, Rock bass, Smallmouth bass, Stonecat, White sucker, Yellow bullhead, and Yellow perch.

No vulnerable, threatened or endangered fish species were identified.

Floodplain

As stated in RVCA's March 22, 2019 letter, should the stormwater management facilities for the proposed development be located within the existing low areas within the regulatory floodplain, as per O. Reg 174/06, the development will need to be approved through a satisfactory Environmental Assessment process which clearly demonstrates that there is no viable alternative and/or if it has been demonstrated to the satisfaction of the Conservation Authority that the control of flooding, erosion, pollution or the conservation of land will not be affected.

RVCA also states in their letter that all proposed lots, infrastructure and facilities should be located at least 30 metres from the normal high water mark of a watercourse (including the Tay River, Blueberry Creek and headwater features) or outside of the floodplain, whichever is greater. Restoration efforts could also be completed to enhance the vegetation within 30 metres of the normal high water mark of the watercourses on the subject lands. RVCA have also recommended that the developer consider doing a tree conservation plan to maintain as much existing vegetation as possible.

Headwater Drainage Features

A headwater drainage feature was identified within the western forested portion of the Golf Course lands, as shown on **Figure 3-1**. It is the remains of farm ditch with imperfect drainage. It captures runoff from the adjacent farm property and from several shallow ditches on-site. While the development proposal will redirect some of this drainage, the drainage from the farm field must be maintained or improved. Existing blockages/obstructions within the drainage feature can be removed, and runoff from roadways is not to be directed to the drainage feature. It provides habitat for amphibians, and is used extensively by wildlife, and an appropriate setback must be determined as part of the further development of the site.

As recommended in RVCA's March 22, 2019 letter, headwater drainage features have been identified on site and should be assessed by a qualified professional according to the Evaluation, Classification and Management of Headwater Drainage Features Guideline, prepared by Toronto and Region Conservation Authority and Credit Valley Conservation, dated July 2014 and finalized January 2014. Prior to completing the assessment, RVCA should be consulted. That process will set out the required setbacks for the drainage feature and is recommended through the subdivision design process.

RVCA also states in their March 22, 2018 letter that any in-water works or watercourse alterations including but not limited to channel piping/realignment, stormwater/discharge outlets to existing watercourses, flow diversion, and bridge construction will need to be reviewed by RVCA.

3.1.3 Land Environment and Terrestrial Flora/Fauna

The land environment reviewed included the Western Annexed Area and adjacent lands within 300 m of the site.

Surficial Geology

According to the Soil Map of Lanark County Ontario, South Sheet, Soil Survey Report No. 40, the soils on the subject lands consist primarily of sandy loam (Monteagle and Tennyson soils) and organic material (Muck) with some clay loam materials (North Gower soils), and rock outcrop. These soils have well drained to poorly drained soils as a result of sloping to basin-like topography.

The soils in the study area based on the Land Information Ontario's Soil Survey Complex include muck, monteagle, north gower, tennyson soils. In addition, the northern part of the western annex has an area with very little soil coverage and is considered by the soil survey complex to be a rock outcrop. A spatial visualization of the soil types is provided in **Figure 3-3**. The hydrologic soil class and soil texture is detailed in **Table 3-1**.

Table 3-1 - Soil Characteristics

Soil Type	Hydrologic Soil Class	Texture
Muck	D	Organic
Monteagle	B	Sandy Loam
North Gower	D	Clay
Tennyson	B	Sandy Loam

The low areas on the site are fairly level, with rock outcrops. On the north side of the Tay, much of the site is dominated by shallow granite. On the south side of the Tay, there are several low areas that act as spill points between the Tay and Grant's Creek during high flow conditions.

A desk top review and site reconnaissance including four (4) hand auger holes were completed by GEMTEC. The results of the preliminary geotechnical investigation is included in **Appendix C**.

Topography

The study area elevation ranges from the normal high-water mark of the Tay River at 134.5m to elevations of 142 m on the golf course property and 140.5m on the Tayview property as shown on **Figure 3-4**.

Significant Habitat of Endangered and Threatened Species

The Ministry of Natural Resources and Forestry indicated in an August 2016 letter that the following species may be present within or adjacent to the site:

- Barn Swallow (threatened)
- Bobolink (threatened)
- Butternut (endangered)
- Chimney Swift (threatened)
- Common Gray Fox (threatened)
- Eastern Meadowlark (threatened)
- Flooded Jellyskin (threatened)
- Gray Ratsnake (threatened)
- Least Bittern (threatened)
- Little Brown Bat (endangered)
- Northern Long-eared Bat (endangered)
- Pale-bellied Frost Lichen (endangered)
- Whip poor will (threatened)

The Ministry of Natural Resources and Forestry also indicated in their letter that a Blanding's Turtle (threatened) has been confirmed adjacent to the site and that the site contains Category 2 habitat.

During site surveys conducted by McIntosh Perry in 2010, a Barn Swallow (threatened) and three Chimney Swifts (threatened) were observed over the Tay River, as well as seven Butternut trees (endangered), an Eastern Ribbonsnake (special concern) and a Common Snapping Turtle (special concern) which were observed on the Perth Golf Course property.

Other species observed by McIntosh Perry during fieldwork carried out in 2010 and 2012 included: Crayfish, Bullfrog, Green Frog, Wood Frog, Eastern Gray Treefrog, American Toad, Northern Leopard Frog, Northern Watersnake, Eastern Painted Turtle, Bullfrog tadpoles, Grey Squirrel, Eastern Chipmunk, White-tailed Deer, Striped Skunk, Groundhog, Porcupine, Beaver, Red Squirrel and Meadow Vole.

Based on email correspondence dated August 11, 2016, the MNRF recommends that new surveys for Species at Risk (SAR) be completed for the site due to the lapse in time since the most recent SAR surveys were carried out in 2010 and 2012 by McIntosh Perry. MNRF also recommended that Gray Ratsnake surveys be carried out for the subject lands. These surveys will be carried out as part of an EIS for the proposed development under an application for Plan of Subdivision.

Additional surveys and analysis as described within the RVCA's March 22, 2019 letter should be carried out as follows:

1. The preferred land use plan is conceptual and it may change based on the outcome of the more detailed analysis required to determine the appropriate location of infrastructure (roads, watercourse crossings, watermains, sanitary sewers, stormwater management facilities) and the lot layout, relative to the natural hazard and natural heritage features within the study area;
2. Prior to consideration of development applications submitted under the *Planning Act*, the detailed analysis as described in paragraph 1, above, will be conducted to the satisfaction of the RVCA and the Town of Perth; and
3. Prior to commencement of subsequent studies that will support the final development concept plan and infrastructure servicing plan, the Town of Perth, RVCA and other government agencies as appropriate, shall engage in pre-consultation to identify outstanding issues and scope of work.

Vegetation Communities

McIntosh Perry used the Ecological Land Classification protocol to determine the vegetation communities present on the subject lands in 2010 as shown on **Figure 3-2**. The 12 vegetation communities that they delineated and described in the report are as follows:

- Community 1: Fresh – Moist Sugar Maple – Lowland Ash Deciduous Forest Type (FOD6-1)
- Community 2: Red Maple Deciduous Swamp Type (SWD3-1)
- Community 3: Black Ash Mineral Deciduous Swamp Type (SWD2-1)
- Community 4: Dry – Fresh Poplar Deciduous Forest Type (FOD3-1)
- Community 5: Cultural Meadow (CUM)
- Community 6: Fresh – Moist White Elm Lowland Deciduous Forest Type (FOD7-1)
- Community 7: Cultural Thicket (CUT)
- Community 8: Maple Organic Deciduous Swamp Ecosite (SWD6)
- Community 9: Fresh – Moist Sugar Maple Deciduous Forest Ecosite (FOD6)
- Community 10: Sweet Gale Organic Thicket Swamp Type (SWT3-6)
- Community 11: Willow Organic Thicket Swamp Type (SWT3-1)

- Community 12: Buttonbush Mineral Thicket Swamp Type (SWT2-4)

The Jp2g October 12, 2016 site reconnaissance involved the review of these vegetation types on the golf course property and confirmed same for the Tayview properties. Community 12 (Buttonbush Mineral Thicket Swamp Type) was the only community within the Perth Golf Course property found to be provincially rare (S3). Photographs of each of these communities were taken by McIntosh Perry in 2010 and again by Jp2g during an October 12, 2016 site visit. McIntosh Perry's description of these vegetation communities and plant species on site as well as Jp2g's photos of the vegetation communities are included in **Appendix B**.

3.1.4 Recommendations

Based on email correspondence dated August 11, 2016, MNRF recommends:

- new surveys for Species at Risk (SAR) be completed for the site due to the lapse in time since the most recent SAR surveys were carried out in 2010 and 2012
- Grey Ratsnake should be added to the list of species to be surveyed.

Based on email correspondence dated September 5, 2019, the MNRF recommends:

- No in-water work should be carried out between October 15th and June 30th in any given year, to protect spring and fall spawning species.
- The establishment and/or retention of a minimum 30 m of natural vegetated cover from the high-water mark to protect fish habitat and water quality.
- The establishment and/or retention of a minimum 30 m of natural vegetated cover adjacent to PSW. At the detail design stage, wetland boundaries should be staked by a qualified professional to protect the feature and ensure adequate setbacks are maintained.
- Appropriate measures to avoid harm to fish and fish habitat (including measures to maintain or improve water quality) should be implemented if any infrastructure or facilities are constructed adjacent to fish habitat.
- Generally, development should be directed to areas outside of the floodplain.
- There is unevaluated wetland within and adjacent to the Tayview property which should be evaluated prior to development approvals to ensure adequate protection and setbacks.
- There is other unevaluated wetland along the shores of the Tay River (e.g., where the new bridge crossing is proposed) which should be evaluated for the same reasons before any development is approved.
- Development and site alteration should not occur in the adjacent lands of the Grant's Creek Provincially Significant Wetland, unless it has been demonstrated that there will be no negative impacts on the feature or its ecological functions.
- Development should be directed away from areas that are unsafe for development due to the presence of hazardous forest types for wildland fire. The risks associated with wildland fire in the project area are anticipated to be low, based on the Ministry's generalized wildland fire hazard data which provides a coarse scale assessment of areas with the greatest potential for risks associated with wildland fire. Site-specific information obtained as part of the existing environmental conditions investigation for this project should provide more confidence regarding the wildland fire hazardous forest types and risk level.
- Work in and adjacent to the Tay River or Grant Creek may require authorization under the Lakes and Rivers Improvement Act and/or the Public Lands Act.

Based on email correspondence dated March 22, 2019, RVCA recommends:

- Completion of an appropriate EIS
- Completion of a Headwater Drainage Feature Assessment
- Completion of a water budget analysis
- Ensure that all proposed development is able to achieve a 30 metre setback from all watercourses
- That prior to consideration of development applications submitted under the Planning Act, the additional studies will be conducted to the satisfaction of the RVCA and the Town of Perth
- That prior to commencement of subsequent studies that will inform the final development concept plan and infrastructure servicing plan, the Town of Perth, RVCA and other government agencies as appropriate, shall engage in pre-consultation to identify outstanding issues and scope of work.

3.2 Cultural Heritage

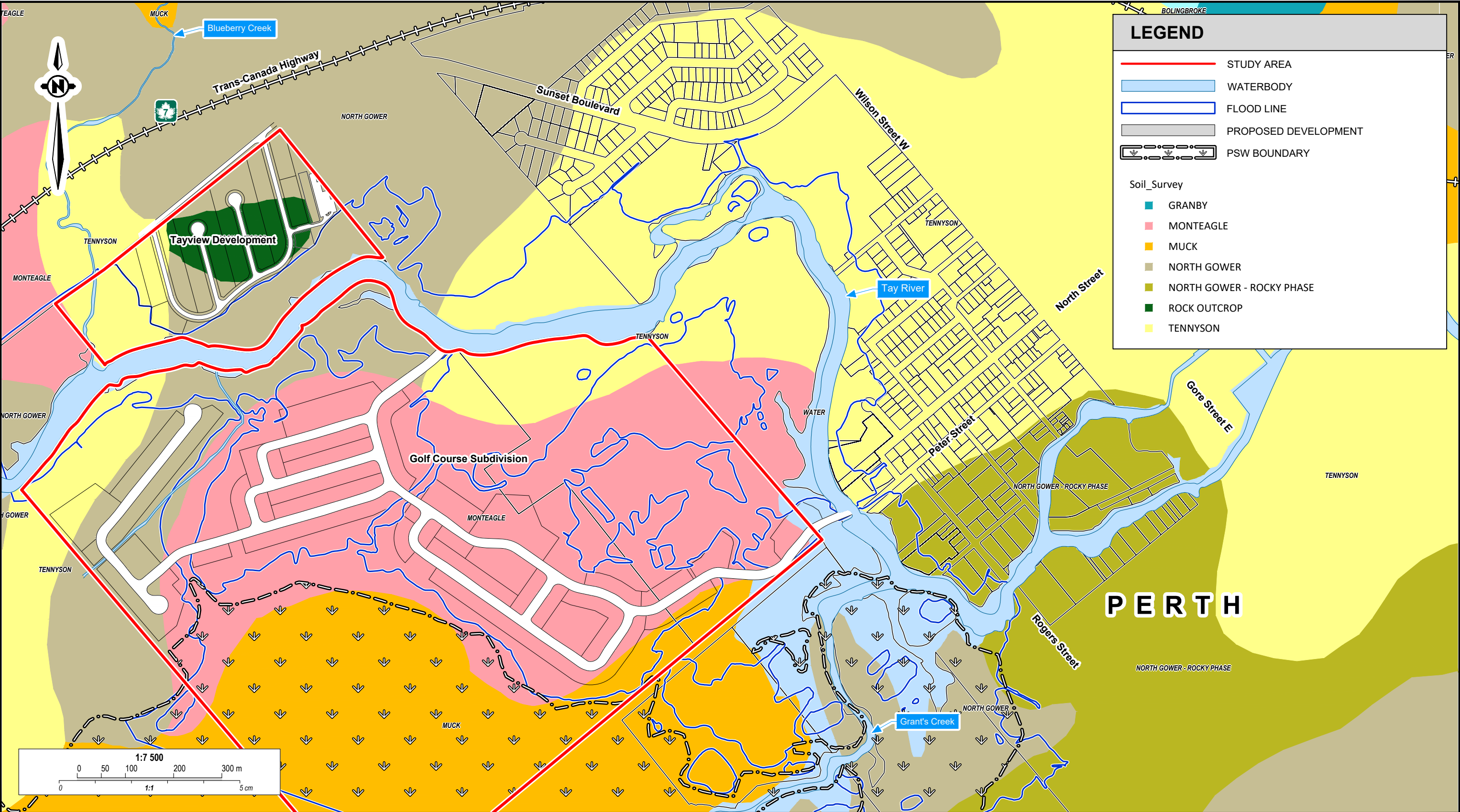
Prior to European settlers, the Omàmininini families of the Anishinaabe First Nation lived on the banks of the Tay River and the land is still considered Anishinabek territory. European and UEL Settlers started arriving in the area in the early 1800s, and began logging, farming, and using the river for transportation and operating mills. The Town of Perth has a 200-year history on the banks of the Tay River, first as a military settlement, and then as the County Seat and the economic, tourist, cultural center of surrounding rural townships. The Tay River is currently used as recreationally, connecting Bob's Lake to the Rideau River system.

The Golf Course site is developed with existing buildings and an active golf course and is located adjacent to the TransCanada trail, and in the vicinity of the Rideau Trail. The Perth Links O'Tay Golf Course is Canada's oldest continuously operating golf course, established in 1890. The 3 original holes are still in use today as Holes 1, 8, and 9. The original clubhouse was a cheese factory that was replaced in 1975 with a cinderblock club house and banquet facility, and a few wood-framed and steel-framed buildings for maintenance and operations. While well kept, they have no obvious intrinsic cultural heritage and are not part of the Town of Perth's Heritage Conservation District. The 'back-9' holes at the golf course were created in 2000. While the Cultural Landscape is recognized as having value, no commemorative plaques or displays exist on the property.

The Tayview site was homesteaded in 1817 and has had several uses over the years. It was operated most recently as a stock yard. There are a pair of metal clad buildings that were used as livestock sales barns.

Currently, none of the buildings have any Heritage designations, are within the Heritage District, or present any specific architectural or historic values. Other significant culture features nearby include the trail network in and around Perth, and the park spaces at Stewart Park, Conlon Farm, and the County Offices.

Using the MTCS Heritage and Archeological Checklists included in **Appendix D**, it was determined that both an Archeological Assessment and a Cultural Heritage Evaluation will be required in support of any application under the Planning Act.





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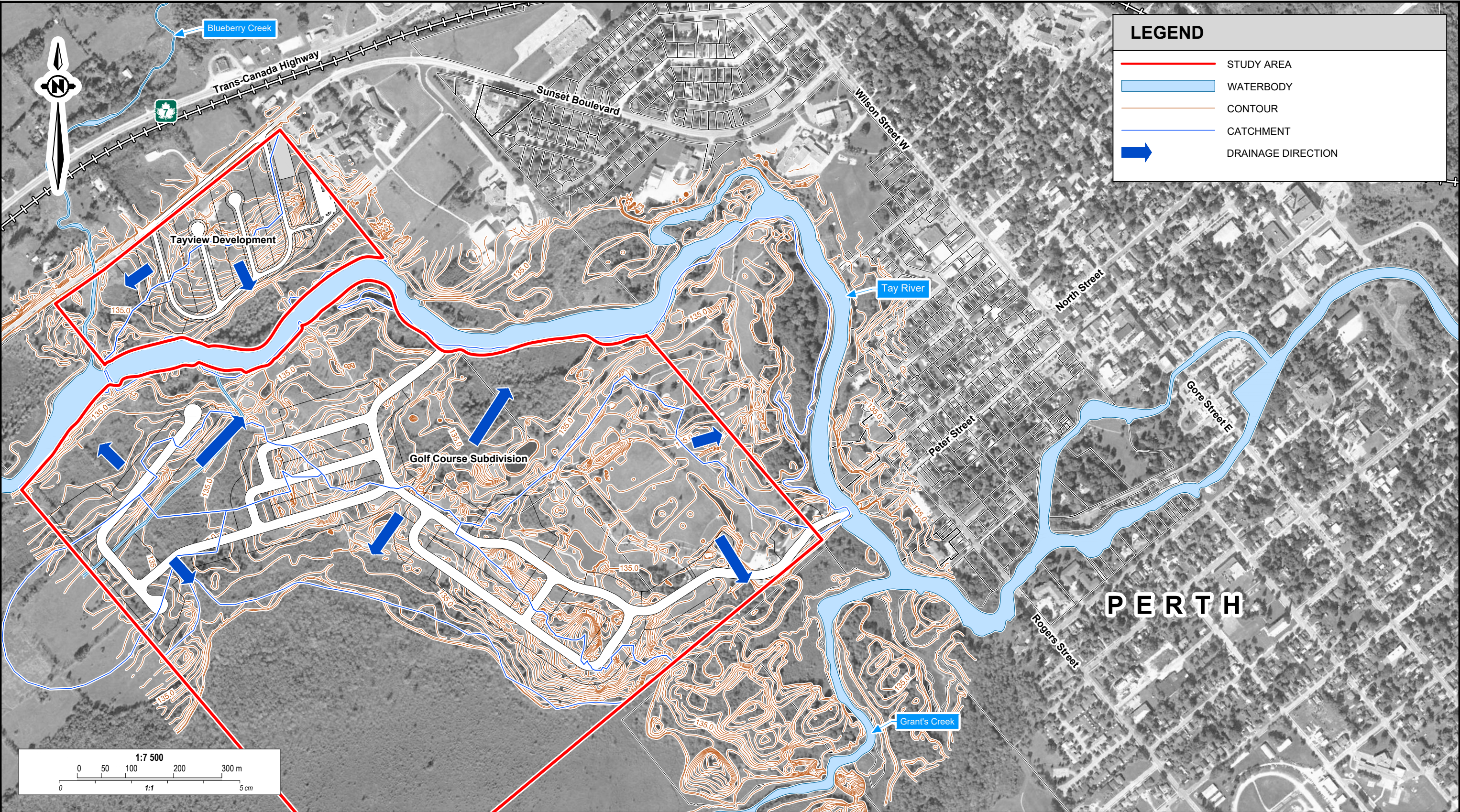
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Infrastructure Master Plan Western Annexed Area

Town of Perth

Surficial Geology

DESIGNED: D.N. / K.M.	PROJECT No.: 2161774A
DRAFTED: R.W.	REVISION DATE: 2019-11-05
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LEGEND

STUDY AREA

WATERBODY

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Infrastructure Master Plan Western Annexed Area

Town of Perth

Topography

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	FIGURE: 3-4

3.3 Socio-Economic

The Town of Perth has been a stable economic engine in Eastern Ontario for 200-years, with modest population growth in the Town proper, but supporting an extensive community in the surrounding townships. Additional economic and population growth is expected in and around Perth. Perth has a current population of 6000 people, with over 6000 jobs in the community, and that is expected to grow by approximately 4500 jobs over the next 30 years (Tunnock, 2014).

Perth acts as the hub of the surrounding community, with 2 High Schools, 3 Elementary schools, 6 churches, a college, an adult high school, a hospital, 3 veterinarians, 3 grocery stores, 32 restaurants, and so forth. The presence of these services draws people into the community and creates a demand for growth.

Growth management is prescribed in part by the Provincial Policy Statement (2014):

“The long-term prosperity and social well-being of Ontario depends upon planning for strong, sustainable and resilient communities for people of all ages, a clean and healthy environment, and a strong and competitive economy.”

And...

“The Provincial Policy Statement focuses growth and development within urban and rural settlement areas while supporting the viability of rural areas. It recognizes that the wise management of land use change may involve directing, promoting or sustaining development. Land use must be carefully managed to accommodate appropriate development to meet the full range of current and future needs, while achieving efficient development patterns and avoiding significant or sensitive resources and areas which may pose a risk to public health and safety.”

The Western Annex is expected to provide housing for 880 families, which will contribute both to supply and demand of services. This will increase the viability of the local schools and improve efficiencies in existing business. It will also put stress on the existing municipal infrastructure and governance systems. Previous work by the Town has identified infrastructure upgrades that would be required in wastewater treatment and drinking water supply to allow for this growth.

Over the years, the community has expressed an interest in moderate-to-slow growth, careful management of ecological systems, and prudent financial planning. The Town motto was “Make Haste Slowly but Surely”, and this has underpinned many of the decisions relating to municipal services and Town planning.

3.4 Transportation

A Traffic Impact Study (TIS) was completed by D. J. Halpenny & Associates Ltd to examine the impact of the access options to/from the Perth Golf Course Community and the Tayview property. The background, methodology, and recommendations of this study are described below.

3.4.1 Existing Roadway Network

The Perth Golf Course lands and Tayview property are located in the northwest quadrant of the Town – west of Wilson Street and south of Sunset Boulevard. The streets and major intersections that would serve the Tayview and Golf Course developments are the following:

Perth Golf Course Access Road – The access to the Perth Golf Course is the extension of Peter Street west of Lustre Lane. The roadway is a two-lane rural access road with a pavement width of 6.1 m, no sidewalks, and grassy shoulders. The road widens to 7 m width with steel guiderails on either side as it approaches the bridge over the Tay River. The speed limit is posted at 30 km/h.

Peter Street – Peter Street is classified as a collector road with an urban cross section and a posted speed limit of 40 km/h. It is bound to the southwest by the Tay River and to the northeast by Wilson St, at which point it continues as Foster St. Sidewalks exist along both sides of the street and on-street parking is prohibited. The pavement width of the street is 7.7 m.

Foster Street – Peter Street changes to Foster Street east of Wilson Street. Foster Street is a two-lane urban arterial road with an unposted speed limit of 50 km/h. There are sidewalks along both sides of the roadway and parking is permitted along both sides of the street except at the approaches to intersections. The street has a pavement width of 13.1 m.

Gore Street – Gore Street is an urban arterial road south of North Street, and a local road north of North Street. Gore Street has a two-lane urban cross section with a pavement width of 12.5 m. Sidewalks are along both sides of the street and parking is permitted except at the approaches to intersections. The speed limit is unposted at 50 km/h.

Wilson Street – Wilson Street is a north-south two-lane major arterial road. The road has sidewalks along both sides of the road and parking is prohibited along the road north of Boulton Street. The Wilson Street cross section provides two southbound lanes between Dufferin Street and Sunset Boulevard with a pavement width of 13.5 m. The speed limit is posted at 50 km/h.

Dufferin Street – Dufferin Street is under the jurisdiction of the Ontario Ministry of Transportation as Highway 7. The road has a rural cross section with four travel lanes between Drummond Street and Lanark Road and a pavement width of 15.2 m bounded by gravel shoulders. There are no sidewalks provided along the road and the speed limit is posted at 60 km/h.

Sunset Boulevard – Sunset Boulevard is under the jurisdiction of Lanark County, County Road 6 is a two-lane arterial road with a rural cross section and pavement width of 13.1 m including roughly 3 m of paved shoulder on each side of the lanes. There is a sidewalk along the south side of the road which terminates at the Lanark County Office. Sunset Boulevard changes to Christie Lake Road west of the Lanark County Office access. The speed limit is posted at 50 km/h, which changes to 80 km/h west of the Lanark Lodge senior residence.

Lanark County Office Access – The access road is a two lane road with 9.5 m pavement width including a ~2 m shoulder on the south/west edge and a posted speed limit of 40 km/h. The access road accesses the Lanark County Office, the public works building and Perth Community Care Centre.

The following are the existing conditions of the intersections which were examined in the TIS:

Peter (Foster)/Wilson Intersection – The intersection is controlled by traffic signals with an exclusive southbound Wilson left turn lane and exclusive westbound Foster right turn lane.

Foster/Gore Intersection – The intersection is controlled by traffic signals with an exclusive northbound Gore left turn lane and an exclusive eastbound Foster right turn lane.

North/Wilson Intersection – This intersection will only be examined for Option 4 which will use North Street as an access to the Perth Golf Course Community and existing Perth Golf Course. The intersection is a two-way stop-controlled intersection with stop signs at the eastbound and westbound North Street approaches. The intersection has an exclusive southbound Wilson left turn lane and an exclusive westbound North right turn lane.

Sunset (Harris)/Wilson Intersection – The intersection is controlled by traffic signals with an exclusive northbound Wilson left turn lane, exclusive southbound Wilson left turn lane and exclusive right turn lane, and an exclusive eastbound Sunset right turn lane.

Dufferin (Highway 7)/Wilson Intersection – The intersection is controlled by traffic signals. All approaches are two lanes with shared turning movements.

Sunset (Christie Lake)/Lanark County Office Access Intersection – The intersection is a “T” intersection controlled by a stop sign at the northbound Lanark County Office access. The intersection has an eastbound Christie Lake right turn taper.

3.4.2 Background Traffic Volumes

The background traffic represents the future traffic volumes which do not include trips from the Perth Golf Course property and the Tayview property. The analysis year was 2041 which is consistent with the horizon year of the County of Lanark’s Official Plan. The 2041 background traffic was determined from the August 19, 2016 *Perth Transportation Master Plan, Future Traffic Forecasting Memo* prepared by Stantec. The Memo did account for 650 residential units in the Perth Golf Course Community and 180 residential units in the Tayview Development. The TIS analysis has removed the Perth Golf Course Community and the Tayview Development trips from the background traffic.

3.5 Active Transportation

The Town of Perth has identified the development and promotion of an active transportation network as a priority, as noted in the following objectives:

1. Develop a cycling network for the Town consisting of bike lanes, multi-use trails, and signed bicycle routes.
2. Integrate multi-use trails with cycling trails where they do not conflict with each other.
3. New Roads: All new collector and arterial roads will be designed to accommodate and facilitate cycling traffic by including bike lanes or through curb lane design. A 4.2 m curb lane should be a component of new roads and road reconstructions where possible, in order to provide greater comfort for motorists and improved safety for cyclists.

4. The Town will coordinate and integrate its internal cycling network with those of adjacent municipalities and Lanark County.

This section will describe the existing network of bicycle-friendly corridors and identify opportunities and constraints in further developing the quality and connectivity of this network.

Currently, there is little connectivity in the town's network – a cyclist traveling between any of the town's major travel nodes will be required to navigate potentially high-volume roadways, along truck routes, and with very minimal or non-existent protection. Research has shown that even a small amount of “high-stress” travel along a route will deter most potential cyclists. Therefore, it is critical to develop interconnected “spines” conducive to safe, stress-free cycling accommodating all levels of skill and experience.

The Town of Perth official plan has identified a planned bicycle route network using Wilson St and Gore St as the primary spines. However, due to the high volume of vehicle traffic, sharing designated trucking routes, physical constraints of these routes, and the required investments to accommodate dedicated bicycle infrastructure along these avenues the proposed network is likely to not be fully realized for years or perhaps decades. In the interim, it is proposed to establish a temporary cycling network that would require significantly less interventions, while still providing designated routes to raise awareness and create opportunities for potential cyclists.

The Rideau Trail and the Great Trail both run through Perth and intersect at Gore St E and Market Square next to the Perth Town Hall – this location may be a candidate for a regional active transportation map to guide trail users to nearby routes and attractions. As the Perth cycling network improves, it may be worth reaching out to the organizations responsible for the regional trails to coordinate signage, wayfinding, and infrastructure improvements. Furthermore, Google Maps is a popular bicycle trip planning tool that may not accurately reflect ideal cycle routes or even bike-friendly avenues. For example, North St east of the railroad (Drummond Concession 2) is indicated as a “bicycle-friendly” road, yet it has no paved shoulders and expected vehicle speeds up to 80 km/h – a potentially harrowing experience even for dedicated cyclists. Feedback on Google's suggested cycling routes can also be provided in coordination with the development of an interconnected cycling network.

Table 3-2 summarizes potential cycling network spines along with possible interventions that would be suitable for the specific route.

Table 3-2 - Potential Interim Cycling Spine Network

Item	Road	From	To	Suggested Interventions
1	North St	Lustre Ln	Drummond St W	Bicycle Route signage; sharrows
2	Drummond St	Highway 7	Cockburn St	Bicycle Route signage; sharrows; bike lanes; street widening; remove on-street parking; shared pathways
3	Isabella St	Garden Ave	Wilson St W	Bicycle Route signage; sharrows
4	Harris St	Drummond St W	Wilson St W	Bicycle Route signage; sharrows
5	Wilson St W	Harris St	Isabella St	Flexible bollards
6	Rogers Rd	Peter St	Cockburn St	Bicycle Route signage; sharrows
7	Cockburn St	Rogers Rd	Drummond St E	Bicycle Route signage; sharrows
8	Lewis St / Joy Ave	Leslie St	North St	Bicycle Route signage; sharrows

Improving the viability of these corridors as bicycle network spines, along with signage to promote visibility, would create an intuitive grid connecting many of Perth’s principal trip generators. At this stage, the simplest measures to promote a cycling network is visible interventions and raising awareness. Therefore, providing “share the road” and route-finding signage (**Figure 3-5**) along with sharrows and other lane markings (**Figure 3-6**) will provide potential cyclists with visible clues as to an existing network while reminding drivers along these routes to be patient and accommodate cyclists of all skill levels.

Assuming that cyclist participation increases with continued development and promotion of Perth’s cycling network, it is recommended to implement more bicycling facilities such as separated lanes, cycle tracks, shared pathways, and off-road trails via road widening, restricting of on-street parking, and trail construction. Road re-construction projects should be coordinated with Perth’s long-term cycling network plans to capitalize on opportunities to implement “complete street” design and cyclist- and pedestrian-friendly infrastructure. Examples of additional measures to promote cycling as a transportation mode include:

- Providing visible and secure bicycle parking at trip destinations
- Provide bicycle maintenance stations along designated cycle routes
- Install park-and-ride facilities at the edge of town to reduce vehicle traffic in the town core
- Work in concert with local employers to encourage bicycle commuting:
 - Promote a “Bike-to-Work” month
 - Encourage installation of shower and change-room facilities in new commercial or institutional developments

- Provide complimentary use of shower and change rooms at recreation centres for bicycle commuters



Figure 3-5 - Examples of Cycling Route Signage (OTM, Book 18)

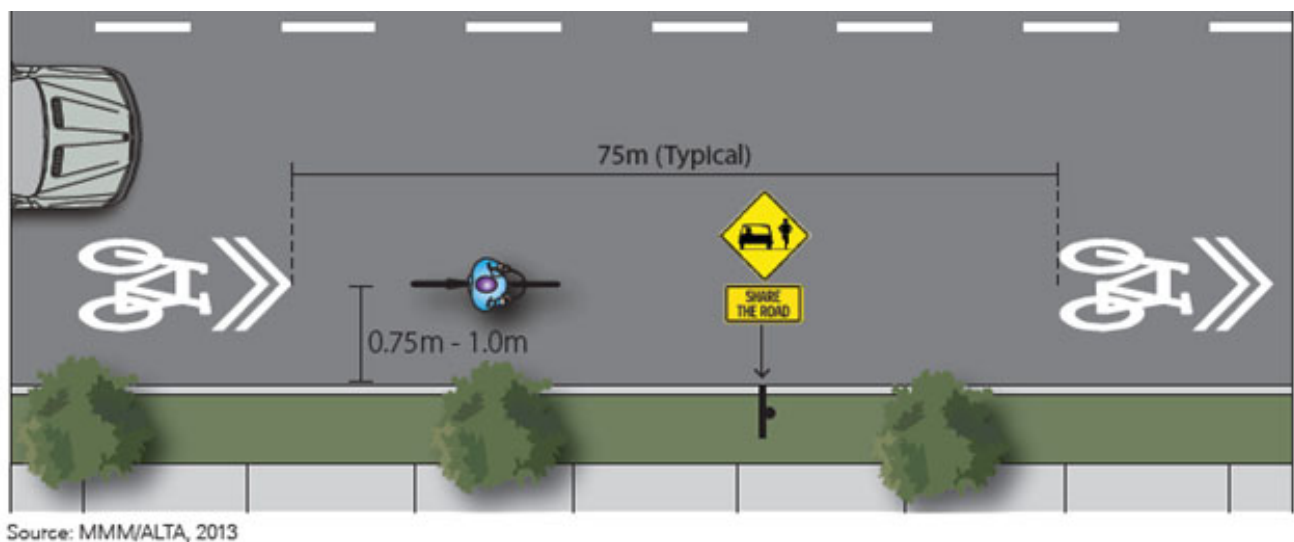


Figure 3-6 - Example of Sharrow Implementation (OTM, Book 18)

3.6 Drinking water

3.6.1 Existing Water Supply

The Town is serviced by a central water treatment plant with high lift pumping and an elevated water storage tower. The existing potable water system draws from the Tay River and is treated at the water treatment plant. Three low lift pumps at the water treatment plant are rated for 105 L/s, 53 L/s and 53 L/s each. The firm pumping capacity of the treatment plant which is defined as the flow rate achieved with

the largest pump offline is 9.158 ML/d. The treatment plant also includes a finished water 2,800 m³ finished water reservoir. The existing water distribution system is pressurized by an elevated storage tank with a volume of 945 m³. The elevated storage tank operates with a minimum and maximum water level of 172.43 m and 180.53 m respectively, with a normal operating band of 3.6 m liquid depth.

3.6.2 Existing Conditions Distribution Model

A WaterCAD model of the Town of Perth water distribution system was provided by Stantec at the request of the Town of Perth. The existing operational model has over 400 pipes and nodes with pipes ranging in size between 25 mm to 450 mm and includes base demands as well as summer and winter demand patterns. The minimum size for firefighting purposes is 150mm, the smaller pipes are treated as laterals.

The model of the distribution system has “C” factors for piping ranging between 30 and 150 representing varying ages and conditions of pipe materials. This would imply that the model has been calibrated.

To confirm calibration, the model would need to be tested. This would involve monitoring pressures and available fire flows at various hydrants or points, and comparison with recorded data to plant production records, tower levels, pump run times, etc. which could then be compared against water model results. Available fire flow results from existing hydrants in the area would then be used to check how close the modelling results are to the fire flow results. However, for the purpose of this project, the model was not additionally calibrated and was taken ‘as-is’ using the calibration as completed by Stantec

3.7 Existing Stormwater Drainage

Stormwater runoff within the Golf Course Site is directed overland to the Tay River, the Grant’s Creek Provincially Significant Wetland (PSW), and to Grant’s Creek downstream of the PSW. The ultimate receiver of the indirect drainage (i.e. Blueberry and Grant’s Creek) is the Tay River, capturing the stormwater flows immediately downstream of the study area. During high flow conditions within the Tay River, flow pass through the subject site to the existing wetland to the south. Stormwater runoff within the Tayview site is directed north and south, with a drainage divide roughly in the middle of the site. The northern portion of the Tayview site drains north to the ditches of Christie Lake Road, then convey west to Blueberry Creek. There is no other municipal infrastructure relating to drainage in the subject lands. The southern portion of the site drains overland to the Tay River. **Figure 3-4** illustrates the existing drainage divides and spill points.

Stormwater runoff currently draining to the PSW receives no specific quantity or quality treatment, beyond natural attenuation. A small area of developed land (golf clubhouse and parking) drains to Grant’s Creek through ditches and also receives no specific quality or quantity treatment. The majority of the existing golf course drains to the Tay River, receiving some quantity and quality treatment as a result of the existing feature/irrigation ponds on site, although the level of treatment has not been quantified. In addition, stormwater flows draining directly to Blueberry Creek receives no specific quantity or quality treatment.

3.7.1 Existing Stormwater Flows within the Approved Development Area Development Area

Changes in hydrology as a result of urbanization has long been recognized as a source of deleterious impacts on the downstream systems. As a result, approval of development is usually restricted to

situations where post-development flow rates can be shown to not exceed pre-development flow rates, or where downstream channels and structures can be shown to have the capacity to carry the change in flows without increasing flood risk or causing ecological damage. Thus, areas to be urbanized are assessed in both pre- and post- development conditions, and sufficient storage is provided to manage flows to the required amount.

A total of 46.2 ha of developable land is considered in this analysis. Of that, 9.6 ha is north of the Tay River, and the remainder is between the Tay River and Grant's Creek. A portion of the land (5.8 ha) west of the Golf Course drains through the subject site but will not be developed. Some of the development area currently drains through low lying areas that have restricted outlets, which will prevent outlet for some of the smaller events. For the purpose of this study, and in the absence of more detailed topography, it is assumed that these areas do not produce runoff in pre-development conditions but will in post-development conditions.

Table 3-3 - Drainage Areas North of Tay River

Outlet	Meadow (ha)	Rock (ha)	Forest (ha)	Total (ha)
Blueberry Creek	2.77	1.53	0	4.30
Tay River	3.16	2.16	0.01	5.33

Table 3-4 - Drainage Areas from the Golf Course

Outlet	Meadow (ha)	Wetland (ha)	Forest (ha)	Impervious (ha)	Total (ha)
Tay River	3.63	0	3.02	0.05	6.7
Grant's Creek	4.52	1.05	2.52	0.25	8.34
PSW	8.10	0.49	3.76	0	12.35
Low lying, out to Tay	1.17	0	3.78	0	4.95
Low lying, out to PSW	5.79	0	4.05	0	9.84

Predevelopment Flows

Each of the 5 potential outlets are receiving peak flows based on the area and the time of concentration of the catchments. It is normally expected that post-development flows will not exceed pre-development flows, unless it can be demonstrated that the receiving channels have the capacity for the change in flows. As that demonstration is beyond the intent of the Master Plan, we will size the stormwater management facilities to not exceed these flows. The flows shown in **Table 3-5** were calculated by the Rational Method, which is expected to be conservative.

Table 3-5 - Stormwater Flows in Existing Condition

Outlet	Area (ha)	Tc (min)	Q-5 yr (l/s)	Q-100 yr (l/s))
Blueberry Creek	4.30	64.2	375	635
Tay River North	5.33	43.1	620	1055
Tay River South	6.7	67.5	562	953
Grant's Creek	8.34	130.6	422	713
PSW	12.35	48.3	1325	2249

3.8 Wastewater Management

The Town's sanitary sewer system consists of approximately 43.8 km of sanitary sewers and two sewage pumping stations. Sewage is treated at a three-cell facultative sewage lagoon operated by the Town, located at Wild Life Road. The Perth sewage lagoon was designed in 1961 for a population of 8,500 people (Proctor & Redfern, 1961). The system is comprised of three stabilization cells and a vacant dry cell, all covering an 80-acre area. The Ministry of the Environment Certificate of Approval (C of A) 1045-6VTHH8 allows an annual average daily sewage flow of 7,718 m³/day. The average discharge into the lagoon over the past three years (2011-2013) was 5,762 m³/day (75% of maximum rated capacity). In the past, the Town has experienced excessive wet weather inflow and infiltration (I/I) into its sanitary sewer collection and lagoon treatment system as a result of snow melt and precipitation. This results in periodic overloading of the town's sewage lagoon. Since 2007, the Town has undergone an intensive wet weather flow reduction program, including sealing and repair work of sewers, elimination of combined sewers, and sealing and elevating manholes. These efforts have successfully reduced average inflows to the lagoon (**Table 3-6**) and the wet weather program is continuing with further improvements expected.

Table 3-6 - Wastewater Flows for Perth Lagoon (2006 - 2013)

Flow Criteria	2006	2009	2010	2011	2012*	2013
Measured Inflow (m ³ /d)	7,278	6,219	7,348	6,264	5,042	5,981
% of Max Capacity	94	81	95	81	65	77
*2012 was a drought year						

Using GIS data provided by the Town of Perth, the sewer network was mapped in AutoCAD Civil3D with catchment areas established corresponding to the greatest flow arriving at each "choke point" in the sewer network. Sanitary flows were calculated according to the City of Ottawa Sewer Design Guidelines (Second Edition, 2012), with land use and dwellings estimated using a combination of local knowledge, satellite imagery, and Google Street View. Population and flow values for different land uses were calculated according to the City of Ottawa Sewer Design Guideline (2012). The aggregate population value according to this method is greater than the current population of Perth; however, this was kept as a

conservative estimate of the maximum density expected if dwellings were used to their full extent. Invert and elevation data were not available for the sanitary network; therefore, pipe slopes were assumed to be at the minimum allowable slope to achieve self-cleaning velocity of at least 0.6 m/s.

In evaluating the Town's system with respect to the Western Annex development, offsite sewer upgrades to accommodate the increased flows were established based on flow capacity compared to expected peak sanitary flows. It was found that the existing sanitary sewer network is largely sufficient to accommodate the increased flows from the Western Annex; however, there are several sections requiring further investigation to determine as-built slopes and verify ultimate capacity. **Table 3-7** shows the anticipated offsite upgrades required. Note that the offsite wastewater management costs are based on what information was made available by the Town of Perth. It is possible that further investigation to confirm inverts, as-built slopes, and pump station operation controls would allow more accurate capacity analysis and mitigate the need for the prescribed off-site sewer upgrades.

Table 3-7 - Off-Site Sanitary Sewer Upgrades

Location	Length (m)	Price (\$600/m)
Inverness Ave	350	\$210,000
George Ave	300	\$180,000
Alan Ave	35	\$21,000
Sherbrooke St E	100	\$60,000
Last Duel Easement	120	\$72,000
Sub-Total	905	\$543,000

It was found that any additional flows directed to Inverness Ave would require upsizing of the existing 200 mm sewer; similarly, from review of as-built drawings it was found that the sewer along George Ave was built at less than minimum required slope and therefore has limited capacity to receive additional flow. Sewers along Alan Ave and the Last Duel Easement serve as intakes to wastewater pumping stations and are therefore critical sewers that should be investigated to determine actual slopes and capacities. Finally, the Sherbrooke sewer network comprises several parallel pipes that may require upsizing depending on how the flows are divided; further investigation is suggested to determine flow patterns during peak events.

3.9 Expected Climate Change

The climate locally is changing. Winters are becoming less cold, and summers are warmer and drier. Native species are forced to adapt or migrate, and invasive species are spreading. We have already experienced changes:

- Changes in the frequency, intensity and duration of precipitation, wind and heat events
- Changes in soil moisture and frost depth
- Shifts in plant growth and growing season
- Changes in the geographic extent of species range, habitat and forest cover

We can expect that the climate will continue to change, and this will lead to different conditions that have to be considered when assessing impacts.

- Winters will be wetter and will have more ice accumulation. Maintenance of roads and sidewalks will require additional work and may require a change in equipment.
- Summer storms will be more intense, and drought periods will be longer, than historic averages. Vegetation will need to be drought tolerant and more runoff will need to be retained on-site than in traditional approaches.
- Invasive species, including noxious weeds and disease vectors, will arrive, and native species that can not compete effectively will be locally extirpated.

Natural Hazards can be expected to be impacted by the changing climatic effects. It can reasonably be expected to see the limit of the Provincially Significant Wetland to be slightly lower, and the 1:100 year flood line to be slightly higher, in the foreseeable future. The current policy is to limit penetrations into building envelopes to be a minimum of 0.3m above the existing flood line at the time of building permit application, and to ensure the 1:5 year event can be carried in the storm sewer system without surcharging the pipe network at the time of detailed design. While these values may prove in the future to be insufficient, there is no direction from the planning authorities to revise this approach.

4 PROBLEM STATEMENT

Whereas the Town of Perth would like to establish new, developable lands in the Western Annexed Areas, there exist a number of constraints to be addressed to the satisfaction of the Town council, regulatory agencies, and local stakeholders. This Problem Statement forms the basis of further investigation, the identification and evaluation of alternative solutions for the development of the study area.

- The lands within the Western Annexed Area have been identified through the Official Plan update process to supply 190 residential units in the next 10 years, and a potential 700 residential units in the future.
- The lands within the Western Annexed Area are not connected to provide safe and efficient vehicle, cycling and pedestrian linkages to the Town's and the region's transportation network.
- The lands within the Western Annexed Area are intended to be developed based on full municipal water and sanitary sewage service in an efficient and sustainable manner, and stormwater management services to protect the water quality and natural heritage features of the Tay River and Grant's Creek.
- The lands within the Western Annexed Area are subject to the Tay River and Grant's Creek regulatory flood plain.
- The study area is subject to development restrictions as lands and adjacent lands to Natural Heritage Features and Areas and Provincially Significant Wetlands.
- The water supply intake for the Town of Perth Water Treatment Plant is to be protected.
- The Perth Golf Course is the oldest in Canada and the first 9 holes should be protected from development.
- The Lanark County Administration Complex and the Perth Community Care Centre are established institutional and special housing developments adjacent to the study area.

- The Town has developed planning policies and servicing guidelines for the annexed areas based on thoroughly vetted population projections and in consideration of development concepts prepared for both the Golf Course and Tayview properties.
- The servicing for the Western Annex area is limited by the surrounding infrastructure and the costs associated with upgrading pinch points.
- Terrestrial habitats will be affected by developing the Western Annex, and this may include habitat for endangered and threatened species.
- Aquatic habitat will be disturbed by bridges and/or other services crossing the Tay River, or any of the on-site drainage features.
- Any development will produce disturbance and displacement of the existing residents, businesses, institutions and community features.
- The municipality has a rich history and endeavors to retain heritage and still keep modern.
- Greenhouse gas emission reduction is a priority for the Town of Perth
- Climate change adaptation and mitigation requires flexibility in both design and operation

The above summarizes the basis of the justification for the Western Annexed Area Infrastructure Master Plan.

5 ALTERNATIVE SOLUTIONS

This section will present the evaluated infrastructure options for transportation, active transportation, drinking water supply, stormwater management, and wastewater management to service the planned developments.

5.1 Transportation

The Traffic Impact Study (TIS) report examined the development of the Perth Golf Course Community and the Tayview Development for four possible access scenarios or options. Each option proposes a different access route scenario for the Perth Golf Course Community and the impact that each option would have on the surrounding roadway network. For all options, the Tayview Development would be examined assuming direct access to Christie Lake Road (Sunset Boulevard) located west of the existing access to the County of Lanark Office.

5.1.1 Access Options

The following are the site access options for the Western Annexed Area lands:

OPTION 1 – All of the Perth Golf Course Community and existing Perth Golf Course trips would enter/exit using Peter Street and the existing bridge over the Tay River for the Perth Golf Course.

OPTION 2 – Trips from the Perth Golf Course Community would be proportioned to 35% to the Lanark County Office access entering/exiting from Sunset Boulevard, and 65% would enter/exit using Peter Street. All of the trips from the Perth Golf Course would enter/exit using the existing golf course access at Peter Street.

OPTION 3 – Of the 650 units in the Perth Golf Course Community, trips from 120 units would enter/exit using Peter Street and 530 units would enter/exit using the Lanark County Office access. All of the trips from the Perth Golf Course would enter/exit using Peter Street.

OPTION 4 – All of the existing Perth Golf Course and Perth Golf Course Community trips would enter using a new bridge constructed across the Tay River as an extension of North Street. All trips exiting would use the existing Peter Street golf course access and bridge.

The study area of the TIS is confined to the major intersections which would be impacted by the site generated trips from the Perth Golf Course Community and the Tayview Development. The study analyzed the operation of the following intersections:

- Peter Street (Foster Street) and Wilson Street Intersection
- Foster Street and Gore Street Intersection
- North Street and Wilson Street Intersection (OPTION 4 Analysis Only)
- Sunset Boulevard (Harris Street) and Wilson Street Intersection
- Dufferin Street (Highway 7) and Wilson Street Intersection
- Sunset Boulevard and Lanark County Office Access Intersection

The traffic analysis was conducted for the expected 2041 traffic which is consistent with the horizon year of the County of Lanark's Official Plan. The 2041 background traffic was determined from the August 19, 2016 *Perth Transportation Master Plan, Future Traffic Forecasting* Memo prepared by Stantec. The analysis was conducted for the peak AM and PM hours which were identified in the Stantec Memo and were the peak hours for trips generated by the Perth Golf Course Community and Tayview Development residential subdivisions.

5.1.2 Trip Generation

The expected trips from the Western Annexed Area were determined utilizing the trip generation statistical data published in the Institute of Transportation Engineers (ITE) document, *Trip Generation* (2012). The study utilized the data from the categories "Single-Family Detached Housing" ITE Land Use Code 210, "Residential Condominium/Townhouse" ITE Land Use Code 230, and "Senior Adult Housing – Attached" ITE Land Use Code 252. The analysis has used the Fitted Curve Equation for the trip generation rates for the Perth Golf Course Community subdivision, and the Average Rate for the trip generation rates for the Tayview Development. The commercial block proposed for the Tayview Development was not included in the analysis as the use is undetermined, may share internal trips with the development, and may generate trips outside the peak AM and PM hours of the analysis.

With the subdivision developments consisting of residential homes, the TIS study examined the roadway network for the peak AM and PM hours of the adjacent streets, which would experience the highest volume of site trips when residents are travelling to and from work.

The Town of Perth does not provide a system of public transit. A privately contracted commuter bus is available which services the surrounding communities travelling to/from Ottawa. No trip reduction factor for public transit use was applied to the site generated trips.

Table 5-1 presents the number of weekday peak AM and PM hour site generated trips at full development of the Perth Golf Course Community and the Tayview Developments.

Table 5-1 – Peak Hour Site Trips Generated

TRIPS	PEAK AM HR.			PEAK PM HR.		
	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Perth Golf Course Community						
650 Single-Family Homes	465	116 (25%)	349 (75%)	538	339 (63%)	199 (37%)
Tayview Development						
57 Single-Family Homes	43	11 (25%)	32 (75%)	57	36 (63%)	21 (37%)
56 Semi, Town/Condo Units	25	4 (17%)	21 (83%)	29	19 (67%)	10 (33%)
120 Senior Residence Units	<u>24</u>	<u>8</u> (34%)	<u>16</u> (66%)	<u>30</u>	<u>16</u> (54%)	<u>14</u> (46%)
Total Tay River Dev. Trips	92	23	69	116	71	45

5.1.3 Trip Distribution

The distribution of expected site generated trips entering and exiting the development were determined from the *Perth Transportation Master Plan, Future Traffic Forecasting* Memo prepared by Stantec. The site generated trips were distributed as per the breakdown shown in **Table 5-2** for both the peak AM and PM hours:

Table 5-2 - Western Annex Access

Route	Trip Share
To/From the east along Dufferin St.	10%
To/From the west along Dufferin St.	15%
To/From the west along Sunset Blvd.	10%
To/From the south along Gore St. (south of Foster)	50%
To/From the east along Foster St. (east of Gore)	15%

The above trip distribution was applied to the expected trips from the Perth Golf Course Community and the Tayview Development for Options 1 to 4.

5.1.4 Transportation Impact

The TIS study examined the operation of the intersections identified in the Section 3.4.1. The analysis used the *Highway Capacity Software, Version 7.4*, which utilizes the intersection capacity analysis procedure as documented in the *Highway Capacity Manual* (2010). For unsignalized intersections, the level of service

(LoS) of each lane movement is determined as a function of the delay of vehicles at the approach. For a two-way stop controlled intersection, the LoS is measured from the control delay for each minor movement. The LoS is not defined for the intersection as a whole. **Table 5-3** relates the level of service of each lane movement with the expected delay at the approach.

Table 5-3 - Level of Service at Two-Way Stop

LEVEL OF SERVICE	CONTROL	DELAY
Level of Service A	0-10 sec./vehicle	Little or No Delay
Level of Service B	>10-15 sec./vehicle	Short Traffic Delays
Level of Service C	>15-25 sec./vehicle	Average Traffic Delays
Level of Service D	>25-35 sec./vehicle	Long Traffic Delays
Level of Service E	>35-50 sec./vehicle	Very Long Traffic Delays
Level of Service F	>50 sec./vehicle	Extreme Delays – Demand Exceeds Capacity

The expected length of queue at the critical lane movements for an unsignalized intersection was determined by the calculation of the 95th percentile queue at the lane approach. The 95th percentile queue length is the calculated 95th greatest queue length out of 100 occurrences at a movement during a 15-minute peak period. The 95th percentile queue length is a function of the capacity of a movement and the total expected traffic, with the calculated value determining the magnitude of the queue by representing the queue length as fractions of vehicles.

For a signalized intersection, the operation or level of service of an intersection is determined from the average control delay per vehicle, which is estimated from each lane group and aggregated for each approach and for the intersection as a whole. **Table 5-4** relates the level of service with the control delay at each lane movement which was utilized in the analysis of the operation of the intersections controlled by traffic signals:

Table 5-4 - Level of Service at Signalized Intersection

LEVEL OF SERVICE	CONTROL	DELAY
Level of Service A	0-10 sec./vehicle	Little or No Delay
Level of Service B	>10-20 sec./vehicle	Short Traffic Delays
Level of Service C	>20-35 sec./vehicle	Average Traffic Delays
Level of Service D	>35-55 sec./vehicle	Long Traffic Delays
Level of Service E	>55-80 sec./vehicle	Very Long Traffic Delays
Level of Service F	>80 sec./vehicle	Extreme Delays – Demand Exceeds Capacity

5.1.5 Traffic Analysis

The TIS analysis examined the operation of the major intersections impacted by the site generated trips from the Golf Course Community and the Tayview Development. The 2041 traffic is the sum of the 2041 background traffic and the trips from full development of the Western Annexed Area. The analysis for the intersections was completed for Options 1 to 4. The following is the traffic impact for the Western Annexed Area site-generated trips for each option:

OPTION 1

Option 1 assumes that all site trips from the Golf Course Community development would enter and exit the site using the existing access to the Golf Course. This access is the west extension of Peter Street which crosses the Tay River. Trips from the Tayview Development would have direct access to Christie Lake Road. **Figure 5-1** presents the expected 2041 traffic following the development of the Western Annexed Area.

The operational analysis was completed for the five major intersections. The analysis determined that with the exception of the peak PM hour at the Dufferin/Wilson intersection, all intersections examined would function at an acceptable level of service. The Level of Service (LoS) “F” during the peak PM hour was mainly due to the lack of exclusive turn lanes along Dufferin Street. The proposed Western Annexed Area trips would have a minor impact on the operation of the intersection. **Table 5-5** summarizes the operation of the intersections with the analysis sheets provided as Exhibits 1 to 10 in **Appendix E**.

OPTION 2

Option 2 proposes that 35 percent of the 650 units (228 units) in the Golf Course Community would use the Lanark County Office access to enter/exit from Sunset Boulevard, and 65 percent (422 units) would use the existing Perth Golf Course access from Peter Street. Trips from the Tayview Development would have direct access to and from Christie Lake Road. **Figure 5-2** presents the total 2041 volume of traffic for the Golf Course Community and the Tayview Development using the Option 2 distribution of trips.

The operational analysis determined that all intersections examined with the exception of the Dufferin/Wilson intersection, functioned at an acceptable level of service. A left turn lane warrant analysis was conducted at the Sunset/Lanark County Access using the procedure documented in the Ministry of Transportation Ontario publication, *Geometric Design Standards for Ontario Highways*. The analysis determined that a westbound Sunset left turn lane was warranted which would provide 15 m of vehicular storage (Exhibit 19). The operational analysis at the Dufferin/Wilson intersection determined that the intersection operated at a LoS “F” during the peak PM hour with the same traffic volumes and approach delays as Option 1. Exclusive turn lanes would improve the operation of the intersection. **Table 5-6** summarizes the Option 2 operation of the intersections with the analysis sheets and left turn lane warrant analysis provided as Exhibits 11 to 21 in **Appendix E**.

OPTION 3

Option 3 proposes that the site generated trips from 120 units in the Perth Golf Course Community be proportioned to the existing Golf Course access off of Peter Street. The remaining trips from 530 units were distributed to the Lanark County property access off of Sunset Boulevard. Trips from the Tayview Development would have direct access to Christie Lake Road. **Figure 5-3** presents the expected peak AM and PM hour traffic for the Golf Course Community and the Tayview Development using the distribution of trips in Option 3.

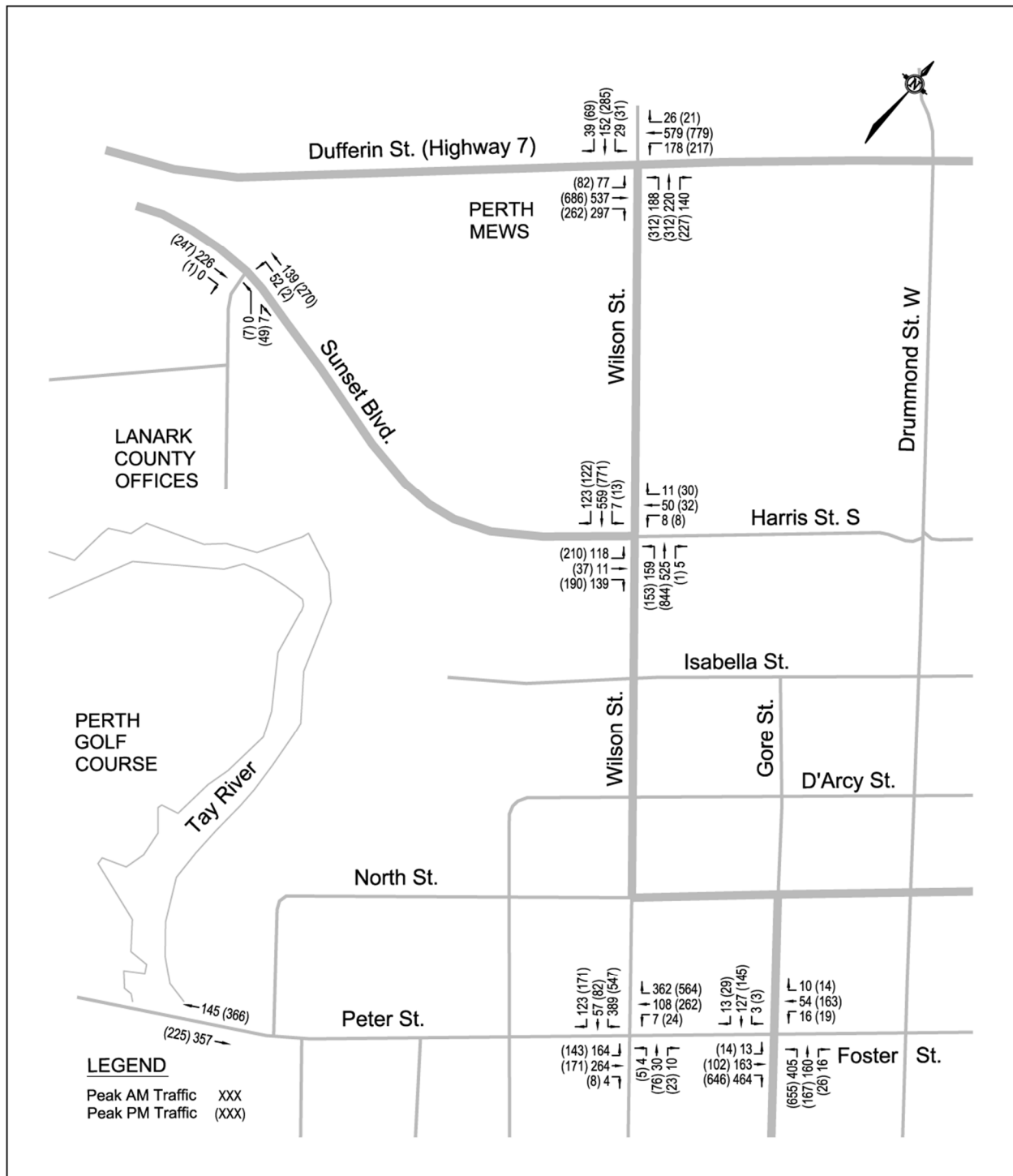
The intersection of Sunset Boulevard and Lanark County property access would experience an increase in traffic for Option 3. A traffic signal warrant analysis was conducted (Exhibit 30 in **Appendix E**) which showed that the intersection met 50 percent of the warrants for the installation of traffic signals, therefore the intersection was analyzed as a stop-controlled intersection with a stop sign installed at the northbound Lanark County property access. A left turn lane warrant analysis was conducted which determined that an exclusive westbound Sunset left turn lane providing 25 m of vehicular storage during the peak PM hour was warranted. The analysis is provided as Exhibit 31. The Option 3 analysis of the Sunset/Lanark County Access did assume an exclusive westbound Sunset Boulevard left turn lane.

The operational analysis which is provided in **Table 5-7** determined that all of the intersections functioned at an acceptable level of service with the exception of the Dufferin/Wilson intersection which would continue to function at a LoS “F” during the peak PM hour due to increasing background traffic. The expected trips from the Western Annexed Area would have a minor impact on the operation of the Dufferin/Wilson intersection. The analysis sheets, left turn lane analysis and traffic signal warrant analysis are provided as Exhibits 22 to 33 of **Appendix E**.

OPTION 4

Option 4 has proposed that all of the Golf Course Community trips enter by way of a new access and bridge crossing the Tay River which would be the westerly extension of North Street. The new access would be restricted to one-way traffic entering the site and would include both the Golf Course Community trips and existing Golf Course trips. Traffic entering would travel from the North/Wilson intersection along North Street. The North/Wilson intersection is a two-way stop-controlled intersection. Traffic exiting the site would use the existing Golf Course access at Peter Street. The existing access and bridge would be restricted to one-way traffic exiting the site. Trips from the Tayview Development would have direct access to Christie Lake Road. **Figure 5-4** provides the expected traffic for Option 4.

The operational analysis determined that the intersections studied all functioned at an adequate level of service with the exception of the North/Wilson and Dufferin/Wilson intersections. A traffic signal warrant analysis was conducted for the North/Wilson intersection (Exhibit 38) which determined that the intersection met 31 percent of the warrants for the installation of traffic control signals. Without traffic signals the eastbound and westbound North Street approaches would function at a LoS “E” or “F” during both the peak AM and PM hours. Traffic signals are recommended in order to reduce the delay at the eastbound and westbound stop-controlled approaches. The Dufferin/Wilson intersection continues to function at an unacceptable level of service during the peak PM hour due to increasing background traffic. The Western Annexed Area development would have a minor impact on the operation of the Dufferin/Wilson intersection. **Table 5-8** summarizes the operation of the intersections for the expected Option 4 traffic. The analysis sheets and traffic signal warrant analysis are provided as Exhibits 34 to 46.

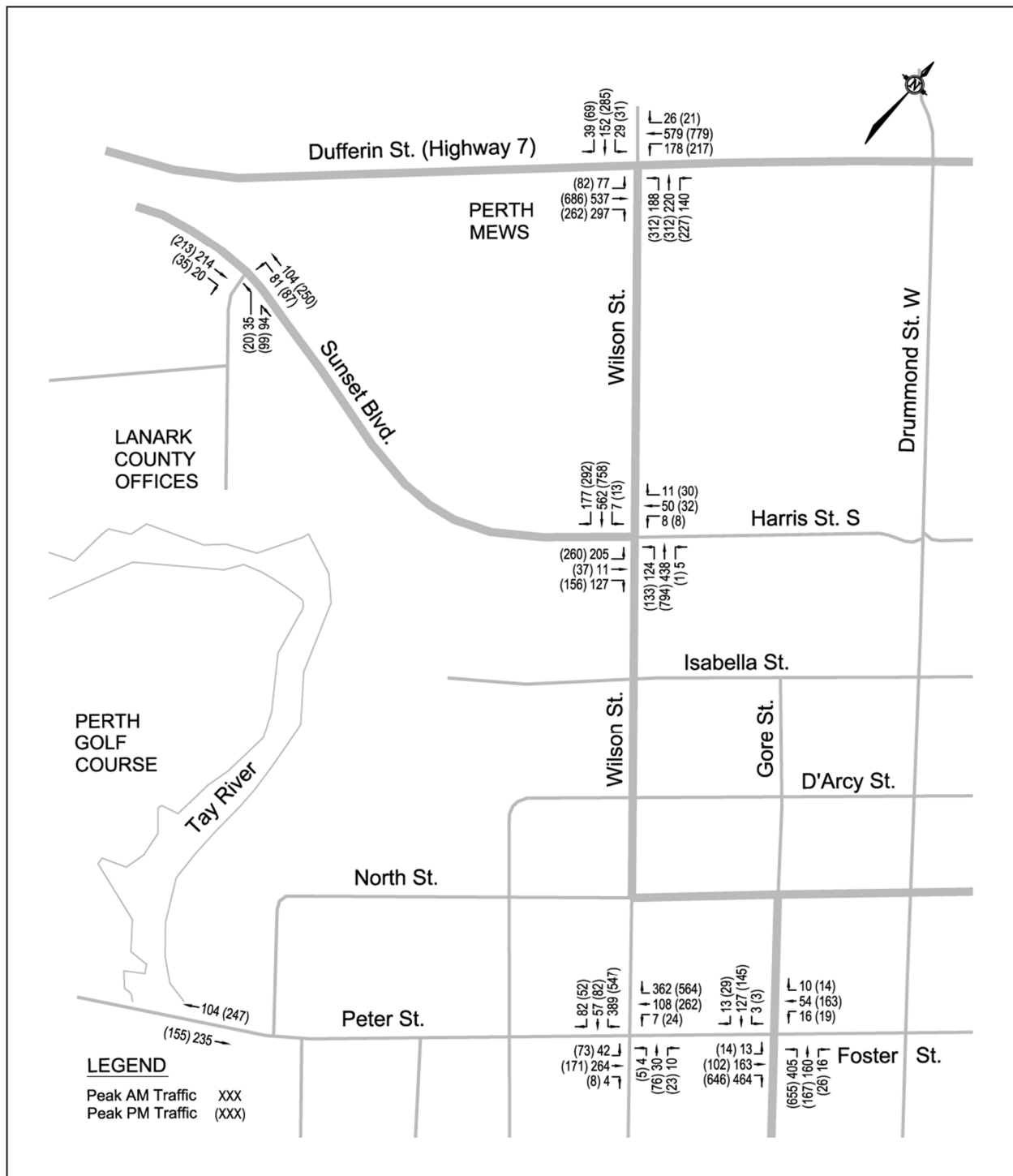


NOT TO SCALE

Figure 5-1 - OPTION 1 – 2041 TOTAL TRAFFIC - All Traffic to Peter Street

Table 5-5 - OPTION 1 (2041 TRAFFIC) – LoS & Delay (sec.)

INTERSECTION APPROACHES		2041 PEAK AM HR.				2041 PEAK PM HR.			
		LoS		Delay (sec.)		LoS		Delay (sec.)	
Peter (Foster)/Wilson	EB Left/Thru/Right - Peter	D	C	50.2	23.5	D	B	39.0	18.2
	WB Left/Thru - Foster	C		22.4		C		25.7	
	WB Right - Foster	B		16.0		B		18.7	
	NB Left/Thru/Right - Wilson	B		12.6		B		16.4	
	SB Left - Wilson	A		5.1		A		6.2	
	SB Thru/Right - Wilson	A		7.4		A		8.0	
Foster/Gore	EB Left/Thru - Foster	C	B	34.6	15.1	C	C	25.8	22.6
	EB Right- Foster	C		28.9		C		32.8	
	WB Left/Thru/Right – Foster	C		31.7		C		27.1	
	NB Left – Gore	A		6.2		C		23.3	
	NB Thru/Right – Gore	A		3.1		A		5.7	
	SB Left/Thru/Right - Gore	A		5.9		A		9.7	
Sunset (Harris)/Wilson	EB Left/Thru – Sunset	D	B	39.0	15.8	D	C	37.3	27.7
	EB Right - Sunset	D		39.3		C		32.3	
	WB Left/Thru/Right – Harris	D		36.0		C		29.2	
	NB Left – Wilson	A		6.0		B		12.6	
	NB Thru/Right – Wilson	B		10.5		C		31.0	
	SB Left – Wilson	A		3.0		B		16.2	
	SB Thru – Wilson	B		10.9		C		24.6	
	SB Right - Wilson	A		6.5		B		10.3	
Dufferin/Wilson	EB Left/Thru - Dufferin	B	C	18.9	23.5	F	F	236.6	123.5
	EB Thru/Right – Dufferin	B		15.0		C		25.2	
	WB Left/Thru – Dufferin	D		38.2		F		241.8	
	WB Thru/Right – Dufferin	B		15.1		C		31.9	
	NB Left/Thru - Wilson	D		36.7		F		249.3	
	NB Right - Wilson	C		25.8		C		28.5	
	SB Left/Thru – CTC	C		26.0		C		29.4	
	SB Right - CTC	C		23.9		C		25.1	
Sunset/ County	WB Left/Thru – Sunset	A		7.9		A	C	7.8	
	NB Left/Right – Lanark Co.	A		9.7		B		10.6	



NOT TO SCALE

Figure 5-2 - OPTION 2 – 2041 TOTAL TRAFFIC – 65% to Peter Street & 35% to County Access

Table 5-6 - OPTION 2 (2041 TRAFFIC) – LoS & Delay (sec.)

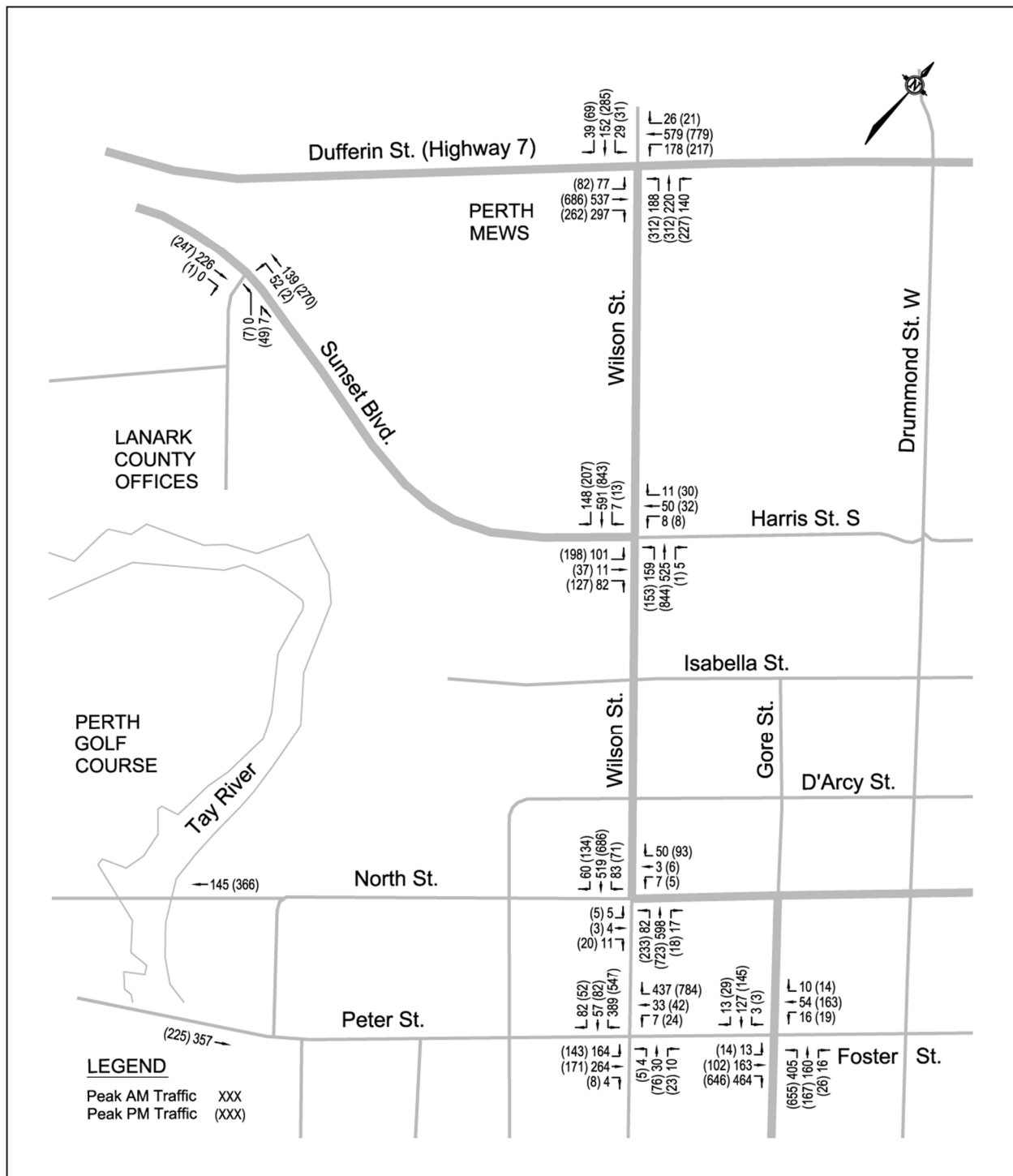
INTERSECTION APPROACHES		2041 PEAK AM HR.				2041 PEAK PM HR.			
		LoS		Delay (sec.)		LoS		Delay (sec.)	
Peter (Foster)/Wilson	EB Left/Thru/Right - Peter	C	B	34.7	17.1	C	B	25.7	16.1
	WB Left/Thru - Foster	C		26.9		C		26.0	
	WB Right - Foster	C		21.1		B		19.2	
	NB Left/Thru/Right - Wilson	A		8.9		B		16.1	
	SB Left - Wilson	A		3.1		A		6.0	
	SB Thru/Right - Wilson	A		4.9		A		6.9	
Foster/Gore	EB Left/Thru - Foster	C	B	34.6	15.1	C	C	25.8	22.6
	EB Right- Foster	C		28.9		C		32.8	
	WB Left/Thru/Right – Foster	C		31.7		C		27.1	
	NB Left – Gore	A		6.2		C		23.3	
	NB Thru/Right – Gore	A		3.1		A		5.7	
	SB Left/Thru/Right - Gore	A		5.9		A		9.7	
Sunset (Harris)/Wilson	EB Left/Thru – Sunset	D	B	51.2	19.3	D	C	53.2	27.7
	EB Right - Sunset	C		34.9		C		31.0	
	WB Left/Thru/Right – Harris	C		33.3		C		29.1	
	NB Left – Wilson	A		6.8		B		15.4	
	NB Thru/Right – Wilson	B		11.2		C		26.4	
	SB Left – Wilson	A		3.1		B		10.8	
	SB Thru – Wilson	B		12.9		C		23.9	
	SB Right - Wilson	A		7.9		B		11.1	
Dufferin/Wilson	EB Left/Thru - Dufferin	B	C	18.9	23.5	F	F	236.6	123.5
	EB Thru/Right – Dufferin	B		15.0		C		25.2	
	WB Left/Thru – Dufferin	D		38.2		F		241.8	
	WB Thru/Right – Dufferin	B		15.1		C		31.9	
	NB Left/Thru - Wilson	D		36.7		F		249.3	
	NB Right - Wilson	C		25.8		C		28.5	
	SB Left/Thru – CTC	C		26.0		C		29.4	
	SB Right - CTC	C		23.9		C		25.1	
Sunset/ County	WB Left/Thru – Sunset	A		8.0		A		8.0	
	NB Left/Right – Lanark Co.	B		12.0		B		11.9	



November 2019

Table 5-7 - OPTION 3 (2041 TRAFFIC) – LoS & Delay (sec.)

INTERSECTION APPROACHES		2041 PEAK AM HR.				2041 PEAK PM HR.			
		LoS		Delay (sec.)		LoS		Delay (sec.)	
Peter (Foster)/Wilson	EB Left/Thru/Right - Peter	C	B	31.8	11.7	C	B	23.4	16.9
	WB Left/Thru - Foster	C		29.5		C		22.3	
	WB Right - Foster	C		23.7		C		25.3	
	NB Left/Thru/Right - Wilson	A		8.1		B		18.9	
	SB Left - Wilson	A		2.3		A		7.8	
	SB Thru/Right - Wilson	A		3.5		A		7.2	
Foster/Gore	EB Left/Thru - Foster	C	B	34.6	15.1	C	C	25.8	22.6
	EB Right- Foster	C		28.9		C		32.8	
	WB Left/Thru/Right – Foster	C		31.7		C		27.1	
	NB Left – Gore	A		6.2		C		23.3	
	NB Thru/Right – Gore	A		3.1		A		5.7	
	SB Left/Thru/Right - Gore	A		5.9		A		9.7	
Sunset (Harris)/Wilson	EB Left/Thru – Sunset	C	C	32.0	22.3	D	C	35.6	30.6
	EB Right - Sunset	D		43.8		C		32.4	
	WB Left/Thru/Right – Harris	C		27.7		C		26.6	
	NB Left – Wilson	A		7.4		B		17.9	
	NB Thru/Right – Wilson	B		16.0		D		35.3	
	SB Left – Wilson	A		6.9		B		15.8	
	SB Thru – Wilson	B		17.6		C		30.6	
	SB Right - Wilson	B		10.9		B		13.3	
Dufferin/Wilson	EB Left/Thru - Dufferin	B	C	18.9	23.5	F	F	236.6	123.5
	EB Thru/Right – Dufferin	B		15.0		C		25.2	
	WB Left/Thru – Dufferin	D		38.2		F		241.8	
	WB Thru/Right – Dufferin	B		15.1		C		31.9	
	NB Left/Thru - Wilson	D		36.7		F		249.3	
	NB Right - Wilson	C		25.8		C		28.5	
	SB Left/Thru – CTC	C		26.0		C		29.4	
	SB Right - CTC	C		23.9		C		25.1	
Sunset/ County	WB Left – Sunset	A		8.1		A		8.6	
	NB Left/Right – Lanark Co.	B		14.2		C		15.5	



NOT TO SCALE

Figure 5-4 - OPTION 4 – 2041 TOTAL TRAFFIC – Enter by North Street and Exit by Peter Street

Table 5-8 - OPTION 4 (2041 TRAFFIC) – LoS & Delay (sec.)

INTERSECTION APPROACHES		2041 PEAK AM HR.				2041 PEAK PM HR.			
		LoS		Delay (sec.)		LoS		Delay (sec.)	
Peter (Foster)/Wilson	EB Left/Thru/Right - Peter	D	C	45.5	22.2	C	C	29.2	29.0
	WB Left/Thru - Foster	C		21.4		C		21.8	
	WB Right - Foster	B		17.0		D		52.9	
	NB Left/Thru/Right - Wilson	B		12.6		B		16.4	
	SB Left - Wilson	A		5.1		A		6.2	
	SB Thru/Right - Wilson	A		7.1		A		6.8	
Foster/Gore	EB Left/Thru - Foster	C	B	34.6	15.1	C	C	25.8	22.6
	EB Right- Foster	C		28.9		C		32.8	
	WB Left/Thru/Right – Foster	C		31.7		C		27.1	
	NB Left – Gore	A		6.2		C		23.3	
	NB Thru/Right – Gore	A		3.1		A		5.7	
	SB Left/Thru/Right - Gore	A		5.9		A		9.7	
North/Wilson	EB Left/Thru/Right - North	E		40.3		F		473.3	
	WB Left/Thru - North	F		69.2		F		686.5	
	WB Right - North	B		13.8		C		17.6	
	NB Left/Thru/Right - Wilson	A		9.2		B		12.1	
	SB Left - Wilson	A		9.4		A		9.9	
Sunset (Harris)/Wilson	EB Left/Thru – Sunset	D	B	39.9	14.0	D	C	51.9	25.5
	EB Right - Sunset	D		38.3		C		34.2	
	WB Left/Thru/Right – Harris	D		37.5		C		32.5	
	NB Left – Wilson	A		5.9		B		17.4	
	NB Thru/Right – Wilson	A		9.6		C		22.6	
	SB Left – Wilson	A		2.6		B		10.1	
	SB Thru – Wilson	B		10.4		C		22.5	
	SB Right - Wilson	A		6.1		A		8.6	
Dufferin/Wilson	EB Left/Thru - Dufferin	B	C	18.9	23.5	F	F	236.6	123.5
	EB Thru/Right – Dufferin	B		15.0		C		25.2	
	WB Left/Thru – Dufferin	D		38.2		F		241.8	
	WB Thru/Right – Dufferin	B		15.1		C		31.9	
	NB Left/Thru - Wilson	D		36.7		F		249.3	
	NB Right - Wilson	C		25.8		C		28.5	
	SB Left/Thru – CTC	C		26.0		C		29.4	
	SB Right - CTC	C		23.9		C		25.1	
Sunset/ County	WB Left/Thru – Sunset	A		7.9		A		7.8	
	NB Left/Right – Lanark Co.	A		9.7		B		10.6	

The Traffic Impact Study has determined the following conclusions from the operational analysis of the intersections evaluated for each option:

1. The Tayview Development is located north of the Tay River and would have direct access to Christie Lake Road. For all four of the options, the Tayview Development would have the same access points onto Christie Lake Road resulting in the same impact on the surrounding intersections for all four options.
2. Option 1 which proposed that all trips from the Perth Golf Course Community along with existing trips from the Perth Golf Course would enter and exit the lands by the existing bridge crossing the Tay River and access which is an extension of Peter Street. This would result in only one access point to the development which would not be acceptable for emergency access.
3. Option 2 and Option 3 proposed that site generated trips from the Perth Golf Course Community be shared between the existing Peter Street access and the Lanark County Office access onto Sunset Boulevard. Both Options 2 and 3 would require a new bridge to be constructed across the Tay River to the Lanark County Offices.
4. Options 4 proposes that all trips from the Perth Golf Course Community and existing Perth Golf Course enter the site from a new one-way access which would be the west extension of North Street and a new Bridge crossing the Tay River. This option would require a high volume of traffic to travel along North Street which is a local street. Traffic signals would have to be installed at the North/Wilson intersection.
5. All four options would result in the same number of trips assigned to the Dufferin/Wilson intersection and the same impact on the operation of the intersection. The low level of service of the Dufferin/Wilson intersection is due to the increasing background traffic and lack of exclusive turn lanes. The Perth Golf Course Community and Tayview Development would have a minor impact on the operation of the intersection.

5.2 Active Transportation

The proposed Golf Course and Tayview developments represent an opportunity to enhance the active transportation network in Perth while providing attractive recreation opportunities for the new neighbourhoods. The alternative investigated are intended to provide active transportation systems consistent with the Perth Official Plan, usable by both public and golf course patrons, and accessible to the widest population. The following options are proposed for the Western Annex area:

Option 1: Multi-Use Pathway System

- Separated and Multi-Use Pathway
 - Resident pedestrian pathway consists of internal linear park pathway through subdivision along height of land. 1.8m wide pathway constructed of crushed limestone with seating areas located at view points. All crosswalks are to be wheelchair accessible.
 - Multi-use pathway limited to external areas of residential portion of subdivision on height of land and on top of dyke where possible. 3.0m wide pathway constructed of crushed

limestone with seating areas located at view points. Multi-use limited to bicycle, golf carts, and motorized wheelchairs only and is fully accessible at all crosswalks.

- Bicycle Pathway to follow main road through subdivision and along areas of multi-use pathway. Bicycle route on roadway on designated and signed bike lane.
- Linkages to pedestrian and bicycle routes outside subdivision to be signed at subdivision entrances.

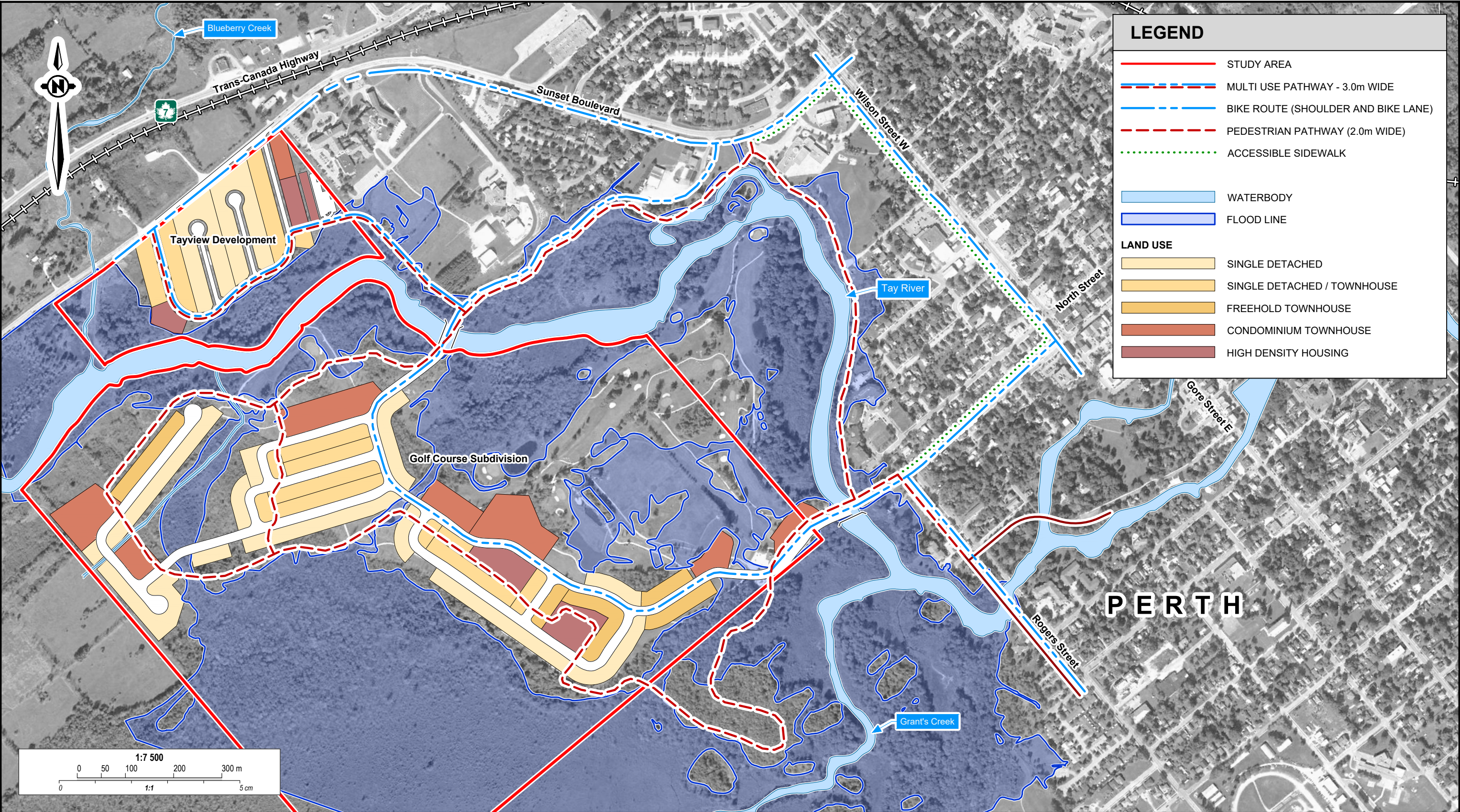
Option 2: Limited Multi-Use Pedestrian and Separated Pathway System

- Separated pedestrian and bicycle pathway system
- Limited Multi-use Pedestrian Pathway
 - Multi-use limited to golf carts, motorized wheelchairs, and pedestrians only and is fully accessible at all crosswalks.
 - Pedestrian pathway consists of both internal linear park pathway through subdivision along height of land. (1.8m width pathway constructed of crushed limestone with seating areas located at view points) and external areas of residential portion of subdivision on height of land and on top of dyke where possible. External pathway is 2.4m width constructed of crushed limestone.
- Bicycle Pathway to follow and limited to main road through subdivision. Bicycle route on roadway on designated and signed bike lane.
- Linkages to pedestrian and bicycle routes outside subdivision to be signed at subdivision entrances.

Option 3: Separated Pedestrian (Resident / Visitor) and Bicycle Pathway

- Resident pedestrian pathway system distinct and separate from visitor pathway.
 - Resident pathway consists of linear park pathway through subdivision along height of land. 1.8m wide pathway constructed of crushed limestone with seating areas located at view points. All crosswalks are to be wheelchair accessible.
 - Visitor pedestrian pathway follows main roadway through subdivision and is limited to 1.5m wide concrete sidewalk along western side of road. All crosswalks are to be wheelchair accessible.
- Bicycle Pathway to follow and limited to main road through subdivision. Bicycle route on roadway on designated and signed bike lane.
- Linkages to pedestrian and bicycle routes outside subdivision to be signed at subdivision entrances.

These options are illustrated in **Figure 5-5 to Figure 5-7**, following.





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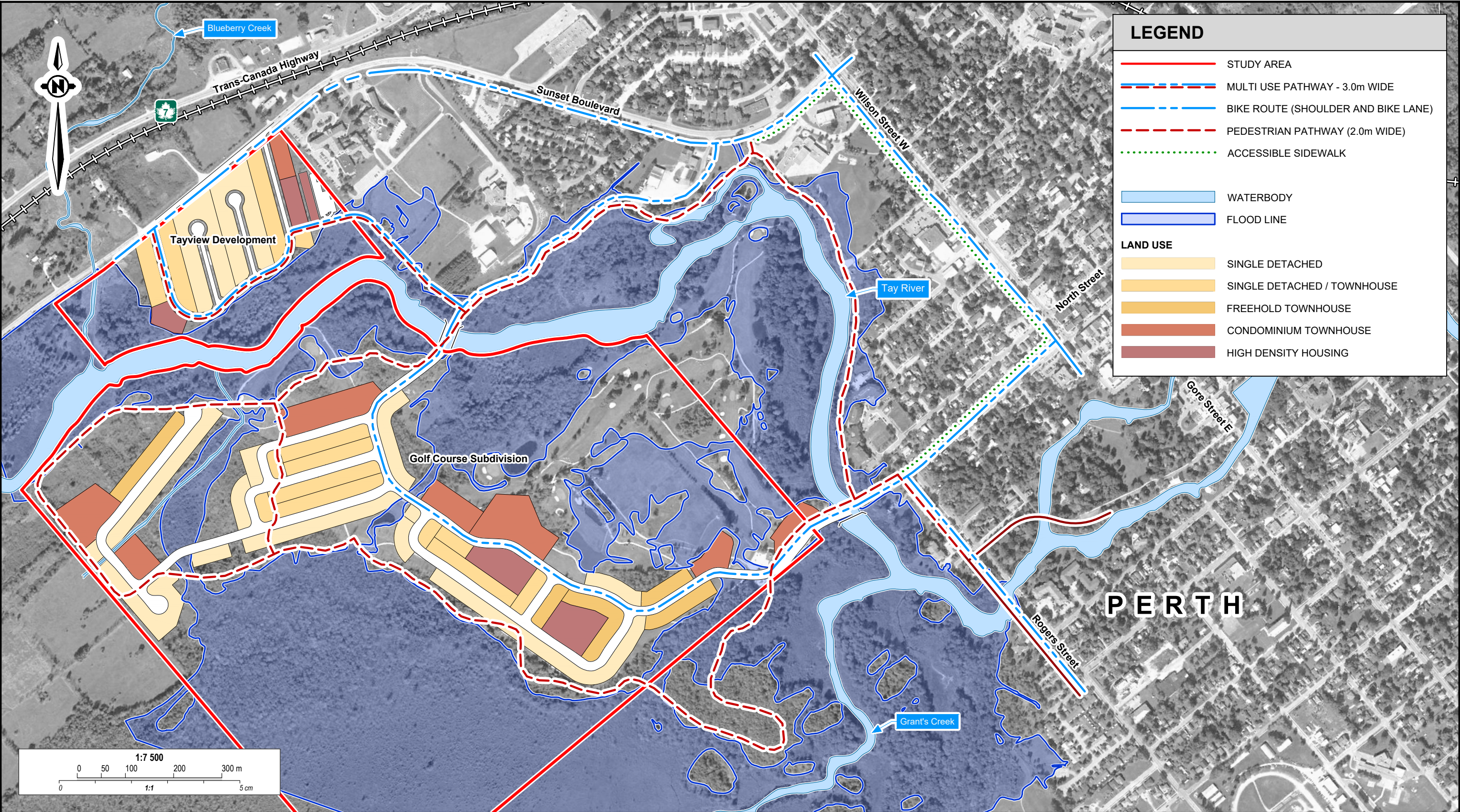
1150 MORRISON DRIVE, SUITE 410, OTTAWA, ON
Phone: (613)828-7800, Fax: (613)828-2600

Infrastructure Master Plan Western Annexed Area

Town of Perth

Active Transportation Route: Option 1

DESIGNED: D.N. / K.M.		PROJECT No.: 2161774A
DRAFTED: R.W.		REVISION DATE: 2019-11-05
CHECKED: D.N.	APPROVED: K.M.	REVISION No.:
SCALE: As shown		FIGURE: 5-5





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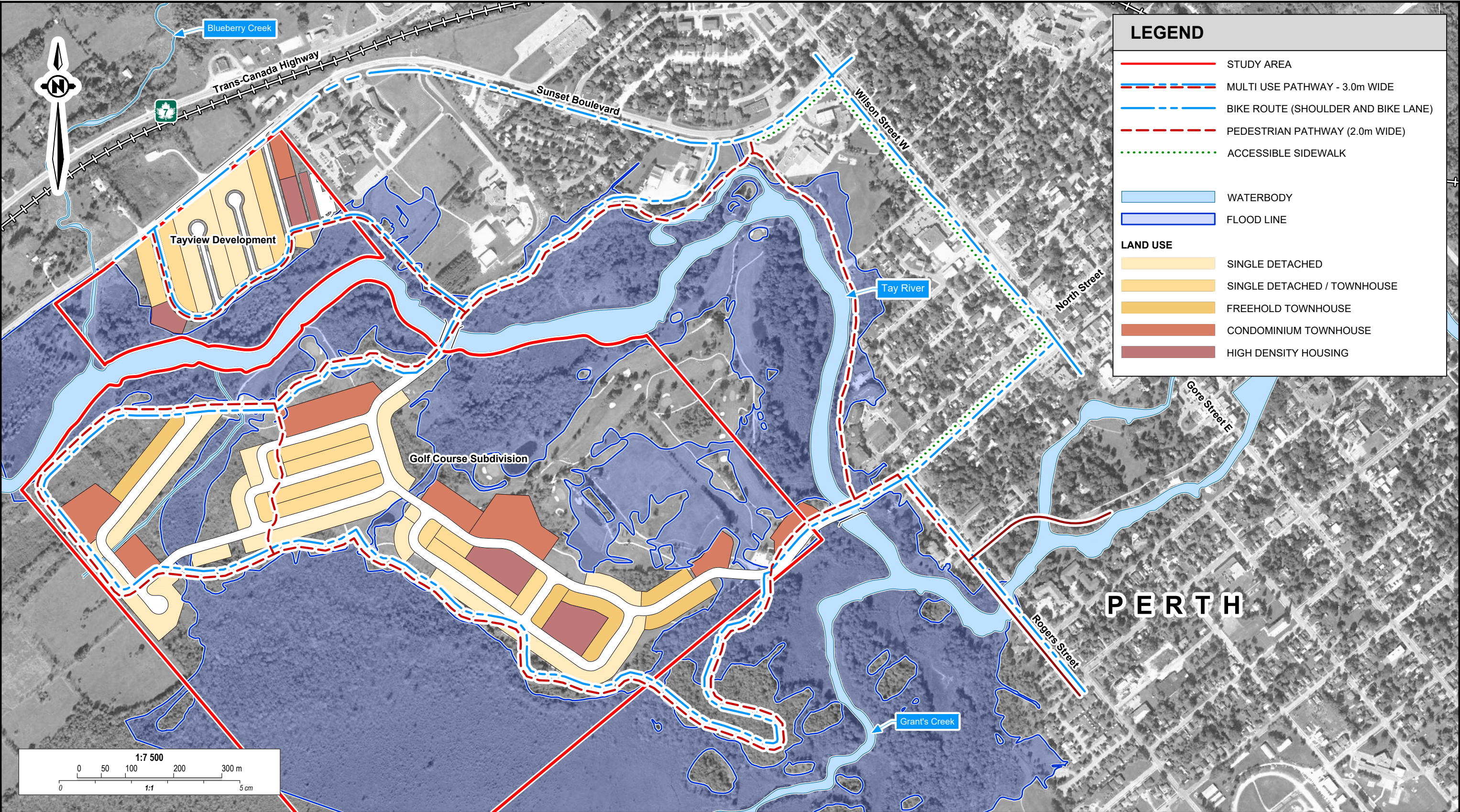
1150 MORRISON DRIVE, SUITE 410, OTTAWA, ON
Phone: (613)828-7800, Fax: (613)828-2600

Infrastructure Master Plan Western Annexed Area

Town of Perth

Active Transportation Route: Option 2

DESIGNED: D.N. / K.M.		PROJECT No.: 2161774A
DRAFTED: R.W.		REVISION DATE: 2019-11-05
CHECKED: D.N.	APPROVED: K.M.	REVISION No.:
SCALE: As shown		FIGURE: 5-6



LEGEND

STUDY AREA

MULTI USE PATHWAY - 3.0m WIDE

BIKE ROUTE (SHOULDER AND BIKE LANE)

PEDESTRIAN PATHWAY (2.0m WIDE)

ACCESSIBLE SIDEWALK

WATERBODY

FLOOD LINE

LAND USE

SINGLE DETACHED

SINGLE DETACHED / TOWNHOUSE

FREEHOLD TOWNHOUSE

CONDOMINIUM TOWNHOUSE

HIGH DENSITY HOUSING

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Infrastructure Master Plan Western Annexed Area
Town of Perth

Active Transportation Route: Option 3

DESIGNED: D.N. / K.M.	PROJECT No.: 2161774A
DRAFTED: R.W.	REVISION DATE: 2019-11-05
CHECKED: D.N.	APPROVED: K.M.
SCALE: As shown	REVISION No.: FIGURE: 5-7

5.3 Water Supply

5.3.1 Water Distribution Network Options

The Golf Course lands and Tayview property water distribution network was modeled to evaluate the impacts on operating pressures and fire flow requirement within the Town of Perth. The options consider the future development north of Highway 7 as established in the existing Infrastructure Master Plan described in Section 2.4.

Three servicing options were analyzed under varying scenarios to account for phasing and the impact of the future North of Highway 7 Development. The Tayview Development is included in all options and scenarios, since water servicing is expected to be consistent for each option. The proposed configuration and phasing of the watermains within the proposed development is shown in **Appendix F**.

Option 1: Evaluates the proposed water system with one connections point, at the existing 300mm watermain on North Street under the following scenarios:

- a)** Phase 1 Western Annex excluding the Future Development North of Highway 7
- b)** At Ultimate build-out (Phase 1 & 2) excluding the Future Development North of Highway 7
- c)** Phase 1 Western Annex including the Future Development North of Highway 7
- d)** At Ultimate build-out (Phase 1 & 2) including the Future Development North of Highway 7

Option 2: Evaluates the proposed water system with two connections points -

- to the existing 300mm watermain on North Street, and
- to the existing 150mm watermain on Inverness Avenue

Under the following scenarios:

- a)** At Ultimate build-out (Phase 1 & 2) excluding the Future Development North of Highway 7
- b)** At Ultimate build-out (Phase 1 & 2) including the Future Development North of Highway 7

Option 3: This option includes upgrades to the existing water system by replacing the existing 150mm watermain on Inverness Avenue with a new 300mm watermain up to Sunset Boulevard. It is expected this would occur coincident with the regular infrastructural renewal program the Town of Perth implements. This option will evaluate the proposed system with connection points to North Street and to the upgraded watermain on Inverness Avenue at ultimate build-out, including the North of Highway 7 development.

5.3.2 Water Supply Servicing Design

The **Table 5-9** summarizes the Water Supply Design Criteria used in the preparation of the preliminary water demand estimates.

Table 5-9 - Water Supply Servicing Criteria

Design Parameter	Value
Residential Single Family	3.4 p/unit
Residential Semi-detached	2.7 p/unit
Residential Townhouse/Back-to-Back	2.7 p/unit
Residential Average Daily Demand	350 L/d/p
Residential Maximum Daily Demand	2 Average Daily
Residential Maximum Hourly Demand	3 Average Daily
Commercial demand	28,000 L/ha/day
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350kPa and 480kPa (50 to 70 psi)
During normal operating conditions pressure must not drop below	275kPa (40 psi)
During normal operating conditions pressure must not exceed	552kPa (80 psi)
During fire flow minimum allowable pressure must not drop below	138kPa (20 psi)
Roughness coefficients C-Factors according to pipe diameter	
150 mm (6 in)	100
200 mm – 250 mm (8 to 10 in)	110
	120

5.3.3 Domestic Water Demands

Existing Water supply

The average and maximum day water demands for 2007 to 2010 are summarized in the *Infrastructure Master for Area North of Highway 7 (Dillon, October 2013)*. The population of 6,360 persons generates an average day demand of 3,184.1 m³/d, a maximum day demand of 4,570.0 m³/d.

Western Annex Demands

The Ministry of Environment (MOE) Design Guidelines for Drinking Water Systems (MOE, 2008) recommends a per capita water consumption between 270 L/c/d and 450 L/c/d. A demand of 350 L/c/d is used as per the City of Ottawa Design Guidelines

The proposed development is separated into 2 phases, with Phase 1 connecting from North Street and extending approximately 575m westerly while Phase 2 represents ultimate build-out. The design population and demands are described in the **Table 5-10** below. Refer to **Appendix F** for detailed calculations of water demands.

Table 5-10 - Anticipated Residential Domestic Water Demand – Western Annexed Area

	Pop	Cum.	Avg. Day		Max Day			Max Hour		
		Pop	m ³ /d	L/min	Peak Factor	m ³ /d	L/min	Peak Factor	m ³ /d	L/min
Phase 1	476	476	167.6	116.4	2	335.2	232.8	3	502.8	349.2
Phase 2	1374	1850	652.3	453	2	1302	904.2	3	1950	1354.8
Max Daily and Max hourly Peaking factors per MOE Guidelines for Drinking Water Systems Table 3-1 for populations between 3,000 and 10,000.										

External Future Water Demands

- The Tayview Development demands were added to all scenarios and options, the population of 465 persons generates an average day demand of 166.1 m³/d, a maximum day demand of 330.6 m³/d and a peak hour demand of 494 m³/d.
- The North of Highway 7 demands were considered in various options, the population of 1,340 persons and 34.97 ha of commercial and institutional businesses generate an average demand of 1,685 m³/d and a peak hour demand of 2,829 m³/d.

5.3.4 Fire Flow Requirements

The fire flow requirements of the Golf Course Development include the fire flow rate as well as the fire flow pumping and/or storage capacity to fight fires. The MOE Guidelines Table 8-1 suggest a fire flow of 38 L/s for the initial population of 500 persons for Phase 1 and 95 L/s for the ultimate build-out population of 1,850 persons for a duration of 2 hours.

Fire flow requirements from on the Fire Underwriter Survey (FUS) guidelines (page 16) – one and two stories in height and assuming a separation of at least 3m requires a fire flow of 4,000 L/min (66.7 L/s for 1.5 hours while townhouses, apartments and mixed use suggest a minimum fire flow of 8,000 L/min (133 L/s) for 2 hours. Fire flow requirement within the proposed development will be assessed based on the FUS guidelines.

Fire flow requirements within the proposed project itself according to the type of housing on the adjoining properties will be confirmed during the design development.

Water Storage

MOE Guidelines identify the requirements for sizing elevated water storage to meet the demands that exceed the daily water supply capacity of the water treatment plant and to provide fire flow demands where fire flow protection is provided. Water storage and/or pumping requirements is based on the overall serviced population.

MOECC Design Guidelines specifies that treated water storage should be comprised of Fire Storage (A), Equalization Storage (B) and Emergency Storage (C). Fire storage is specifically based on population, equalization storage should correspond to 25% of the maximum day demand and emergency storage should correspond to 25% of the sum of A+B.

The fire storage recommendation is based on the MOE method for the Town population of the various options from Table 8-1 of the MOECC Guidelines.

The firm pumping capacity of the Town water treatment plant is 9,158.4 MLD which meets the projected maximum day requirements for all developments of 7,489 MLD. The pumping reserve capacity of the water treatment plant is 1,669 MLD (19.72 L/s) and can provide fire flow from the 2800 m³ water treatment plant water storage reservoir. The 19.72 L/s will reduce the fire storage requirements.

The table below summarizes the total water storage requirements for the existing and future conditions as per MOECC Guidelines.

Table 5-11 - Treated Water Storage

Type of Storage	MOECC Guidelines	Volume (m ³)
Existing Conditions (Maximum Day Demand of 4,570 MLD)		
Fire storage (A)	For an equivalent population of 6,360, use 142.1 L/s (reduced from 161.8 L/s) during 3 hours	1,534 m ³
Equalization storage (B)	25% of Maximum Day Demand	1,142 m ³
Emergency storage (C)	25% of A+B	669 m ³
Total storage required		3,345 m³
Option 1b (Maximum Day Demand of 5,804 MLD) – excluding North of 7 Development		
Fire storage (A)	For an equivalent population of 8,675, use 159.3 L/s (reduced from 179 L/s) during 3 hours	1,720 m ³
Equalization storage (B)	25% of Maximum Day Demand	1,451 m ³
Emergency storage (C)	25% of A+B	793 m ³
Total storage required		3,964 m³
Option 4a (Maximum Day Demand of 7,489 MLD) – including North of 7 Development		
Fire storage (A)	For an equivalent population of 10,015, use 169.3 L/s (reduced from 189 L/s) during 3 hours	1,828 m ³
Equalization storage (B)	25% of Maximum Day Demand	1,872 m ³
Emergency storage (C)	25% of A+B	925 m ³
Total storage required		4,625 m³

Note that the calculated volume does not account for any operational volume requirements.

The required elevated storage volume at ultimate build-out exceeds the available elevated storage volume of 945 m³.

5.3.5 Hydraulic Analysis

The Western Annex Development will be serviced with watermain ranging in size from 150 mm to 300 mm, extended through the development with interconnecting links where possible to loop the system. The proposed water distribution system was looped from Node G-8 to G-6 to eliminate the dead end and improve fire flows. The WaterCAD model was developed and added into the Town's overall model, to ensure that the minimum and maximum pressures will be provided across the development. The model was also used to confirm theoretical available fire flow rates at various important nodes within the development. Based on the results of the modeling, Maximum day demand plus fire flow is the determining condition with respect to pipe sizing.

The future development lands water distribution systems were added to the model as well as the phasing of the Western Annex as part of various scenarios discussed previously. Results of the model scenarios within the proposed study area are provided in **Appendix F** and include overall plans of the proposed

system showing pipe diameters and node numbers along with data tables, which identify the flow rate at each node.

5.3.5.1 Fire Flow Requirements

The fire flow was evaluated under the various options under maximum day demand within the existing, proposed and future developments. The existing elevated storage tank was set to hydraulic elevation of 174 or 20% full, which corresponds to the end of a fire event with the two small high lift pumps operating. The minimum residual pressure under fire flow was limited to 20 psi as per MOE guidelines.

The proposed water storage tank in the future development North of Highway 7 with a storage capacity of 3,400 m³ was set to the minimum hydraulic grade line (HGL) of 174 m as per the *Infrastructure Master for Area North of Highway 7 (Dillon, October 2013)* and operating under similar controls as the existing 945 m³ storage tank. Based on the validity of the existing Watercad model, the summary of the fire flow results is as follows:

Option 1

- Option 1 - the single connection option to the existing water distribution system does not provide adequate fire protection in the higher density areas at nodes G7A and G8 at ultimate build-out. The minimum required fire flow for townhouses as stated previously is 133 L/s.
- This option provides sufficient fire protection at Phase 1 irrespective of the future development North of Highway 7. The Phase 1 can be considered representative of the interim construction phase for all options.

Option 2

- This option involves extending the existing 150mm watermain on Inverness Avenue to the proposed development as well as connecting from North Street. This option to the existing water distribution system does not provide adequate fire protection in the higher density areas at nodes G7A and G8.

Option 3

- Under this option, all nodes but one has adequate flow. Note that node G7A is slightly below the required 133 L/s. This can be remediated at the time of design by increasing the watermain pipe sizes in the vicinity at the final design.

5.3.5.2 Service Pressures

The water system was evaluated under peak hour water demands. Elevated water storage tanks within the existing and future water distribution system were modelled at 60% full at an elevation of 177.28 m. Flow from the water treatment plant was provided by the high lift pump 1-B only. The resulting peak hour pressures within the Western Annex are above 45 psi at all locations, which meets the peak hour minimum pressure of 40 psi per MOE.

5.4 Stormwater Management

5.4.1 Proposed Stormwater Conveyance and Treatment Options

The development of the Golf Course lands and Tayview property are proposed to be urbanized, draining by conventional storm sewers, treated within stormwater management facilities located within the existing low areas – but outside of the 30 m setback from designated wetlands or sensitive areas – and draining to the Tay River, Grants Creek Wetland, or Grant’s Creek. Urbanized surfaces significantly reduce the time of concentration, due to channelization; and increase the rate of runoff, due to imperviousness; however, the intent of the proposed SWM infrastructure is to avoid all negative impacts to designated wetlands and sensitive natural features.

The options being considered are:

Option 1: Drainage restricted to pre-development flow rates to existing outlet locations

The pre-development flow rates to each of Blueberry Creek, the Tay River, Grant’s Creek Wetland, and Grant’s Creek will be maintained, using wet ponds to control the release rates for a range of storm events. The use of level spreaders or equivalent means will be incorporated into the design to ensure hydraulic impacts on the PSW are mitigated. Enhanced TSS removal will be required for all discharges. The system will be constructed so that the invert of the outlet is at the 1:100 year water level, and the pipe system does not surcharge during the 1:5 year event.

Option 2: Drainage restricted to pre-development flow rates not upstream of water treatment plant

As above, but no discharges to the Tay will occur upstream of the Water Treatment Plant on Sunset Drive. Due to the location of the existing spill points – the ideal locations for proposed SWM facilities – this means all of the runoff from the land around the golf course will be directed to Grant’s Creek or the PSW, and the drainage from the land north of the Tay River must discharge to Blueberry Creek. The spill points between the Tay and the PSW will be blocked, and the release rate to the PSW will be restricted to the pre-development spill plus the pre-development runoff rate.

Option 3: Drainage restricted to pre-development flow rates via LID

As above, but rather than a conventional SWM facility providing the regulation of flows, a linear LID is proposed to provide quantity treatment, and some quality treatment. Small SWM facilities would be located in the same locations as with the other two options, and they would capture much of the suspended solids – roughly 60 %, with a volume equal to the first 30 minutes of flow for a 1:5 year event. The water would then drain to a linear feature built above the flood plain that would capture and infiltrate flows up to the 1:5 year event and would regulate all additional flows to pre-development rates. The infiltration filter would be designed to retain all sands, silts, and most clays, with an estimated long-term sediment removal efficiency of approximately 90%.

The linear LID would be constructed immediately uphill of the regulatory flood line, or the 30m setback from the PSW, whichever is further from the water’s edge. It would include a raised berm that would act as a pedestrian/golf-cart path and a wide clearstone bed covered in a sandy-topsoil filter medium to provide water quality enhancements and subsurface storage of frequent events, and surface storage for more extreme events.

5.4.2 Development Area

For all stormwater options, the portion of the site that is being urbanized will require significant regrading, which will produce a lot of rock excavation. It is expected that all of the disturbed material will remain on site, providing grade raise to low areas outside of the flood plain. The presence of the blasted rock placed over the existing soils will have the effect of decreasing the runoff coefficient of the clay soils while making no significant difference to the sandy loam areas. Regrading the rock areas will require removal of much of the forest within the urbanized area. This will increase the runoff coefficients of the open space.

The volumes and areas in the following tables are what is required to match post-development flows to pre-development rates. For Option 3, the volume of the ponds is what is required for quality treatment within the pond, and quantity treatment within the swale. The volumes were calculated to ensure that the 1:5 year and 1:100 year events would match post- to pre-development peak flow rates and provide quality treatment per MOE SWM Guidelines. Storage shows the approximate 1:100 year storage volume required to attenuate flows to pre-development rates. The area required impacts the amount of development land that needs to be set aside for the SWM facility. In the case of the Linear LID, it could be placed as a feature within the golf fairways.

Table 5-12 - Option 1 – Post- to Pre-

Catchment	Area (ha)	Runoff C	Tc (at pond)	Storage (m ³)	Area (m ²)
Pond 1 (to PSW)	20.33	0.42	15	8445	5314
Pond 2 (to Tay)	12.61	0.48	14	6381	4334
Pond 3 (to Grant's)	9.24	0.49	15	4700	3491
Pond 4 (to Blueberry & Tay)	9.63	0.46	15	4048	3143

Table 5-13 - Option 2 – No discharge to Tay upstream of water treatment

Catchment	Area (ha)	Runoff C	Tc (at pond)	Storage (m ³)	Area (m ²)
Pond 1 (to PSW)	20.52	0.42	16	9337	5688
Pond 2 (to PSW)	11.86	0.52	15	6928	4587
Pond 3 (to Grant's)	7.82	0.49	15	3889	3055
Pond 4 (to Blueberry)	9.63	0.46	15	4551	3412

Table 5-14 - Linear LID

Catchment	Area (ha)	Runoff C	Tc (at pond)	Storage (m³)	Area (m²)
Pond 1 (to PSW)	20.52	0.42	16	3249	2683
Pond 2 (to PSW)	13.59	0.49	15	2393	2095
Linear LID				10662	21073
Pond 3 (to Grant's)	7.82	0.49	15	3889	3055
Pond 4 (to Blueberry)	9.63	0.46	15	4551	3412

5.5 Wastewater Management

5.5.1 Design Methodology

Throughout the site 250 mm PVC gravity sanitary mains will be installed as required with a minimum velocity of 0.6 m/s in the pipe. A target velocity of 0.6 m/s in the pipe may not be feasible on every length of pipe, as the capture area for the uppermost mains in the system is relatively small. This issue will be reviewed with the Town prior to final design. The sanitary mains and services will have an equivalent of at least 2.0 m of cover including insulation for shallow sanitary sewers.

The following tables summarize the wastewater design criteria used in the design of the proposed wastewater sewer system according to the City of Ottawa Sewer Design Guidelines (2012).

Table 5-15 - Wastewater Design Criteria

Design Parameter	Value
Average Daily Demand	280 L/c/d
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Infiltration and Inflow Allowance	0.28 L/s/ha
Sanitary sewers are to be sized employing Manning's Equation	$Q = \frac{A}{n} * R^{\frac{2}{3}} * S^{\frac{1}{2}}$
Minimum Sewer Size	250 mm diameter
Minimum Manning's 'n'	0.013
Minimum Full Flowing Velocity	0.6 m/s
Maximum Full Flowing Velocity	3.0 m/s

Table 5-16 - Estimated population values per dwelling type

Unit Type	Persons Per Unit
Single Family	3.4
Seme-Detached	2.7
Duplex	2.3
Townhouse (row)	2.7
Apartments	
Bachelor	1.4
1 Bedroom	1.4
2 Bedroom	2.1
3 Bedroom	3.1
Average Apt.	1.8

Table 5-17 - Minimum pipe slopes to achieve at least 0.6 m/s flow velocity

Diameter (mm)	Minimum Slope (%)
200	0.32
250	0.24
300	0.186
375	0.14
450	0.111
525 and larger	0.10

Table 5-18 - Average wastewater flows and Peaking Factors according to land use

Land Use	Flow Rate
Residential	280 L/c/d
Commercial	50,000 L/gross ha/d
Institutional	28,000 L/gross ha/d

Table 5-19 - Wastewater Peaking Factors

Land Use	Peaking Factor
Residential	Harmon Equation $P.F. = 1 + \left(\frac{14}{4 + \left(\frac{P}{1000} \right)^{\frac{1}{2}}} \right) * K$ where: P=Population K=Correction Factor = 0.8
Commercial	1.5
Institutional	1.5

Note that in accordance with the Technical Bulletin ISTB-2018-01 issued by the City of Ottawa in March 2018, the institutional flow rate has been revised from 50,000 to 28,000 L/ ha/d; the residential flow rate is changed to 280 L/c/d from 350; the infiltration allowance set to 0.33 L/s/ha from 0.28; and the residential correction factor (K) is set to 0.8 from 1.0.

5.5.2 Wastewater Management Options

The wastewater management options for the study area are:

1. Send 100% of the flow via Inverness Ave
2. Send 100% of the flow via North St
3. Divide the flows between Inverness and Peter St bridges (assume 50/50 split)

These options were also evaluated both with and without the potential “North of Highway 7” development noted in **Section 2.4**.

Option 1 – Connect to Sewer System at Inverness Ave

This option requires the Western Annex sanitary sewer system to flow to the north (against the general site grade); significant rock excavation and/or sewer insulation to achieve minimum slopes and frost protection; as well as construction of a full-capacity pump station and a new Tay River crossing during the initial phases. Upsizing of the Inverness Ave sewers and downstream pipes are likely required. It is assumed this upsizing would occur as part of the infrastructure renewal process the Town of Perth undertakes, if the connection is required after the infrastructure renewal occurs.

Option 2 – Connect to Sewer System at North St

This option would allow the initial development phase to tie-in to the existing golf course sanitary sewer west of the Tay River and therefore minimize initial construction costs compared to a connection at Inverness Ave. However, draining from the far west of the proposed development would still require significant rock excavation and/or sewer insulation to achieve minimum slopes and frost protection.

Option 3 – Divide the Site Flows 50/50 between Inverness and Peter St Sewers

This option would allow the initial development phase to tie-in to existing golf course sewers west of the Tay River. A new pump station would be required at this location; however, it would not need to be sized to accommodate the entire Western Annex development. As the development proceeds, an additional pump station and connection at Inverness Ave would be established. This would allow construction of the sanitary network to proceed apace with the land development while also allowing the sewer network to more closely align with existing terrain – reducing the potential rock excavation, sewer insulation, and regrading required.

5.6 Assessment of Alternatives

For the purposes of this assessment, we will consider Technical, Environmental, and Socio-Economic Factors for each alternative for each component of the overall system. The criteria are weighted equally, with each option scored relative to the average of all options and assigned positive, negative, or neutral values relative to the other alternatives. Negative Technical aspects indicate that the approach would be technically difficult to implement or maintain regardless of the cost. Positive Technical aspects indicate the approach would be technically simple to implement, as compared to the other alternatives. Environmental criteria will be assessed on the comparative evaluation of an alternatives to minimize impact on the sensitive features identified in Section 3.1 of this report. The Cultural and Socio-Economic criteria will be assessed on the comparative evaluation of an alternative to minimize impact on the sensitive features identified in Section 3.2 and 3.3 of this report. For costs, positive implies less than half of the average cost of all of the alternatives, neutral is between the average cost and half of the average cost, and negative is greater than the average cost. The specific criteria are outline in **Table 5-20**.

“+” represents positive assessment

“-“ represents negative assessment

“0” represents neutral assessment or does not apply.

Table 5-20 - Evaluation Criteria

Technical
Feasibility of solution to address problems and be approved
Compatibility with other infrastructure within subject site
Constructability
Maintenance requirements
Environmental
GHG emissions
Terrestrial environment
Aquatic Environment and Fish Habitat
Groundwater Impacts
Surface Water Impacts
Cultural and Socio-Economic
Displacement of residents, business, institution, or community features as a result of development
Disruption of residents, business, institutions, or community features, especially during construction
Visual Impact & Aesthetics
Cultural Heritage
Climate Change adaptability
Potential to meet Planning objectives
Relative capital cost
Relative operational cost

5.6.1 Transportation Assessment

The traffic assessment determined that Option 3, which placed trips from 120 units to the existing Peter Street access and trips from 530 units to the Lanark County Office access, would result in the lowest impact on residents along Peter Street and surrounding neighbourhood as shown in **Table 5-21**. The option would also provide two access points for a better distribution of trips and for emergency access. The option would require an exclusive westbound Sunset Boulevard left turn lane at the Lanark County Office (25 m of vehicular storage), a new bridge across the Tay River at the Lanark County Office, and the upgrading to the existing Perth Golf Course bridge and access to a collector road standard along with sidewalks for pedestrians.

The design of the bridge will require hydraulic modelling to demonstrate that for any of the return-period events modelled by RVCA in their Flood Risk Mapping (RVCA 2013), there is no increase in water level at the cross-sections in the existing model. This will likely mean that the abutments are placed near the existing limits of the flood plain. In addition, construction within existing wetlands will require additional investigation to demonstrate: that the hazard associated with organic soils can be mitigated effectively; that the ecological impacts can be mitigated effectively; and that a permit under O.Reg.174/06 can be issued.

The design of the roadways system includes crossings of narrow strips of flood plain, and this is discussed further in Section 6.1.6.

Table 5-21 - Transportation Option Evaluation

Criteria	Option 1 – Upgrade Existing Bridge	Option 2 – New Bridge Crossing at County Property for 35% of site traffic	Option 3 – New Bridge Crossing at County Property for 65% of site traffic	Option 4 – New Bridge Crossing at North Street for 1-way in and Existing Bridge for 1-way out
Technical				
Feasibility	-	+	+	-
Compatibility	-	+	+	-
Constructability	0	+	+	0
Maintainability	+	0	0	0
Environmental				
GHG emissions	-	-	-	-
Terrestrial	0	-	-	-
Aquatic	0	0	0	-
Groundwater	0	0	0	0
Surface water	0	0	0	0
Cultural Socio-economic				
Displacement	0	0	0	-
Disruption	-	-	0	-
Aesthetics	0	0	0	0
Cultural Heritage	0	0	0	0
Adaptability	-	0	0	+
Planning objectives	-	0	0	+
Capital cost	+	0	0	0
Operating cost	+	0	0	0
Summary of results				
# Positives	3	3	3	2
# Negatives	6	4	2	7
Preference			P	

5.6.2 Active Transportation Assessment

It was determined that Option 1 is the preferred alternative due to the overall usability and compatibility with the area; it is expected to provide the most attractive recreation and active transportation options for the Town of Perth as well as the Western Annex development. Care will need to be taken in the design and construction phases to minimize disturbance of and/or restore the natural heritage features, including vegetation communities, aquatic communities, and terrestrial ecosystems. The relative scores for active transportation options for the Western Annex are summarized in **Table 5-22**.

Table 5-22 - Active Transportation Option Evaluation

Criteria	Option 1 – Multi-Use Pathway System	Option 2 – Limited Multi-Use Pedestrian and Separated Pathway System	Option 3 – Separated Pedestrian (Resident/Visitor) and Bicycle Pathway
Technical			
Feasibility	+	+	0
Compatibility	+	+	0
Constructability	-	-	+
Maintainability	+	+	-
Environmental			
GHG emissions	+	+	+
Terrestrial	0	0	+
Aquatic	0	0	0
Groundwater	0	0	0
Surface water	-	-	+
Cultural Socio-economic			
Displacement	0	0	-
Disruption	0	0	-
Aesthetics	+	0	-
Cultural Heritage	0	0	0
Adaptability	+	0	0
Planning objectives	+	0	-
Capital cost	+	0	+
Operating cost	0	0	-
Summary of results			
# Positives	8	4	5
# Negatives	2	2	6
Preference	P		

5.6.3 Water Service Assessment

For the Water Service, Option 3 is preferred due to the technical constraints of the site. It was found that providing a looped service within the development and connecting to Inverness Ave would provide redundancy within the system with the least associated cost. There are not expected to be any significant environmental impact differences between the alternatives, and all are given a neutral value. Similarly, differences in socio-economic impact are largely negligible, with Option 3 preferred as it has the best conformance with the Town's planning objectives despite a minor increase in potential disruption. Refer to Section 6.1.3 for further discussion of the preferred option.

Table 5-23 - Water Service Option Evaluation

Criteria	Option 1 – Single connection to North Street	Option 2 – Connection to Inverness Avenue & North Street	Option 3 – 2 Connections and offsite upgrades on Inverness Avenue
Technical			
Feasibility	-	-	+
Compatibility	-	-	+
Constructability	0	0	0
Maintainability	-	-	+
Environmental			
GHG Emissions	0	0	0
Terrestrial	0	0	0
Aquatic	0	0	0
Groundwater	0	0	0
Surface water	0	0	0
Socio-economic			
Displacement	0	0	-
Disruption	0	0	-
Aesthetics	0	0	0
Cultural Heritage	0	0	0
Adaptability	-	0	0
Planning objectives	0	0	+
Capital cost	0	0	0
Operating cost	0	0	0
Summary of results			
# Positives	0	0	4
# Negatives	4	3	2
Preference			P

5.6.4 Stormwater Management Assessment

The Preferred alternative for the Stormwater Management of the Tayview Development would be to discharge drainage from the urbanized area directly to Blueberry Creek, as far upstream as possible. The preferred alternative for the Golf Course Subdivision would be to collect runoff in sediment forebays that provide a relatively short residency time, and then discharge to a linear LID to provide quantity control and additional quality treatment.

Table 5-24 - Stormwater Management Option Evaluation

Criteria	Tay View		Golf Course		
	Discharge to Blueberry	Discharge to Tay & Blueberry	Discharge to existing drains	Discharge not to Tay	Discharge not to Tay + LID
Technical					
Feasibility	0	-	0	0	-
Compatibility	0	-	-	0	0
Constructability	0	0	0	0	0
Maintainability	0	0	0	0	+
Environmental					
GHG Emissions	0	0	0	0	0
Terrestrial	0	0	0	0	0
Aquatic	0	0	0	0	0
Groundwater	0	0	0	0	+
Surface water	0	0	0	0	0
Cultural Socio-economic					
Displacement	0	0	0	0	0
Disruption	0	0	-	-	-
Aesthetics	0	0	0	0	+
Cultural Heritage	0	0	0	0	0
Adaptability	0	0	0	0	+
Planning objectives	0	0	0	0	0
Capital cost	0	0	0	0	-
Operating cost	0	0	0	0	+
Summary of results					
# Positives	0	0	0	0	5
# Negatives	0	2	2	1	3
Preference	P				P

5.6.5 Wastewater Management Assessment

It was found that the three proposed wastewater servicing options had similar scores in terms of overall capital costs and socio-economic impacts. The wastewater servicing options are not expected to have any significant difference in environmental impact and have been assigned neutral scores. The preferred option was found to be a 50/50 split between Inverness Ave and North St due to the possibility of phasing the infrastructure investment according to the development rate thereby reducing initial investment and minimizing maintenance and disruption impacts.

Table 5-25 - Wastewater Management Option Evaluation

Criteria	Option 1 - Inverness Ave	Option 2 - North St	Option 3 - 50/50 Split
Technical			
Feasibility	-	+	+
Compatibility	-	+	+
Constructability	+	-	0
Maintainability	0	-	0
Environmental			
GHG Emissions	0	0	0
Terrestrial	0	0	0
Aquatic	0	0	0
Groundwater	0	0	0
Surface water	0	0	0
Cultural Socio-economic			
Displacement	-	0	0
Disruption	-	0	0
Aesthetics	0	0	-
Cultural Heritage	0	0	0
Adaptability	0	0	+
Planning objectives	-	0	+
Capital cost	0	0	0
Operating cost	0	-	-
Summary of results			
# Positives	1	2	4
# Negatives	5	3	2
Preference			P

6 PREFERRED SOLUTION

6.1 Preferred Design

6.1.1 Transportation

The traffic assessment determined that Option 3, which placed trips from 120 units developed on the Golf Course property to the existing Peter Street access and trips from 530 units to the Lanark County property access, would result in the lowest impact on residents along Peter Street and surrounding neighbourhood. The option would also provide two access points for a better distribution of trips and for emergency access. The option would require an exclusive westbound Sunset Boulevard left turn lane at the Lanark County Office (25 m of vehicular storage), a new bridge across the Tay River at the Lanark County property, and the upgrading to the existing Perth Golf Course bridge and access to a collector road standard along with sidewalks for pedestrians. Refer to **Figure 6-1** for the preferred traffic plan.

6.1.2 Active Transportation

The preferred Active Transportation option is Option 1 – a multi-use pathway system throughout the development that connects with on-street bicycle routes as well as pedestrian paths. The proposed system would provide attractive recreation opportunities with a focus on accessibility, waterfront viewing points, and interconnectivity. Pedestrian-only paths would be a 1.8 m wide while any multi-use sections would be 3.0 m to accommodate cyclists, wheelchairs, and golf carts. It is recommended to include signage and way-finding maps at junction points to facilitate active transportation travel both within and between proposed developments as well as the Town of Perth and other regional trails such as The Great Trail (formerly the Trans-Canada trail) and The Rideau Trail. Furthermore, it should be noted that cycling connectivity would be enhanced by extending the paved shoulders of Christie Lake Road to match those of Sunset Blvd; however, this may require coordination with Lanark County. Refer to **Figure 6-2** for the proposed layout relative to the planned active transportation network within the area.

6.1.3 Water Supply

The preferred Water Supply solution is to connect to the existing water distribution system at two locations, to the existing 300 mm on North Street and to provide a 300 mm connection to Inverness Avenue. This solution requires off-site watermain upgrades along Inverness Avenue. The existing 150 mm watermain is to be replaced by a new 300 mm watermain up to Sunset Boulevard. Refer to **Figure 6-3**.

This solution provides sufficient fire flow as well redundancy to the water distribution system in case of breakage of the watermain.

Connection to the existing watermains will require crossing the Tay River at two locations near the proposed bridge locations. The methodology for the crossings of the Tay River will be determined during the detailed design phase following a focused geotechnical analysis. Methods to be reviewed will include attaching the watermain to the bridge, and trenchless methods such as jack and bore. The costing of the preferred alternative provides for a jack and bore installation.

Supplemental elevated fire storage will be required as part of any further development within the municipality. The existing 945m³ elevated storage tank was built in 1939. The Town of Perth is currently conducting a review and analysis for storage tank replacement.

It is assumed that the work on Inverness can be done coincident with the Town of Perth's Infrastructure Renewal program. If this is not the case, the alignment may need to be reconsidered. A double road allowance exists beside the County Office, and it might provide an alternative location for servicing.

6.1.4 Stormwater Management

The preferred stormwater solution would be to collect the runoff from the urbanized portion of the site by conventional catchbasins and sewers draining to a SWM facility, as shown in **Figure 6-4**.

For the Tayview Development, the wet-pond would be designed to be conventional, with an inlet and outlet above the 1:100 year water level in the adjacent Blueberry Creek, and it would provide Enhanced protection to downstream fish habitat. It would discharge as far upstream on Blueberry Creek as possible and would manage runoff for storm events up to and including the 1:100 year event.

For the Golf Course Subdivision, there would be 3 sediment forebays, each located partially within the existing flood plain, and would be constructed with inlet and outlet elevations above the 1:100 year water level (Option 3). The ponds would be sized to provide active and permanent storage per the MOE Stormwater Design Guidelines, but all quantity storage and some additional quality treatment would be provided downstream within a linear LID feature to ensure that better than Enhanced Protection is provided. This LID would also intercept any runoff from site that is not collected by storm sewers, and all of the water would drain slowly into the Grant's Creek PSW. The bottom of the LID would be set above the 1:2 year water elevation, and the operating range would allow the water in the swale to draw down 95% in 24 hours, without exceeding the peak pre-development flow rate into the PSW. There would be a berm constructed between the LID and the PSW, that would have specifically designed porosity and overflow locations to provide adequate flow attenuation. The berm would be used as part of the active transportation system.

As part of the design of the subdivision (including the linear LID feature), a Hydrologic Impact Study would have to be conducted to demonstrate that there are no negative impacts on hydrologic function of the PSW as a result of the development. At the time of this report, the Conservation Authority has a policy requiring an HIS, but no policy regarding the requirements of that HIS. In the absence of such a policy, it is recommended to follow the approach laid out in **Appendix G**. In addition, a water balance for the subdivision as a whole will be required prior to applying for draft plan of subdivision

No offsite costs would be associated with the preferred alternative.

6.1.5 Wastewater Management

The preferred wastewater solution is to divide the sanitary flows 50/50 between North St and Inverness Ave. This would strike a balance between providing capacity for the ultimate build-out of the Western Annex development without requiring large up-front capital costs. It is expected that the initial development phase would be the south-eastern portion with sanitary services tying into the North St sewers. By planning for a second pump station that would discharge by forcemain to the sanitary sewer on Inverness to ultimately accommodate the later development phases, the connection at North St can be sized appropriately for initial development, thereby reducing initial capital costs and avoiding an excessively deep excavation which would also pose operating and maintenance challenges. As shown in **Table 5-26** above, for technical feasibility, constructability, and minimization of socio-economic disruption, Option 3 – a 50/50 split of flows between North St and Inverness Ave is the preferred wastewater management strategy for the Golf Course development in the Western Annex. Refer to **Figure 6-5**. The second pump station would be designed to discharge its overflow pipe to the SWM facility on the other side of the roadway, to ensure that no discharges upstream of the water intake of the water treatment plant.

It is assumed that the work on Inverness can be done coincident with the Town of Perth's Infrastructure Renewal program. If this is not the case, the alignment may need to be reconsidered. A double road allowance exists beside the County Office, and it might provide an alternative location for servicing.

6.1.6 Work Within a Floodplain

The preferred transportation and infrastructure solution for the Golf Course property development includes construction with the flood plain. Per PPS policy, residential land development on 'islands in the flood plain' requires demonstrating that the 'islands' can be safely accessed during flood events. This would require the creation of infrastructure. Per RVCA policy, the creation of infrastructure within the flood plain can only be done through an EA process where it is shown that there is no negative impact on flooding, erosion, pollution, or the conservation of land. There are 3 specific locations where this has to be considered.

Phase 1

Within Phase 1, it is proposed to construct a road and a SWM facility within the existing flood plain. Refer to **Figure 6-6**. Most of this flood plain is currently the existing parking lot, and some of it is the fairway for Hole 18. A small portion of it is within the existing forest land. The existing hydraulic modelling of the Tay River already considers this connection closed, so closing this connection would not negatively affect flooding, erosion, or pollution. Conservation of Land is described by RVCA as the ecological function of the affected land. Due to the presence of the existing parking lot that is to be removed, there will be a net increase in ecological function if it is replaced with plantings of forest species, consistent with the existing forest. A condition shall be put in all future subdivision work to the effect of:

In the Phase 1 Golf Course Lands, lands that are disturbed for the creation of municipal infrastructure (roads, utilities, services) and raised out of the flood plain shall be restored in the immediate vicinity of the work done so that there will be no net loss of forest cover area, and no net increase in impervious (asphalt, concrete, or compacted granular) surface area. Plantings will be of local species, as mature as reasonably possible to ensure viability, and those planted outside of the right of way shall be maintained at the developer's expense for a minimum of 5 years after substantial completion.

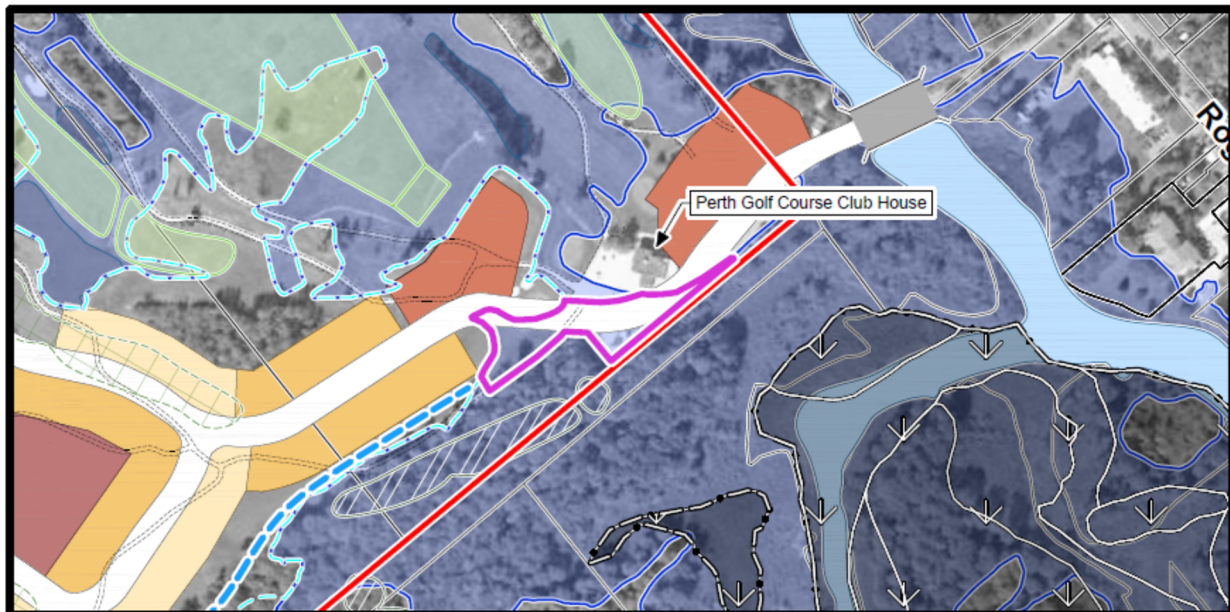


Figure 6-6 - Work Within the Flood Plain – Phase 1

Phase 2

Within Phase 2, it is proposed to construct a road and a SWM facility within the existing flood plain, in two locations. Refer to **Figure 6-7**.

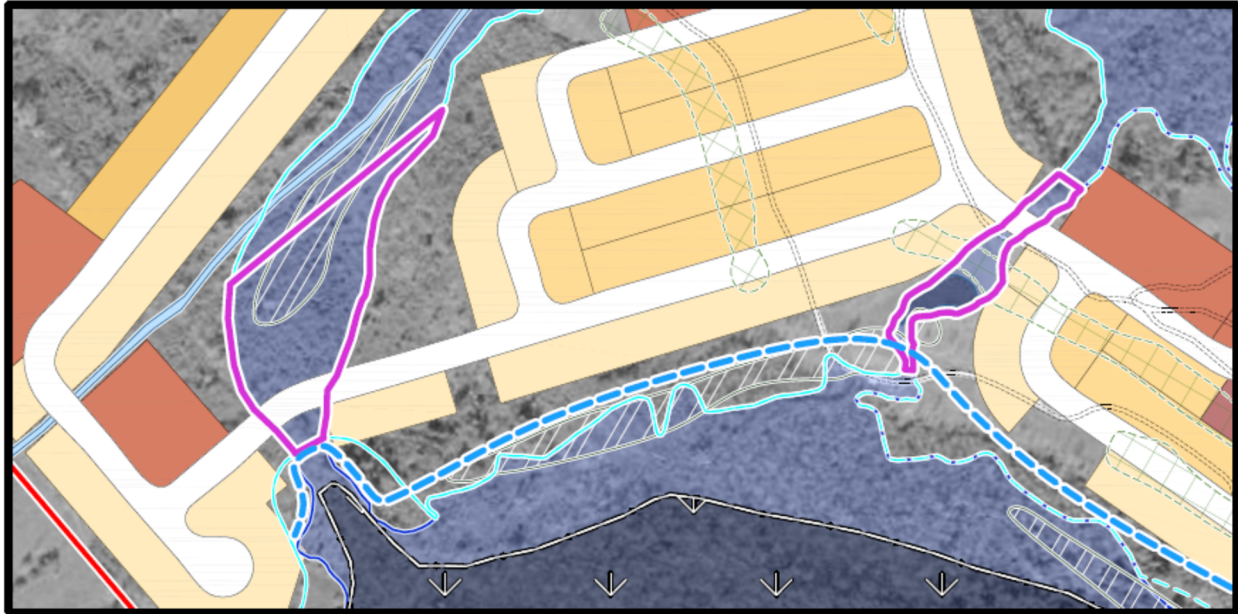


Figure 6-7 - Work Within the Flood Plain – Phase 2

The eastern connection is to be cut-off from the Tay River flood plain, to ensure that any discharges from the sanitary pump station are incapable of being directed toward the intake for the Perth Water Treatment Plant, and to allow for the creation of a continuous linear SWM feature. The area to be removed from the flood plain is currently a water feature, golf green, golf cart path, and fairway. It would be raised out of the flood plain, to ensure that all discharge from the site can be directed to the linear SWM feature, prior to release to the Grant's Creek PSW. Closing this connection would have no negative impact of flooding, erosion, or pollution – the flood plain modelling by RVCA already assumes this connection has been closed off, and no flow between Tay River and Grant's Creek is accounted for, so this development will not change the regulatory flood levels; there is currently effectively no erosion or sediment transport, and there will be no change with this proposal. With the current limited ecological function as a golf course, there will be a way of ensuring that ecological functions can be increased.

The western connection is to be cut off from the Tay River flood plan, to allow for the creation of a continuous linear SWM feature. As the SWM feature is constructed above the flood elevation of Grant's Creek wetland, all of the land draining to it must also be above the flood elevation, necessitating the filling of approximately 0.5 ha of land. This land is part of a regrowth area, with more mature vegetation growing along the old hedgerows. While it is possible to clear, raise, and replant the area to allow it to return to a forest, due to the surrounding disturbance associated with residential development, it is not clear that this would be the most effective manner to attempt to maintain the ecological function. Rather, it is proposed that the Town of Perth and the RVCA are to negotiate the most appropriate method ensuring the requirement for Conservation of Land is maintained.

A condition shall be put in all future subdivision work to the effect of:

In the Phase 2 Golf Course Lands, lands that are disturbed for the creation of municipal infrastructure (roads, utilities, services) or lands that are within the regulatory flood plain, and are proposed to be raised out of the flood plain, shall be restored in the immediate vicinity of the work done. Any loss in forest cover, or increase in impervious area, will be compensated at the Town of Perth's expense, at a location and in a manner that is mutually acceptable to the Town of Perth and RVCA.

6.1.7 Climate Change Adaption and Mitigation

While the Infrastructure Master Plan is considering the impacts of climate change and GHG emissions, there are several additional measures that could be addressed by the Town and the developers during the subdivision planning process. This includes:

- Solar orientation of streets and homes
- Low water flow fixtures throughout the buildings
- Rainwater harvesting
- Rooftop solar hot water
- Electric car recharging points
- Net-zero-ready home designs

In addition, it is suggested that the Town of Perth investigate the use of forest cover policies for the Town as a whole in keeping with the suggestions from the American Forests, Green Infrastructure Ontario, and Tree Canada.

It is expected that the Town will seek to meet a goal of urban tree canopy cover of a minimum of 30%, and preferably greater than 40% as a means to both adapt to and mitigate climate change.

6.2 Preferred Solution Opinion of Probable Costs

A Class 'D' cost estimate was prepared to determine the overall project costs. The cost components and descriptions are provided in **Table 6-1**.

Table 6-1 - Class 'D' Estimate Cost Components

Cost Component	Description	Class D Estimate Class	Estimate Values - Remarks
Construction	Construction Contract, Traffic Management and Related Services during Construction	Rough, Order-of-Magnitude estimate based on historical costs for similar work	Unit prices based on the City of Ottawa Spec Code List unit cost (for unit cost contracts)
Engineering and Architectural Services	Planning, Design, Construction Administration, Surveying, Studies	15% - 25% of Construction Estimate	Used 20%
Utilities	Relocation of Existing Utilities	5% - 20% of Construction Estimate	Used 5% due to established utility corridors
Property	Land Purchases, Leases, Easements, Legal and Appraisal Services	---	Used 1%
Town of Perth Internal Costs	Project Management, Traffic Management, Water and Sewer Services	7% to 10% of Construction Estimate	Used 10%
Miscellaneous	Permits, Public Art, Communications	5% of Construction Estimate	Used 5%
Operating and Maintenance Costs (Annualized)	Costs associated to the annual operation and typical expected maintenance	1% to 3% of Construction Estimate	Used 2%
Contingency	In advance of detailed design, significant unanticipated details can be overlooked	40% to 50%	Used 40%

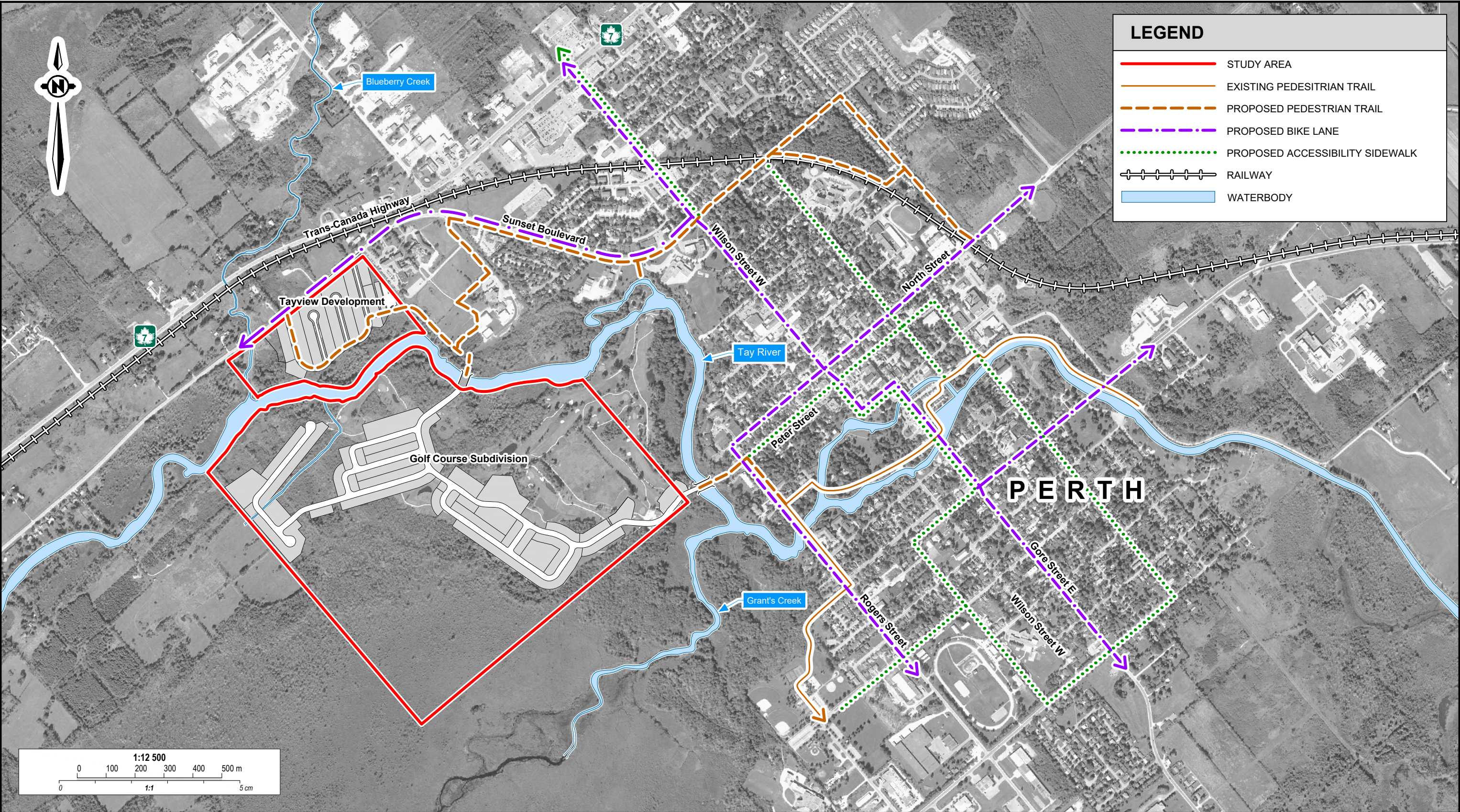
The Class 'D' cost estimate summary for the preferred transportation and servicing is provided in **Table 6-2**, detailed summary tables are provided in **Appendix H**

Table 6-2 - Opinion of Probable Cost Class 'D' Cost Estimate Summary

Category	Tayview	Golf Course	Offsite
Transportation (Bridge Crossings and Traffic Signal Upgrades)	0	\$11.025 M	\$190,000
Active Transportation	\$38,350	\$83,500	\$36,050
Road Construction and Site Preparation	\$1,475,000	\$2,385,000	0
Watermain	\$1,345,000	\$4,625,000	\$350,000
Storm Water Management	\$1,560,000	\$5,220,000	0
Wastewater Management	\$1,000,000	\$4,150,000	\$543,000
Construction Costs Sub-Total	\$5.42 M	\$27.5 M	\$1.1 M
Engineering and Architectural Services (15%)	\$810,000	\$4,125,000	\$170,000
Utilities (10%)	\$540,000	\$2.75 M	\$110,000
Property (1%)	\$54,000	\$275,000	\$10,000
Town of Perth Internal Costs (5%)	\$271,000	\$1.375 M	\$60,000
Miscellaneous (5%)	\$271,000	\$1.375 M	\$60,000
Annualized Operation and Maintenance Costs (2%)	\$110,000	\$550,000	\$20,000
Sub-Total	\$7.47 M	\$37.9 M	\$1.55 M
Contingency (40%)	\$3.0 M	\$15.2 M	\$620,000
Total Opinion of Probable Costs Class 'D' Cost Estimate (With HST)	\$10.5 M	\$53.1 M	\$2.17 M

Limitations

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labour, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's opinion of probable construction costs are made on the basis of the Consultant's professional judgement, current knowledge and past experience. The Consultant makes no warranty, express or implied, that the bids or the negotiated cost of the Work will not vary from the Consultant's opinion of probable construction cost. The provided Cost Estimate is an opinion of probable costs and not a guaranteed maximum price.



LEGEND

STUDY AREA

EXISTING PEDESITRIAN TRAIL

PROPOSED PEDESTRIAN TRAIL

PROPOSED BIKE LANE

PROPOSED ACCESSIBILITY SIDEWALK

RAILWAY

WATERBODY

Jp2g Consultants Inc.

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Phone: (613)828-7800, Fax: (613)828-2600

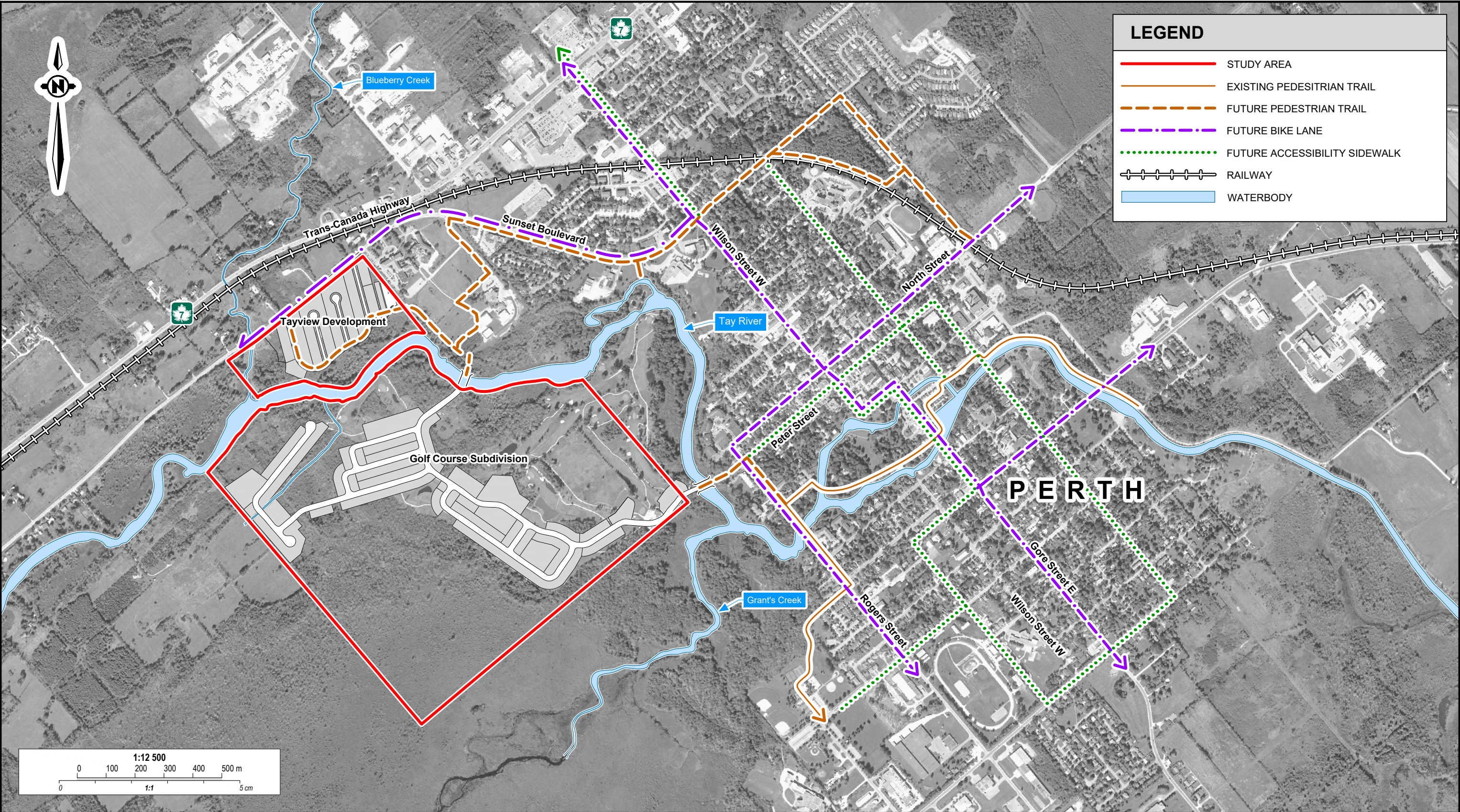
Infrastructure Master Plan Western Annexed Area

Town of Perth

Preferred Transportation

DESIGNED: D.N. / K.M.	PROJECT No.: 2161774A
DRAFTED: R.W.	REVISION DATE: 2019-11-05
CHECKED: DN.	APPROVED: K.M.
SCALE: As shown	REVISION No.:
	FIGURE: 6-1

Folder: \\JP2GOTTNAS\MAIN DATA\DOCS\1 - CIVIL\ACTIVE\2161774A - PERTH MASTER PLAN CLASS EA\07 DRAWINGS\ONGOING\INFRASTRUCTURE MASTER PLAN | Drawing: 6.1 - preferred transportation.dwg | Layout: proposed transport routes | Print date: 12:47 PM November 27, 2019





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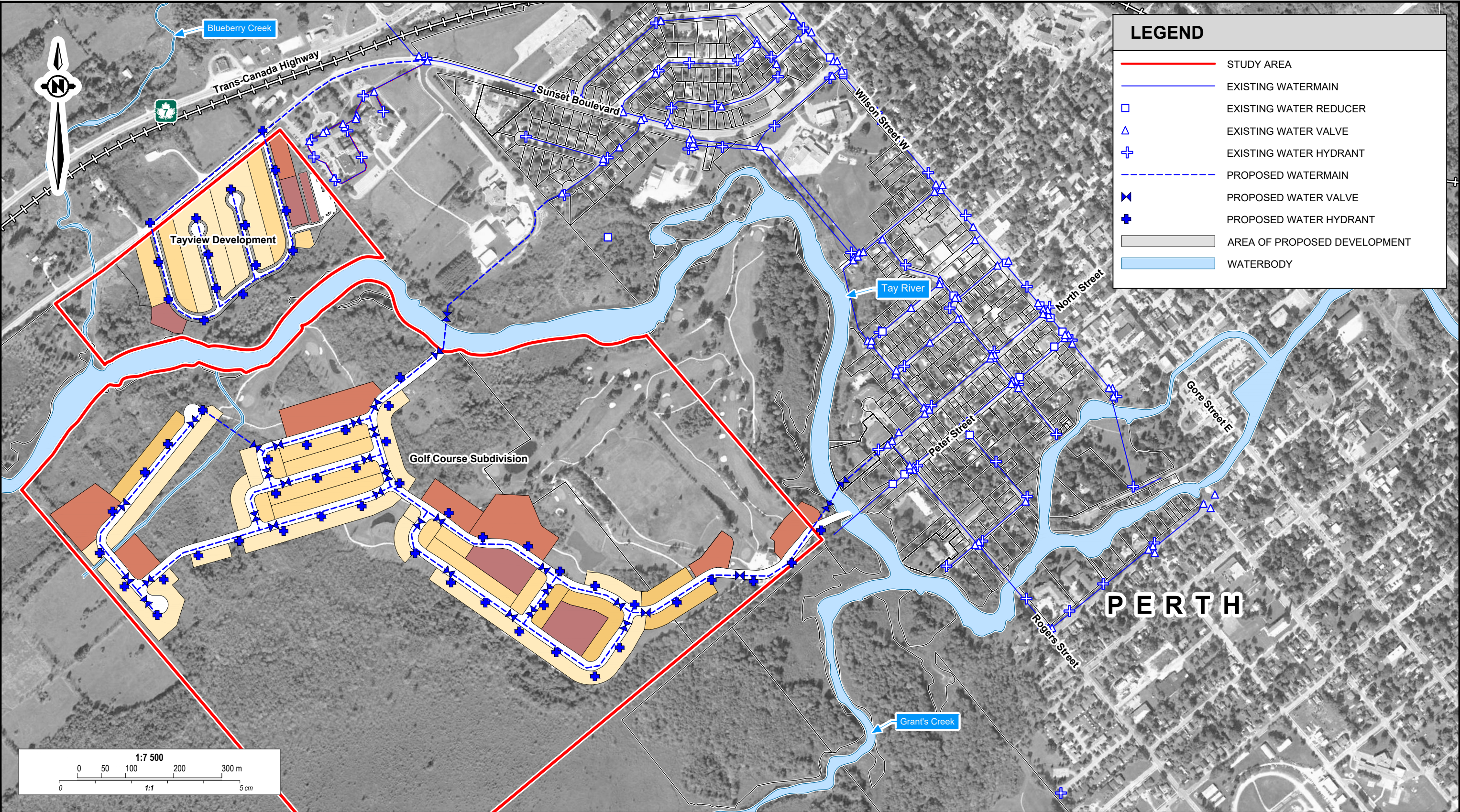
1150 MORRISON DRIVE, SUITE 410, OTTAWA, ON
Phone: (613)828-7800, Fax: (613)828-2600

Infrastructure Master Plan Western Annexed Area

Town of Perth

Official Plan: Active Transportation Routes

DESIGNED: D.N. / K.M.	PROJECT No.: 2161774A
DRAFTED: R.W.	REVISION DATE: 2019-11-05
CHECKED: D.N.	APPROVED: K.M.
SCALE: As shown	
FIGURE: 6-2	



LEGEND

- STUDY AREA
- EXISTING WATERMAIN
- EXISTING WATER REDUCER
- EXISTING WATER VALVE
- EXISTING WATER HYDRANT
- PROPOSED WATERMAIN
- PROPOSED WATER VALVE
- PROPOSED WATER HYDRANT
- AREA OF PROPOSED DEVELOPMENT
- WATERBODY

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Infrastructure Master Plan Western Annexed Area
Town of Perth

Preferred Option: Water Distribution Network

DESIGNED: D.N. / K.M.

PROJECT No.: 2161774A

DRAFTED: R.W.

REVISION DATE: 2019-11-05

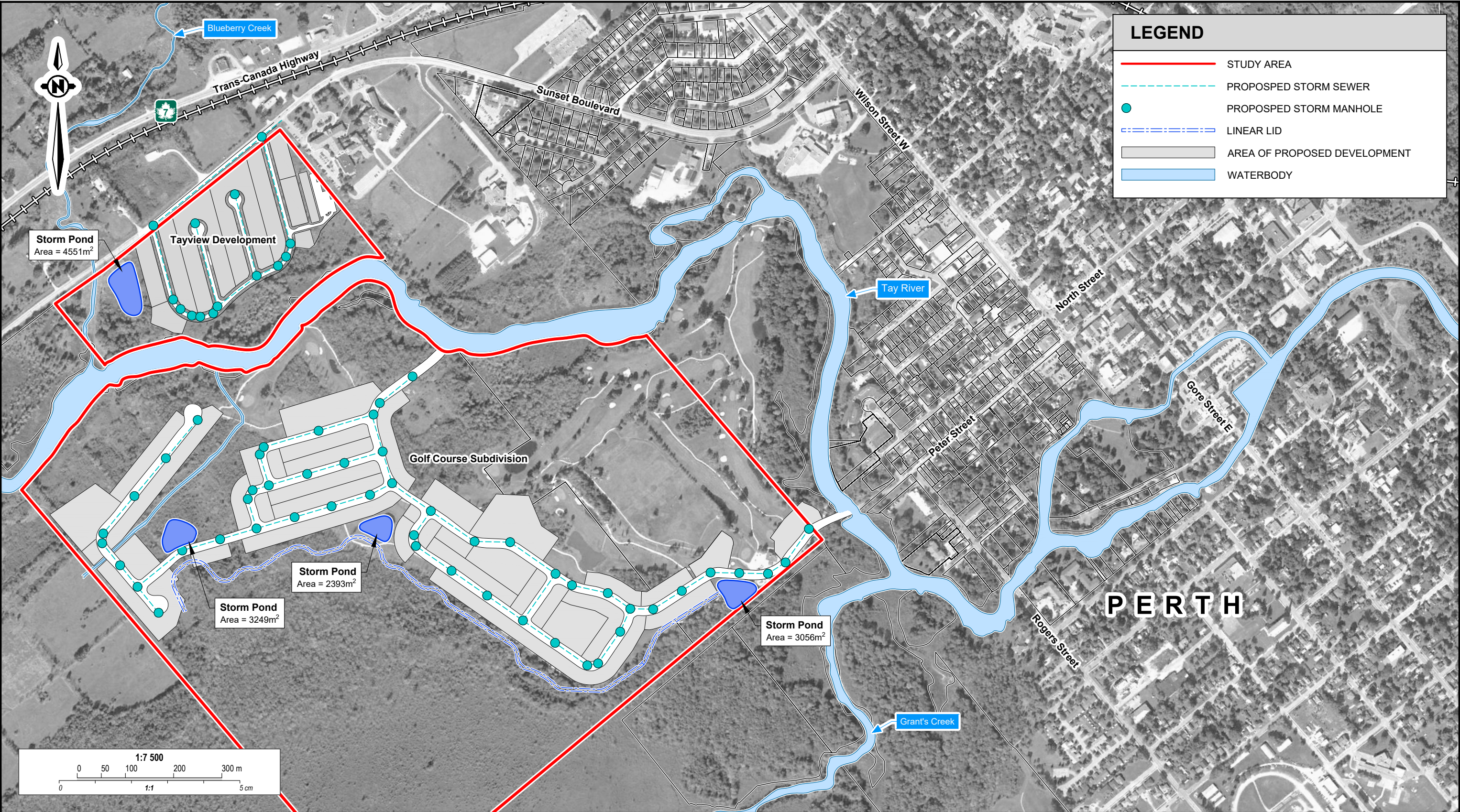
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APPROVED: K.M.

REVISION No.:

SCALE: As shown

FIGURE: **6-3**





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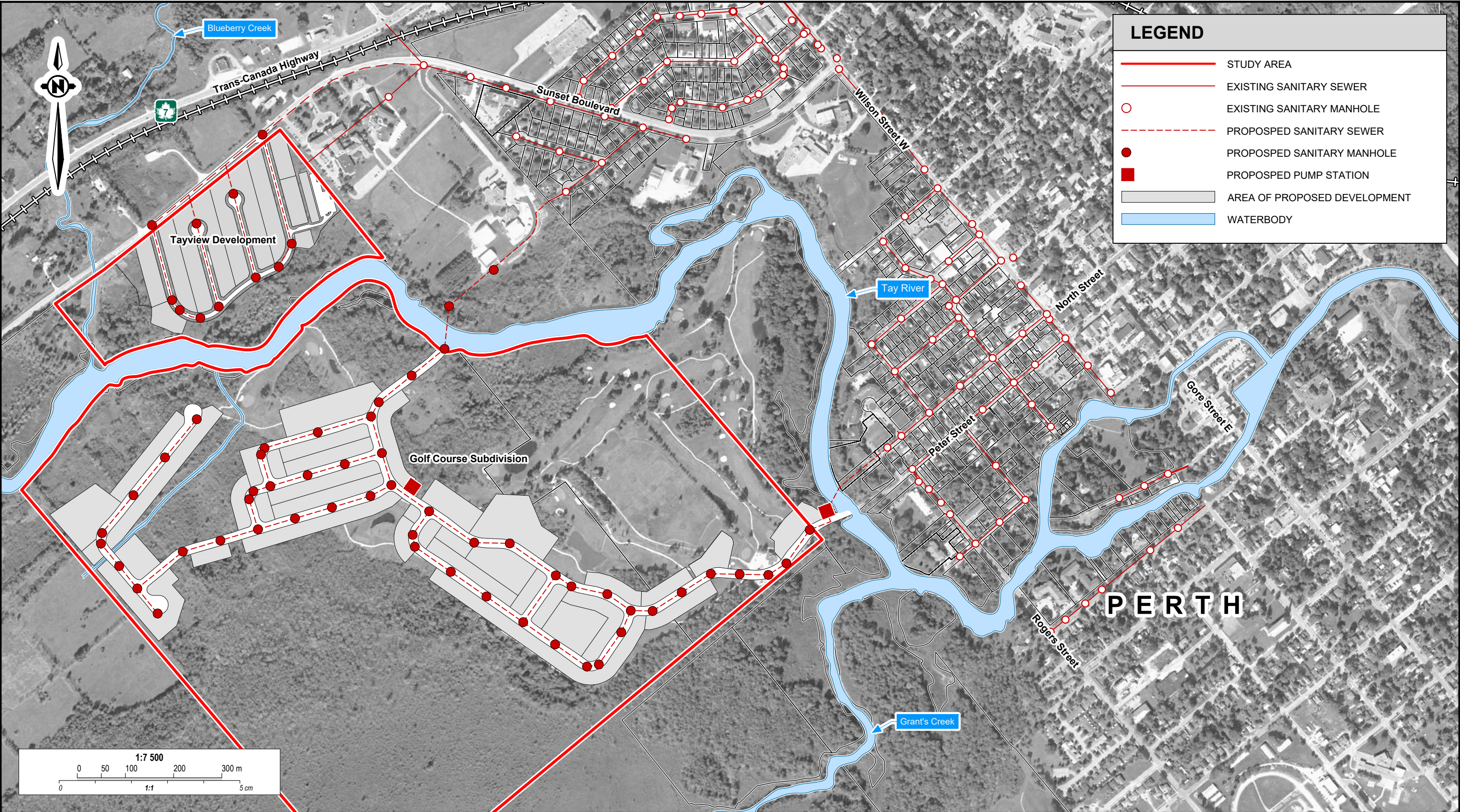
1150 MORRISON DRIVE, SUITE 410, OTTAWA, ON
Phone: (613)828-7800, Fax: (613)828-2600

Infrastructure Master Plan Western Annexed Area

Town of Perth

Preferred Option: Storm Sewer Network

DESIGNED: D.N. / K.M.	PROJECT No.: 2161774A
DRAFTED: R.W.	REVISION DATE: 2019-11-05
CHECKED: D.N. APPROVED: K.M.	REVISION No.:
SCALE: As shown	FIGURE: 6-4





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Phone: (613)828-7800, Fax: (613)828-2600

Infrastructure Master Plan Western Annexed Area

Town of Perth

Preferred Option: Sanitary Sewer Network

DESIGNED: D.N. / K.M.		PROJECT No.: 2161774A
DRAFTED: R.W.		REVISION DATE: 2019-11-05
CHECKED: D.N.	APPROVED: K.M.	REVISION No.:
SCALE: As shown		FIGURE: 6-5

7 CONSULTATION PROGRAM

7.1 Master Plan Process

The Infrastructure Master Plan is being planned as a Schedule 'B' project. Schedule 'B' projects involve the completion of two (2) Phases of investigation which include:

Phase 1: Identification of the problem or opportunity.

Phase 2: Identification of the alternative solutions and selection of a preferred solution.

The Master Plan enables the Town to identify the needs for a specific study area and establish broader infrastructure alternatives to consider, which may lead to better solutions. The Master Plan would then be used in support of further work for specific Schedule 'B' projects, or further work in Phases 3 and 4 for Schedule 'C' projects.

Phase 3: Identification of the alternative design concepts for the preferred solution and selection of the preferred design concept.

Phase 4: Preparation of the Environmental Study Report and review.

Mandatory public and agency consultation is required under the Class EA process for Schedule 'B' projects:

Phase 2 – Public Comment Invited

Phase 4 – Notice of Completion

For Master Plans, requests for an order to comply with Part II of the EA Act are only considered by the MOECC for the specific projects identified in the Master Plan and not the Master Plan itself.

It is extremely important, not only to service and allow for the growth of the Western Annexed Area but also for the sustainable development of the Town as a whole, that meaningful public participation is obtained throughout the study process. This combined with the ongoing concern with the flooding and water quality of the Tay River, results in the potential of various interest groups and individuals participating in the consultation process with only their own agenda in mind

The public and agency contact requirements for this study are summarized as follows:

1. Notice of Study Commencement – published in the local newspaper (2 consecutive times) and posted on the municipal website on July 18, 2016. Also a Notice was filed with review agencies, utility companies, and key stakeholders requesting comments on August 9, 2016.
2. Notice of Public Information Centre (PIC) – requesting public comment published in the local newspaper (2 consecutive times) and posted on the municipal website on March 6, 2019.
3. The PIC involved a number of static displays summarizing the findings and recommendations of Phase 1 and Phase 2 as a preliminary identification of the recommended solution and a presentation with questions/answers at the Planning Advisory Committee Meeting held March 25, 2019. The public were asked to sign in for the record and if they wish to obtain future correspondence regarding the project.

4. Consult with Key Agencies to obtain comments on the draft Infrastructure Master Plan and the recommended preferred solution. The Rideau Valley Conservation Authority provided comments dated March 22, 2019. A meeting was held April 18, 2019. This report has included responses to the issues identified.
5. Notice of Completion – When the Infrastructure Master Plan was completed a Notice of Completion was published August 7, 2019 and sent to all interested parties. A minimum 30 calendar days from the date of the notice was provided for comments. If concerns regarding a specific project (not the Master Plan) cannot be resolved through discussion with the municipality during that period a person may request that the Minister of the Environment, Conservation and Parks (MECP) make an order for the project to comply with Part II of the Environmental Assessment Act (referred to a Part II Order). The request must use a Part II Order Request Form and be sent to the:
 1. Minister of the Environment Conservation and Parks
Ferguson Block 77 Wellesley Street West, 11th Floor
Toronto, ON M7A 2T5
 2. Director Environmental Assessment and Permissions Branch
135 St. Clair Avenue West, 1st Floor
Toronto, ON M4V 1P5
 3. Director of Development and Protective Services
Town of Perth
80 Gore Street East
Perth, ON K7H 1H9
6. Filing with MECP – if after the review period there are no Part II Orders then a Notice is filed with the MECP Environmental Assessment and Permissions Branch and the project may proceed.

7.2 Public Consultation

The Notice of Study Commencement was published in the local newspapers on July 19, 2016. The property owners were contacted directly in a letter dated August 9, 2016, and responses were received from several residents. A Public Consultation Centre (PCC) was held on March 25, 2019 at the Town of Perth Municipal Building. The notice was published in the Perth Courier on March 6 and 13, 2019 and notice was sent directly to the landowners and key agencies on March 11, 2019. Jp2g and the Town's Director of Development and Protective Services were available to meet and answer any questions. That evening Jp2g made a presentation as part of the Planning Advisory Committee meeting and answered questions from Committee (PAC) members and the general public. Subsequent meetings were held with the landowners. A summary of questions and responses is provided in **Table 7-1**, copies of public notices are included in **Appendix I**.

Table 7-1 – Public Consultation

Comment/Question	Response
1. Sept 27/16 - The Golf Course site may be unsuitable for development as it is habitat for Blanding's Turtle.	The August 2016 consultation with MNRF confirmed the properties are potential habitat for Blanding's Turtle. The 2010 field surveys did not observe Blanding's Turtle. Site specific surveys will be required prior to development and may require permits under the Endangered Species Act.
2. May 24/17 - What is the progress of the bridge evaluation and impact on Tayview Development property?	The transportation analysis was ongoing, and alternative locations of a bridge will be evaluated.
3. Aug 7/18 – What is the progress of the study and expected dates of completion?	Study ongoing, currently assessing transportation and servicing options.
4. Mar 25/19 – PCC - When will the study be completed?	The study recommendations will be presented to Council on April 2, 2019.
5. Mar 25/19 – PCC - How many residential units are proposed for the Golf Course and Tayview Developments?	Golf Course 650 mixed density units Tayview approx. 230 with potential commercial based on Concept Plans provided by the Owners.
6. Mar 25/19 – PCC - The Golf Course Phase 1 results in a loss of holes 17 and 18, will they be replaced and when?	The Concept Plan provided by the Golf Course proposes a redesign providing an 18 hole course. The design and scheduling would be done by the Owners.
7. Mar 25/19 – PCC - Is a sanitary sewer pump station required for the Golf Course Phase 1?	Yes
8. Mar 25/19 – PCC - How many residential units are currently approved for the Golf Course and Tayview properties? What is the status of Official Plan Amendment No. 16?	Under the current Official Plan Golf Course 120, and Tayview 70. OPA No. 16 proposes to redesignate all the lands for future development, and is subject to the Lanark County approval.
9. Mar 25/19 – PCC - Are improvements needed for the Peter St. bridge for Phase 1? When is the new bridge required?	A pedestrian addition is required for Phase 1. Based on the traffic analysis 120 units can be built using only the Peter St. access.
10. Mar 25/19 – PCC - Are the residential units approved for Golf Course Phase 1 limited to 120, previously proposing 170?	Under the existing Official Plan it is limited to 120. If OPA No. 16 is approved and a traffic analysis supports additional units they could be considered.

11. Mar 25/19 – PCC – What has to be done to get subdivision approvals?	A number of site specific studies such as an Environmental Impact Study, Archaeological Assessment and Preliminary Stormwater Management Plan would be required.
12. Mar 25/19 – PAC – Based on the recent RVCA comments do they significantly effect the feasibility of either of the developments?	These comments related to the floodplain and wetlands were to be expected and will be addressed in the final report

7.3 Agency Consultation

On August 9, 2016 letters were sent to ten (10) agencies and four (4) utility companies. Replies were received from 6 agencies and 1 utility. Subsequent agency consultation were conducted and are included in **Appendix I**. A summary of comments and responses is provided in **Table 7-2**.

Table 7-2 – Agency Consultation

Comment/Question	Response
1. July 18/16 RVCA Summary of study requirements	Acknowledge pre-study requirements
2. Aug 11/16 MNRF response to Information Request	Species at risk surveys valid for 1-2 years
3. Aug 25/16 Enbridge provided general location of facilities	To be addressed in design
4. Aug 26/16 MNRF please provide further notice as project proceeds	Notices sent
5. Sept 9/16 MOECC from Vicki Mitchell EA Coordinator, Consultation requirements	Acknowledged Class EA process
6. Sept 26/16 MTCS archaeological and cultural heritage resource requirements	To be addressed for the subdivision application
7. Mar 22/19 RVCA comments on draft report dated January 31, 2019	Detailed response in Table 7-3

Table 7-3 – RVCA Consultation

	RVCA comment	Where comment addressed in report	How comment is addressed
General Comments			
1.1	The future bridge crossing goes onto lands in the Township of Tay Valley. This will require significant engineering, hydraulic analysis of the floodplain, consideration of the ecological impact of the bridge and a permit will be required.	Section 8	A Schedule C Project under the Municipal Class EA

1.2	The IMP appears to show land being serviced into what is currently designated "natural heritage feature" by the Town of Perth's Official Plan. The related Official Plan Amendment (OPA-16) makes no change to this designation.	Figure 6-1 to 6-5	It is not intended to revise the NHF designation. Lot lines have been revised.
1.3	The RVCA agrees with the recommendation in Section 3.1.4 of the IMP that a new SAR survey should be carried out on site. We would suggest that it be a component of an appropriate EIS, described elsewhere in this letter.	Section 3.1.4	Additional studies will be required as part of the Subdivision planning process
1.4	the development in the Golf Course Lands and Tayview Development are proposed to be urbanized, draining by conventional storm sewers, treated within stormwater management facilities located in the existing low areas, and draining to the Tay River, Grants Creek Wetland or Grant's Creek. The reviewing planner would like to point out that the "existing low areas" are all located within the regulatory floodplain. As stated in the O.Reg Section 17 4/06 of this report: public infrastructure and various utilities shall not generally be permitted within the 1: 100 year regulatory floodplain except where the development has been approved through a satisfactory Environmental Assessment process clearly demonstrating that there is no viable alternative and / or if it has been demonstrated to the satisfaction of the Conservation Authority that the control of flooding, erosion, pollution or the conservation of land will not be affected.	Section 6.1.6	No impact on flooding, erosion, pollution. Town and RVCA to negotiate to ensure conservation of land will not be affected.
1.5	The reviewing planner understands that Option 3 has been selected as the preferred stormwater conveyance and treatment option as part of the IMP. The reviewing planner appreciates that this option proposes pre-development stormwater flows which will equal post-development flows, but it is not clear if 80% TSS will be achieved. The option indicates that the ponds will achieve 60% TSS, and that the linear retention facility will complete the remaining treatment. However, the IMP does not specify that 80% will be achieved by the overall system. Please clarify that the overall stormwater management system will be able to meet this target.	Section 5.4.1	Infiltration system would achieve long-term efficiency of better than 80% TSS removal.
1.6	Our office would recommend that the Town consider completing a tree preservation plan such that every opportunity to preserve existing vegetation is explored.	Section 3.1.4	Additional studies will be required to inform development proposals
1.7	The transportation assessment does not respect the existing floodplain and there is no mention of the three identified floodplain crossings to implement the IMP. The IMP should address these matters in section 5.6.1.	Section 5.6.1 and Section 6.1.6	Flood plain crossings are identified and described

1.8	water budget of LID system or indication of any impact to Grant's Creek PSW as a result of this feature has not been clarified.	Section 3.1.4, Appendix G	Additional studies will be required to inform development proposals
1.9	The proposed LID facility and berm trail appear to be located very close to the PSW and no indication is given for the setback. Should we offer a minimum?	Section 5.4.1	More distant of flood plain or 30m setback from PSW
1.10	The 2012 EIS that has been prepared in support of this application is still being reviewed by our office. Related to our review, we will be looking to see if the LID and related infrastructure proposed in the IMP were assessed and whether it was indicated that these features will have no negative impacts on the PSW.	Section 6.1.4	All development within 120m of the PSW will require an HIS.
1.11	the proposed bike route/pedestrian/multi-use pathway system could cause many unintended impacts to the natural hazards and natural heritage feature in and adjacent to the Grants Creek floodplain and PSW. It may also negatively affect the habitat and functions of the various vegetation communities listed in the IMP, which it is proposed to pass through.	Section 5.6.2	Transportation design and construction shall protect natural features.
1.12	Section 6.1.5 of the IMP depicts a sanitary pipe traversing the Tay River 500 metres upstream of the Town's intake for its potable drinking water supply. It is not clear if this will be a forcemain. Our office would like to raise the location of the pipe as a matter for the Town to consider at this stage of planning.	Section 6.1.5	Town to consider
1.13	Figure 6.5 shows two pump stations, which will be constructed with wet wells. Through discussions with the consultant, it is our understanding that bypasses and overflows are planned to be redirected to SWM facilities and ultimately discharge into Grant's Creek PSW. Source Protection staff within our office are currently inquiring with the MOECP regarding this to verify what type of risk management plan, if any, is required for these discharges. The northernmost pump station is located within the floodplain and also within the IPZ-2. Regarding its location in the floodplain, our policies with respect to infrastructure would apply. The southern pump station appears to be located outside the floodplain, but also appears to be located within 30 metres of the normal highwater mark of the Tay River and should meet the required 30 metre setback identified in our regulation.	Section 6.1.5	Discharge location noted in text
1.14	A further question for consideration is the depth of the proposed pump station excavations. This may have an effect on groundwater, which should be understood. To assist in this understanding, related background information should include groundwater elevations and a water budget analysis.	Section 6.1.4	Water Budget and groundwater analysis of whole development

1.15	As the subject property is a greenfield development, all proposed lots, infrastructure and facilities should achieve a minimum 30 metre setback from the Tay River, Blueberry Creek and headwater features.	Section 3.1.2	Respect 30 m setbacks from fish habitat
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Natural heritage / Water comments			
2.1	Our office would be pleased to work with the Town to conduct a series of field visits by RVCA staff (watershed biologist, ecologist and Tay Watershed planner) to assess the natural heritage features on the western annex lands with respect to the findings in the 2012 EIS and subsequent 2016 field survey. Amongst other things, this activity will help to confirm the boundary of the Grants Creek PSW, as well as other wetland features on the western annex lands.	Noted	To be completed with the developers biologist
2.2	Some of the fish species referenced in the existing conditions section do not account for the full range of species our office has encountered during 2015 -2017 and our historical records. For assistance, we have included this information as Schedule 'A' to this comment letter to assist with completing a fulsome existing conditions section to the IMP.	Section 3.1.2	IMP has been updated with fish species per Schedule A
2.3	Headwater drainage features have been identified through our desktop mapping. We note that at least one feature has been identified by the 2012 EIS. In addition, there may be additional features not mapped, but located on the property. Our office would be willing to participate in a walk of the property to explore all features within this area in the spring. Ultimately, these features will need to be assessed by a qualified professional who would make recommendations on their status and whether they should be maintained or if mitigation/relocation is possible. Our office does note that one of the stormwater management facilities is proposed to locate on an existing watercourse identified through our mapping. Our office has not been provided enough information to demonstrate that the control of flooding, erosion, pollution and conservation of lands will be acceptable to our office associated with the relocation of this feature and replacement with a stormwater pond. We offer the following additional information about headwater features	Section 3.1.2. and 3.1.4	To be discussed with Town and future developer
Hydrologic Considerations			

3.1	Additional existing information should be provided in the form of a water budget analysis. The urban effects of development has the potential to interfere with the natural transfers of water between storage components of the hydrologic cycle. Submission of a water balance is used to describe the hydrological cycle and provide an accounting of water transfers across the development area over time. Any difference between inflows to the system and outflows from the system during a specified time period will need to be balanced by the proposed urbanization of the area which will have an effect on storage of the hydrologic system. This is especially important with the adjacent Grant's Creek PSW to ensure that it remains hydrated. The water balance would form the basis of permits for interference to the wetland.	Section 6.1.4 and Appendix G	HIS and Water budget analysis required prior to applying for Draft Plan of Subdivision
3.2	IMP does not appear to fully respect natural hazards and natural heritage features with the current development layout.	Section 3.1.4	Additional studies will be required as part of the Subdivision planning process
3.3	The IMP shows access roads traversing the floodplain in three separate locations. While these may be proven to be suitable with additional information and hydraulic analysis of the change of the floodplain as a result of the development, safe access has not yet been demonstrated	Section 5.6.1 and Section 6.1.6	Flood plain crossings are identified and described
3.4	There are also still some areas depicted on the preferred plan that show future lots within the 1: 100 year floodplain. Creation of new lots within the floodplain is not supported by our policies	Figure 6.1, 6.2, 6.3, 6.4, 6.5	Figures revised. Cut and Fill balancing may be required in specific cases.
3.5	Significant grading is proposed within the study area, and it is not known what effect this may have on the existing regulatory floodplain and whether this may exacerbate flooding up or downstream for existing properties. This should be considered with hydraulic modelling to account for any changes that may occur, and to demonstrate if those changes are acceptable.	Section 6.1.6	RVCA hydraulic model assumes flows are cutoff, further modelling will not change water levels.
3.6	The golf course lands, in particular, should also consider the impacts of climate change that may increase the risk associated with natural hazards as required by Section 3.1.3 of the PPS	Section 2.5, Section 3.9, and Section 5.6	Incorporate discussion of climate change impacts
Recommendations			
4.1	Completion of an appropriate EIS;	Table 8-1	To be addressed in support of the subdivision application

4.2	Completion of a Headwater Drainage Feature Assessment;	Table 8-1	To be addressed in support of the subdivision application
4.3	Completion of a water budget analysis;	Section 6.1.4 and Appendix G	To be addressed in support of the subdivision application
4.4	Relocation of SWM facilities outside the floodplain or engineering analysis to demonstrate that locating these facilities partially or entirely within the floodplain will not have adverse impact with respect to flooding, erosion and pollution control and the conservation of land;	Section 6.1.6	RVCA hydraulic model assumes flows are cutoff, further modelling will not change water levels. Conservation of Land to be negotiated with Town
4.5	Ensure that all proposed development is able to achieve a 30 metre setback from all watercourses.	Table 8-1 EIS	To be addressed in support of the subdivision application
4.6	More detailed analysis required to determine the appropriate location of infrastructure (roads, watercourse crossings, watermains, sanitary sewers, stormwater management facilities) and the lot layout, relative to the natural hazard and natural heritage features within the study area;	Table 8-1 EIS	To be addressed in support of the subdivision application
4.7	That prior to consideration of development applications submitted under the Planning Act, the detailed analysis as described in paragraph 1, above, will be conducted to the satisfaction of the RVCA and the Town of Perth;	Table 8-1	To be addressed in support of the subdivision application
5	That prior to commencement of subsequent studies that will inform the final development concept plan and infrastructure servicing plan, the Town of Perth, RVCA and other government agencies as appropriate, shall engage in pre-consultation to identify outstanding issues and scope of work.	Table 8-1	To be addressed in support of the subdivision application

7.4 Notice of Completion Consultation

The Infrastructure Master Plan dated August 2019 was filed on the public record August 7, 2019. Letters were sent by email to ten (10) agencies and four (4) members of the public and the report was posted on the Town's website. The following responses were received:

- Friends of the Tay Watershed September 4, 2019
- MNRF Kemptville District September 5, 2019
- Bob Strachan September 6, 2019
- RVCA September 6, 2019 with Technical Memo August 29, 2019
- Ministry of Tourism Culture and Sport September 17, 2019

Subsequent meetings and discussion with RVCA were held resulting in correspondence dated October 4, 2019 and RVCA acceptance of the preferred concept and the mitigating measures proposed for implementation in their letter dated October 22, 2019.

Copies of this correspondence and responses are provided in **Appendix I**.

8 PROJECT SUMMARY

The Infrastructure Master Plan satisfies the requirements of Phase 1 and 2 of the Municipal Class EA process as outlined in Section 1.3 of this report.

Phase 1 Problem/Opportunity provides the justification for the transportation and servicing infrastructure for the Western Annexed Area. Phase 2 Alternative Solutions involved the identification and evaluation of alternatives to service the Study Area. The preferred Solutions are combined to form the Master Plan.

Since the Master Plan covers Phase 1 and 2 those projects may proceed to implementation through an application for a Plan of Subdivision under the Planning Act. Projects that must follow all five phases of the Municipal Class EA, such as construction of the new bridge where the construction value is greater than \$2.4 million can proceed directly to Phase 3 and 4 of the Class EA process. Phase 3 includes the identification and evaluation of the preferred design and Phase 4 consists of an Environmental Study Report.

Based on the findings in this Master Plan the following additional work will be required to support an application for plan of subdivision. The required studies and reports shall be completed in a coordinated manner and assess the entirety of the lands that are the subject of this Plan. Future proponents will pre-consult with the Town of Perth and the various authorities to ensure appropriate scoping of any of these future studies.

Table 8-1 – Documentation for Plan of Subdivision and Approvals

1.	Environmental Impact Studies to confirm wetland limits and update Species At Risk survey
2.	Stage 1 Archaeological Assessment for all lands within 300m of a watercourse. Stage 2 Archaeological Assessments may be required
3.	A Cultural Heritage Evaluation Report will be required on both properties, and Heritage Impact Assessments may be required.
4.	Preliminary Servicing Studies to confirm design elements of the preferred solutions including a geotechnical investigation
5.	All proposals within the floodplain and 30m setback will require RVCA approval
6.	All water, sanitary, and stormwater infrastructure will require ECA approvals from the Ministry of Environment, Conservation and Parks
7.	Tree Preservation Plan
8.	Water Budget and Groundwater analysis
9.	Hydrologic Impact Assessment for all development within 120m of PSW, per RVCA
10.	Headwater Drainage Feature assessment, per RVCA

The following provides a summary of the recommended servicing improvements, their EA Schedule and additional work prior to implementation.

Tayview Property

1.	Watermain extension on Sunset Blvd.	Schedule A	Coordination with County
2.	Sanitary sewer extension on Sunset Blvd.	Schedule A	Coordination with County
3.	Roads and sidewalks as a condition of approval for the plan of subdivision	Schedule A	See Table 8-1
4.	Watermain distribution system as a condition of approval for the plan of subdivision	Schedule A	See Table 8-1
5.	Sewage collection system as a condition of approval for the plan of subdivision	Schedule A	See Table 8-1
6.	Stormwater pond as a condition of approval for the plan of subdivision	Schedule A	See Table 8-1

Perth Golf Course Lands Phase 1

1.	Pedestrian lane added to Peter Street	Schedule A+	Structural assessment and design
2.	Sidewalk on Peter Street	Schedule A	Coordinate with Town Sidewalk Improvement Program
3.	Roads and sidewalks as a condition of approval for the plan of subdivision	Schedule A	See Table 8-1
4.	Watermain distribution system as a condition of approval for the plan of subdivision	Schedule A	See Table 8-1
5.	Construct new sewage pumping station	Schedule B	See Table 8-1
6.	New sewage collection system as a condition of approval for the plan of subdivision	Schedule A	See Table 8-1
7.	New linear LID system and sediment forebay	Schedule A	See Table 8-1

Perth Golf Course Lands Phase 2

1.	New Bridge	Schedule C	Update to Town Official Plan Phase 3 and 4 of Municipal Class EA including hydraulic analysis
2.	Extend road through County lands and improve the intersection at Sunset Blvd.		Coordination with County
3.	Pathways as condition of approval or through municipal implementation	Schedule A	Coordination with Trails Associations
4.	Roads and sidewalks as a condition of approval for the plan of subdivision	Schedule A	See Table 8-1
5.	Watermain upgrade to Inverness	Schedule A	Public Notification

6.	Watermain distribution system as a condition of approval for the plan of subdivision	Schedule A	See Table 8-1
7.	Construct new sewage pumping station	Schedule B	See Table 8-1
8.	Construct linear stormwater retention pond	Schedule A	See Table 8-1

9 REFERENCES

- Dillon, Mary. (August 11, 2016). Letter Re: Information Request - Developments
- Information Request Services, Kemptville District, Ministry of Natural Resources. (August 11, 2016).
Email Re: MNR Kemptville District Information Request (2016_BAT-3631) Response.
- Jp2g Consultants Inc. (2015) Joint County of Lanark Sustainable Communities Official Plan Amendment No. 4 and Town of Perth Official Plan Amendment No. 14 Technical Report, December 9, 2015
- Jp2g Consultants Inc. (2019) Joint County of Lanark Sustainable Communities Official Plan Amendment No. 9 and Town of Perth Amendment No. 16 Technical Report June 3, 2019
- Lanark County (2011) Official Plan Program, prepared by Stantec Consulting Ltd., February 2, 2011
- Lanark County (2012) Lanark County Sustainable Communities Official Plan, adopted June 27, 2012, prepared by McIntosh Perry, 2012
- McIntosh Perry Consulting Engineers Ltd. (December 2012). Environmental Impact Statement, Perth Golf Course Community Concept.
- Ontario Municipal Board (2015) Minutes of Settlement OMB Case File PL130677 dated May 27, 2015
- Rideau Valley Conservation Authority. (2011). Tay River – Town of Perth Catchment. Tay River Subwatershed Report 2011.
- Rideau Valley Conservation Authority. (2013). Tay River Flood Risk Mapping Report, Glen Tay Road to Lower Rideau Lake, 2013.
- Soil Research Institute, Research Branch, Canada Department of Agriculture, Ottawa. (1966). Soil Map of Lanark County Ontario, South Sheet, Soil Survey Report No. 40.
- Strategic Projections Inc. (2014) Town of Perth Projections to 2041, January 2014
- Tocher Heyblom Design Inc. (2013) Development/Landscape Master Plan, Lanark County, March 2013
- Town of Perth (undated) Town of Perth Official Plan Review Proposed Policies for Annexed Areas and Servicing Capacity Management
- Town of Perth (2009) Amendment No. 10 to the Official Plan for the Town of Perth, July 2009
- Town of Perth (2014) Recommended Modifications to Town of Perth OPA No. 14
- Town of Perth (2017) Climate Change Action Plan, June 2017

Appendix A

Relevant Planning Documents

Summary of proposed Modifications to Town of Perth OPA #14

- 1. Section 3.1**, pertaining to population growth estimates, is modified as follows:
 - a. The second paragraph is deleted and a new paragraph inserted to recognise the growth allocated by the County Sustainable Communities Official Plan;
 - b. Text is added to the first sentence in the third paragraph;
- 2. Section 3.2**, paragraph A) pertaining to housing growth estimates is modified as follows:
 - a. The first paragraph is modified to reflect the estimates used in the OMB Minutes of Settlement
 - b. the second paragraph is deleted and replaced with new text recognizing the housing projection reflects the allocated growth;
 - c. the third paragraph is modified by deleting the reference to the annexed Master Plan area in the last sentence.
- 3. Section 3.3** is modified by reducing the jobs projection by over 50% to 1,400 consistent with the change in the population growth projection.
- 4. Section 5.2**, paragraph E), clause 2. is modified to correct the title of the referenced Infrastructure Master Plan for the area North of Highway 7 and paragraph F) is modified to correct title of the “New Residential Area” designation
- 5. Subsection 5.5.5**, paragraph a., is modified to delete the third sentence as the text is repetitive.
- 6. Subsection 7.3.1.**, paragraph a., is modified with the addition of a clause 3. addressing the PPS issues of unstable soils and wildland fires.
- 7. Subsection 7.3.2.**, paragraph a., is modified with the addition of a clause 11., addressing wildland fires per the PPS.
- 8. Subsection 8.1.1** paragraph b. new wording is inserted to recognize the reduced Residential area and to be consistent with the OMB Minutes of Settlement.
- 9. Article 8.1.3.1** – a new paragraph g) is inserted to cross reference New Residential Area Designation policies which should be applicable to the westerly annexed lands.
- 10. Article 8.1.3.21** a new clause 6 is inserted in paragraph a) to recognize the existing commercial building at 205 Gore Street East and permit a limited retail use and addresses a concern raised during the review period.
- 11. Subsection 8.4.3**, paragraph a., clause 1 – “physical fitness and training centres” use is added.

- 12 Subsection 8.6.4**, paragraph g., the word “Significant” is deleted to be consistent with the Provincial Policy Statement
- 13. Section 8.8** all references to the term “Future Urban Service Area” are replaced with the term “Special Study Area”
- 14 Article 9 .12.15.2** paragraph a) clause 9 is modified to add text to first bullet point for clarification and the fourth bullet point is deleted as the intent is addressed in the first bullet point and otherwise it potentially conflicts with clause 8.
- 15. Article 9.12.5.4** is modified to add clause 2 to be consistent with and assist with the implementation of Article 9.11.5.3. clauses 4 and 5.
- 16. In Chapter 10** the following modifications are proposed:
 - a. The definition of “Adjacent lands” is expanded, to be consistent with the 2014 PPS
 - b. The definition of “Built Heritage Resources” is modified to be consistent with the 2014 PPS;
 - c. The definition of “Conserved” is modified to be consistent with the 2014 PPS and the *Ontario Heritage Act*.
 - d. The definition of “Cultural Heritage Landscapes” is modified to be consistent with the 2014 PPS and the *Ontario Heritage Act*.
 - e. A definition of “Green Infrastructure” is added to clarify and assist with interpretation of the Official Plan;
 - f. The definition of “Habitat for endangered and threatened species” is modified to be consistent with the 2014 PPS and the Endangered Species Act;
 - g. The definition of “Hazardous forest types for wildland fire” is modified to be consistent with the 2014 PPS;
 - h. A definition of “Hazardous substance” is added to clarify and assist with interpretation of the Official Plan;
 - i. The definition of “Heritage Attributes” is modified to be consistent with the 2014 PPS and the *Ontario Heritage Act*;
 - j. A definition of “infrastructure is added to clarify and assist with interpretation of the Official Plan;
 - k. A definition of “Major Facilities” is added to clarify and assist with interpreting the Official Plan and to be to be consistent with the 2014 PPS;
 - l. A definition of “Multimodal Transportation System” is added to clarify and assist interpreting the Official Plan and to be consistent with the 2014 PPS;

- m. The definition of “Natural Heritage System:” is modified to clarify and assist interpreting the Official Plan and to be to be consistent with the 2014 PPS;
- n. The definition of “Negative Impacts:” is modified to clarify and assist with interpreting of the Official Plan and to be to be consistent with the 2014 PPS;
- o. The definition of “Protected Heritage Property” is modified to be consistent with the 2014 PPS and the *Ontario Heritage Act*;
- p. A definition of “Public Use or Public Service Facility” is added to clarify and assist with interpretation of the Official Plan and to be to be consistent with the 2014 PPS;
- q. A definition of “Renewable or Sustainable Energy System” is added to clarify and assist with interpretation of the Official Plan and to be to be consistent with the 2014 PPS;
- r. A definition of “Residential Intensification” is added to clarify and assist interpreting the Official Plan and to be to be consistent with the 2014 PPS;
- s. A definition of “Sensitive Land Uses” is added to clarify and assist with interpretation of the Official Plan and to be to be consistent with the 2014 PPS;
- t. The definition of “Significant” is modified by adding a clause d. addressing heritage and a final paragraph permitting alternative evaluation measures to clarify and assist with interpretation of the Official Plan and to be to be consistent with the 2014 PPS;
- u. A definition of “Waste Management System” is added to clarify and assist with interpretation of the Official Plan;
- v. A definition of “Watershed” is added to clarify and assist with interpretation of the Official Plan;
- w. A definition of “Wildland Fire Assessment and Mitigation Standards” is added to clarify and assist with interpretation of the Official Plan and to be to be consistent with the 2014 PPS;
- x. The definition of “Woodlands” is modified to clarify and assist with interpretation of the Official Plan and to be to be consistent with the 2014 PPS;

17. The New Schedule ‘A’ for the Official plan is modified to add the boundary of the municipal settlement (service) area; The “Future Urban Service Area” Designation title is changes to the “Special Study Area” and the area covered by the designation is expanded. The New Residential Area designation is reduced in size and the “Residential Designation is applied to a portion of the Perth Golf Course site. A corresponding portion of the Residential Designation north of Highway 7 is removed consistent with the change in the urban settlement boundary.

TOWN OF PERTH OFFICIAL PLAN

SCHEDULE A LAND USE DESIGNATIONS AND OVERLAYS PER COMPREHENSIVE UPDATE AMENDMENT NO. 14

Legend

LAND USE DESIGNATION

- PERTH URBAN SETTLEMENT BOUNDARY
- RESIDENTIAL AREA
- CENTRAL AREA DISTRICT
- BUSINESS PARK
- HIGHWAY COMMERCIAL DISTRICT
- INDUSTRIAL AREA
- NEW RESIDENTIAL AREA
- SPECIAL STUDY AREA
- PARKS AND OPEN SPACE

ENVIRONMENTAL PROTECTION AREA
DESIGNATION CONSISTS OF:
FLOOD PLAIN CONSTRAINT (FC),
NATURAL HERITAGE FEATURES (NHF),
PROVINCIAL SIGNIFICANT WETLANDS (PSW) AND
PROVINCIAL SIGNIFICANT SHIELD WETLANDS (PSSW)

OTHER FEATURES

- FISH SPAWNING
- OTHER PARKS
- WASTE MANAGEMENT FACILITY
- 1:100 YEAR REGULATORY FLOOD LEVEL
- FLOOD PLAIN
- FILL AND CONSTRUCTION LINE

Transportation

- PROVINCIAL HIGHWAY
- ARTERIAL ROADS
- COLLECTOR ROADS
- LOCAL ROADS
- PRIVATE ROADS
- FUTURE ROADS (R.O.W. APPROXIMATE ONLY)
- ST. LAWRENCE AND HUDSON RAILWAY

Parks, Recreational and Cultural Facilities

- SCOTT PARK
- DAINES PARK
- PERTHMORE PARK
- STEWART PARK
- CODE PARK
- MILL STREET PARK
- LAST DUEL PARK
- MORGAN PARK
- THE ROUND GARDEN
- OLD BURYING GROUND
- PERTH AND DISTRICT INDOOR SWIMMING POOL
- TENNIS
- PERTH AND DISTRICT COMMUNITY CENTRE
- TAY BASIN
- CONLON FARM RECREATION COMPLEX
- NEVIS COTTAGE
- HAGGART HOUSE
- MATHESON HOUSE MUSEUM
- PERTH PUBLIC LIBRARY
- SUMMIT HOUSE
- McMARTIN HOUSE
- INGE-VA HOUSE

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NOTE: The base information on this plan was prepared from a variety of map sources and was used by permission of the Town of Perth. It is not a legal plan of survey. For precise location of plan features recourse should be had to the original source data.

Date: May 2015

SCHEDULE 'A' TO BY-LAW _____

AMENDMENT NO. 16 TO THE OFFICIAL PLAN OF THE TOWN OF PERTH

This amendment was adopted by the Corporation of the Town of Perth by By-law No. _____ in accordance with the *Planning Act, R.S.O. 1990, Chapter P. 13*, as amended, on the _____ day of _____, 2019.

PART A - THE PREAMBLE contains an explanation of the purpose and basis for the amendment, as well as a description of the lands that are affected, but does not constitute part of this amendment.

PART B - THE AMENDMENT consisting of schedule changes and the adoption of replacement Text and Policies for Urban Boundary Expansion constitutes Amendment No. 16 to the Official Plan of the Town of Perth.

PART C - THE APPENDICES attached hereto do not constitute a part of this amendment. These appendices include the public involvement associated with this amendment.

PART A - THE PREAMBLE

PURPOSE

Over the past two decades the Town of Perth has been pursuing opportunities to encourage the growth and development of the community as a fully serviced, completed Settlement Area within the County of Lanark, consistent with Section 1.1.3 of the Provincial Policy Statement (PPS). To this end, the Town of Perth has undertaken a number of studies and initiatives which support the growth and development of the Town and the expansion of the Urban Settlement Boundary.

In 2002 the Town of Perth completed a Secondary Plan for the lands north of Highway #7, with intent of identifying a wide range of residential, commercial, recreational and institutional land uses. In addition, this study identified a potential arterial and collector road system, sewer, water and stormwater servicing needs and natural heritage features. The Secondary Plan was updated in 2006. This document was to be used by Council, the development industry and the general public on making future land use and infrastructure decisions. This work resulted in adopted Official Plan Amendment (OPA) #10 to the Town of Perth Official Plan.

In 2009, the Town Council and staff worked with area property owners to annex three distinct parcels of land into the Corporation of the Town of Perth (i.e. Golf Course lands, Tayview lands, Meadows lands). The intent of this effort was to provide the Town with sufficient lands to accommodate future development, consistent with the direction of the PPS and the desire for future development to be on full municipal services.

Following the work completed for the Secondary Plan, the Town commissioned the preparation of the 2013 Infrastructure Master Plan for Area North of Highway 7. The purpose of the Master Plan was to review the requirements of the traffic, water supply, sanitary/wastewater sewage and stormwater management servicing for the Secondary Plan Area, plus the added Meadows lands. This work was performed in accordance with the planning process defined in the Municipal Class Environmental Assessment (Class EA) and deemed to have met the Ontario *Environmental Assessment Act*, R.S.O. 1990 requirements.

The Town of Perth retained the services of Strategic Projections in 2014 to prepare a population projection for the Town of Perth, consistent with the vision for fully serviced, complete communities as set out in the PPS. This report identified a range of assumptions and concluded that the Town could, under a high growth scenario, reach a population of 10,500 by 2041.

The Town's vision as a regional growth centre for the western half of Lanark County was not fully reflected in the Lanark County Sustainable Communities Official Plan adopted in 2012. Through a series of negotiations, it was agreed that some minor changes would be made to the Town's "Residential" development lands and that future expansion of Perth's Urban Settlement Boundary would have to wait for the outcome of

the County's five year review which would include a Comprehensive Review, as defined in the PPS.

In 2017, the Town of Perth initiated a major upgrade of its lagoon system with the construction of a "Submerged Attached Growth Reactor (SAGR) – Phase 1". This major capital investment resulted in the treatment capacity of the lagoon increasing from 6,100 persons to 8,100 persons. Phase 2 of the SAGR project, which is planned and designed but not constructed, will bring the capacity to 10,500 persons. Phase 1 was commissioned in the fourth quarter of 2018.

In 2018 Lanark County undertook a Comprehensive Review which identified a projected total population for the County of 96,443 by 2038. Subsequent to the Comprehensive Review, County Council passed motion #ED-2018-55, allocating 8,085 person population to the Town of Perth by 2038.

As a follow-up to the 2013 Servicing Master Plan for Area North of Highway 7, in 2017 the Town commissioned a study to look at sustainable, low impact development options for stormwater management. The preliminary results from this work are positive and appear to provide a more cost-effective, resilient stormwater design for the lands "North of 7". The Town is proceeding through the Class EA process with this new design option.

The Town has also commissioned two additional servicing master plan projects, one for the Golf Course lands and one for the Tayview lands. Both of these studies are consistent with the County's Official Plan Policy 2.4.1 (3) which requires "a study which establishes, water, waste water and stormwater servicing requirements" for new growth areas.

Official Plan Amendment #16 (OPA #16) is intended to pull together all of the planning work of the past 15 years, both at the local and the County level, to expand the Urban Settlement Boundary of the Town of Perth and identify additional lands for Residential development consistent with the population allocation of 8,085. OPA #16 will also update policies within the Official Plan which relate to the new design population of 8,085, acknowledge the increased waste water treatment capacity of the lagoon, and establish policies for lands designated Future Development. In addition, OPA #16 is also designed to expand the Urban Settlement Boundary to include non-development lands, primarily provincially significant wetlands, which are within the boundaries of the Corporation of the Town of Perth. Finally, OPA #16 will designate some of the lands annexed into the Town in 2009 as "Future Development". Although these lands are not anticipated to be necessary to accommodate the projected growth to 8,085 by 2038, it is critical that these lands are incorporated into the Urban Settlement Boundary for purposes of long term infrastructure planning, consistent with Section 1.1.2 of the PPS.

OPA #16 will not come into force and effect until such time as the Lanark County Sustainable Communities Official Plan is amended to include the new population projection and allocation identified in County Council motion #ED-2018-55.

EFFECT OF THE AMENDEMENT

- Item 1: The proposed amendment extends the “Urban Settlement Boundary” to encompass all of the lands within The Corporation of the Town of Perth;
- Item 2: The proposed amendment designates an additional 24.65 hectares of land “Residential”;
- Item 3: The proposed amendment designates approximately 24 hectares of land “Future Development”;
- Item 4: The proposed amendment designates approximately 2.75 hectares of land from “Residential” to “Business Park”;
- Item 5: The proposed amendment will modify text in Section 1.0, 2.2, 2.4, 2.6, 3.13.2 (a), and 3.4 (c) related to the new design population of 8,085;
- Item 6: The proposed amendment will modify the text of 8.1.1 related to the Town owned lands being reserved for future recreational and institutional uses;
- Item 7: The proposed amendment will modify the text of 8.1.4.4 (a) & (d) related to development on full municipal services; and
- Item 8: The proposed amendment will add new policies in Section 8.8 governing the limited use of Future Development lands.

BASIS

There are two components, text and mapping, to the proposed Official Plan Amendment. The basis for the amendment is discussed below, as it relates to each of the two components.

The Official Plan has policies that deal with the general context of planning in the Town of Perth, the design population and how lands are to be efficiently utilized to support the goals and objectives of the Official Plan.

The Official Plan Amendment will update the policies in Section 2 and 3 of the Plan to reflect the lands being added into the Urban Settlement Boundary and the added sewage treatment capacity with the development of the SAGR.

The Official Plan Amendment will also update the policy of Section 8.1 which deals with residential development being on full municipal services which now exist as well as the unique policies related to municipally owned lands North of 7.

Finally, the Official Plan Amendment, will add policies to Section 8.9 related to the limitations placed on Future Development lands and how and when they could be considered for development.

Schedule ‘A’ of the Official Plan will be amended to change the “Urban Settlement Boundary”, designate additional lands “Residential”, change the designation of lands from “Residential” to “Business Park” and designate lands “Future Development”.

AMENDMENT NO. 16
TO THE OFFICIAL PLAN
OF THE TOWN OF PERTH

This amendment was adopted by the Corporation of the Town of Perth by By-Law No. [REDACTED] in accordance with the Planning Act, R.S.O. 1990, Chapter P. 13, as amended, on the [REDACTED] day of [REDACTED], [REDACTED].

PART B - THE AMENDMENT

All of this part of the document entitled Part B - The Amendment, which consists of changes, additions and revisions of the text and the changes to Schedule A as setout below, constitutes Amendment No. 16 to the Official Plan of the Town of Perth.

DETAILS OF THE AMENDMENT

The Official Plan of the Town of Perth, as amended, is further amended as follows:

1. The first sentence in the 8th paragraph of Section 1.0 is hereby deleted and replaced with the following:

“The Town of Perth is a vibrant small town of 5930 (2016) functioning as an urban service centre for a large rural area.”

2. Section 2.2, History of Land Use Planning in Perth, is hereby amended with the addition of the following text as a new paragraph three:

“In 2016, OPA #14 was approved which represented a comprehensive update to the Official Plan, bringing it into conformity with the Lanark County Sustainable Communities Official Plan and the 2014 Provincial Policy Statement.

OPA #15 was approved in 2017 to establish Source Water Protection policies and to bring the Official Plan into compliance with the Mississippi-Rideau Source Protection Plan.

In 2018, the Town initiated OPA #16 which incorporated the 2009 annexed lands into the Town of Perth Urban Settlement Boundary, providing the community with sufficient lands to accommodate the 2038 planned population of 8,085.”

3. Section 2.4, Official Plan Review Process, is hereby amended by adding the following new text as paragraph four (4):

“In 2014 the Town initiated a mandatory Five (5) Year Review. OPA #14 was subsequently approved in 2016, bringing the Town of Perth Official Plan into conformity with the Lanark County Sustainable Communities Official Plan and the 2014 Provincial Policy Statement.

In 2017 the County of Lanark undertook a Comprehensive Review resulting in a revised population projections for the County and related growth allocations to the member municipalities for the twenty (20) year horizon ending in 2038. The growth allocation to the Town of Perth to the year 2038 is 8,085 persons.

The County’s growth allocation to the Town of Perth to the year 2038, resulted in OPA #16, which placed the annexed lands within the Town’s “Urban Settlement Boundary” and designated the annexed lands “Residential” and “Future Development”. The additional “Residential” lands will ensure that the Town has sufficient lands available to accommodate the twenty (20) year planned growth.

This Official Plan is the culmination of that preceding work and the public workshops and formal consultations undertaken prior to its adoption.”

4. Section 2.6, Planning Period, is hereby amended by adding the following new text as paragraph two (2):

“Notwithstanding the above paragraph, the design population of 8,085 and the designated vacant residential land base and residential infill opportunities are based on the County’s growth allocation to the Town of Perth to the year 2038.”

5. Section 3.1, Population, is hereby deleted and replaced with the following:

“3.1 Population

The target population of 8,085 persons by the year 2038 was derived from the 2017/2018 Comprehensive Review undertaken by the County of Lanark and set out in the Lanark County Sustainable Communities Official Plan, Appendix 2. This target population builds upon the population analysis undertaken by the Town in 2014 (Town of Perth Population Projection to 2041) which demonstrated that Perth is very likely to experience a positive rate of growth.

The Town’s population is expected to expand because of Perth’s proximity to the Ottawa and Kingston markets, representing a potential market from which to attract retirees to anticipated life-style developments. There is also potential to attract people commuting to the Ottawa area due to the quality of life and character that Perth offers. Further diversification of the Town’s economic base in the area of business services, tourism, finance, consulting and health care professionals and skilled trades will generate employment growth. Finally, the widening of Highway 7 to Carleton Place has reduced commuting time to Ottawa, improving the attraction of the Town for both commuters and retirees.

Several properties were annexed into the Town in 2009 and added into the inventory of residential lands available for future development. An option for improved access to the development in the easterly side of Town with a new arterial road will allow for additional phases of development. In addition, the Town has completed a servicing Master Plan to facilitate development in the northerly portion of the Town and has completed Phase I of the expansion of the sewage lagoon with a design population of 8,100. Phase II of the lagoon upgrade would establish a design population of 10,500, if needed.

The Town will continue to monitor the rate of growth to ensure that the designated land supply and infrastructure capacity is appropriate for, and continues to support, development demand and projected growth.”

6. Section 3.2 (A), Housing, is hereby deleted and replaced with the following:

“3.2 A) Housing

The land supply for housing will be met through a combination of intensification, redevelopment and green-field development. The land supply designed “Residential” within the Town has the potential for 1,135 lots/units.

The available supply of designated land is anticipated to be sufficient for the projected housing demand that corresponds with the population target of 8,085. The Town has also identified certain lands as “Future Development” on Schedule ‘A’. The “Future Development” lands are included within the Town’s Urban Settlement Boundary to permit long term infrastructure planning and may only be considered for future residential development when Lanark County increases the Town’s growth allocation beyond the 8,085 persons.

The land available for housing supply has the flexibility to provide substantial variety in the mix and density of housing types (i.e. singles, two-unit dwellings, town houses, apartments). Intensification and redevelopment will be focused on the downtown (i.e., upper storeys of the Central Area District), converted institutional buildings, second units in dwellings and large lots in established residential neighbourhoods. Green-field housing will be directed to the future extension of Perthmore Glen in the east; to the secondary plan area north of Highway #7; and to the areas annexed in 2009 to the west.”

7. Section 3.4 C), Infrastructure and Public Service Facilities, is hereby deleted and replaced with the following:

“3.4 C), Infrastructure and Public Service Facilities

Sanitary treatment capacity, essential to growth, was greatly expanded in 2018 with the addition of a “Submerged Active Growth reactor” (SAGR). This addition to the sanitary treatment system increased the treatment capacity of the existing lagoon system to a population equivalent of 8,100. With the addition of a fourth cell to the SAGR, the population equivalent could be increased to 10,500 persons. This capacity is anticipated to be sufficient to accommodate the design

population of 8,085 persons. It is necessary for the Town to continue to be vigilant in removing stormwater from the sanitary collection system to ensure the maximum benefit of the sanitary treatment system to support the growth and development of the community.”

8. Section 8.1.1, Development Concepts, is hereby amended with the addition of the following:

“j. The Secondary Plan Area north of Dufferin Street envisioned a large block of land reserved for future recreational and public service facilities (sports complex and high school) uses. To this end, the Town of Perth has ownership of approximately 7.7 ha (19 acres) of land within the Residential Designation of the Secondary Plan Area. These lands do not exactly match the planned location for such facilities, but do represent the land mass necessary to support such uses. As such, the Town owned lands are not intended for residential development. Notwithstanding this, the Town owned lands may be developed for residential purposes on the condition that the Town acquire an equivalent amount of land to be reserved for future recreational and public service facilities consistent with the Secondary Plan and Infrastructure Master Plan design. The new lands to be acquired by the Town must be designated Residential.”

9. Section 8.1.4.4 (a), Development Restrictions – Servicing – Zoning, is hereby deleted and replaced with the following:

“8.1.4.4 (a), Development Restrictions – Servicing – Zoning
All new development shall be connected to municipal services. The Town anticipates that piped water and sanitary sewage services will be extended to all of the developable lands within the Residential designation in an efficient, sustainable and cost effective manner.”

10. Section 8.1.4.4 (d), Development Restrictions – Servicing – Zoning, is hereby deleted and replaced with the following:

“8.1.4.4 (d), Development Restrictions – Servicing – Zoning
Sanitary treatment capacity, essential to growth, was greatly expanded in 2018 with the addition of a “Submerged Active Growth reactor” (SAGR). This addition to the sanitary treatment system increased the treatment capacity of the existing lagoon system to a population equivalent of 8,100. With the additional of a fourth cell to the SAGR, the population equivalent could be increased to 10,500 persons. This expanded capacity is sufficient to provide sanitary treatment services to the design population of 8,085 and the lands designated for development within the Urban Settlement Boundary.

11. Section 8.9, Future Development Designation is hereby added to Section 8 with the following:

“8.9 Future Development Designation

8.9.1 General Scope

Lands within the Future Development designation are needed for long term infrastructure planning and may be needed to accommodate future residential development in years beyond the planning horizon of this Plan. Lands within this designation may be considered for residential development whenever a comprehensive review of this Plan is undertaken in accordance with the Provincial Policy Statement and/or in conjunction with a comprehensive review of growth for an update of the Lanark County SCOP.

8.9.2 Range of Permitted Uses

On lands designated as Future Development on Schedule ‘A’ of this Plan, the following range of uses may be permitted:

- a. uses existing on the date of adoption of this Plan;
- b. agricultural and agricultural related uses including crop production, nursery and horticultural activities, forestry, and comparable uses;
- c. uses permitted in the Parks and Open Space designation which do not require connection to municipal water or sanitary sewer systems;
- d. uses accessory to any permitted use; and,
- e. new uses requiring a septic system or other form of private on-site sewage or wastewater management shall not be permitted but modest expansions of existing uses and servicing systems may be considered.

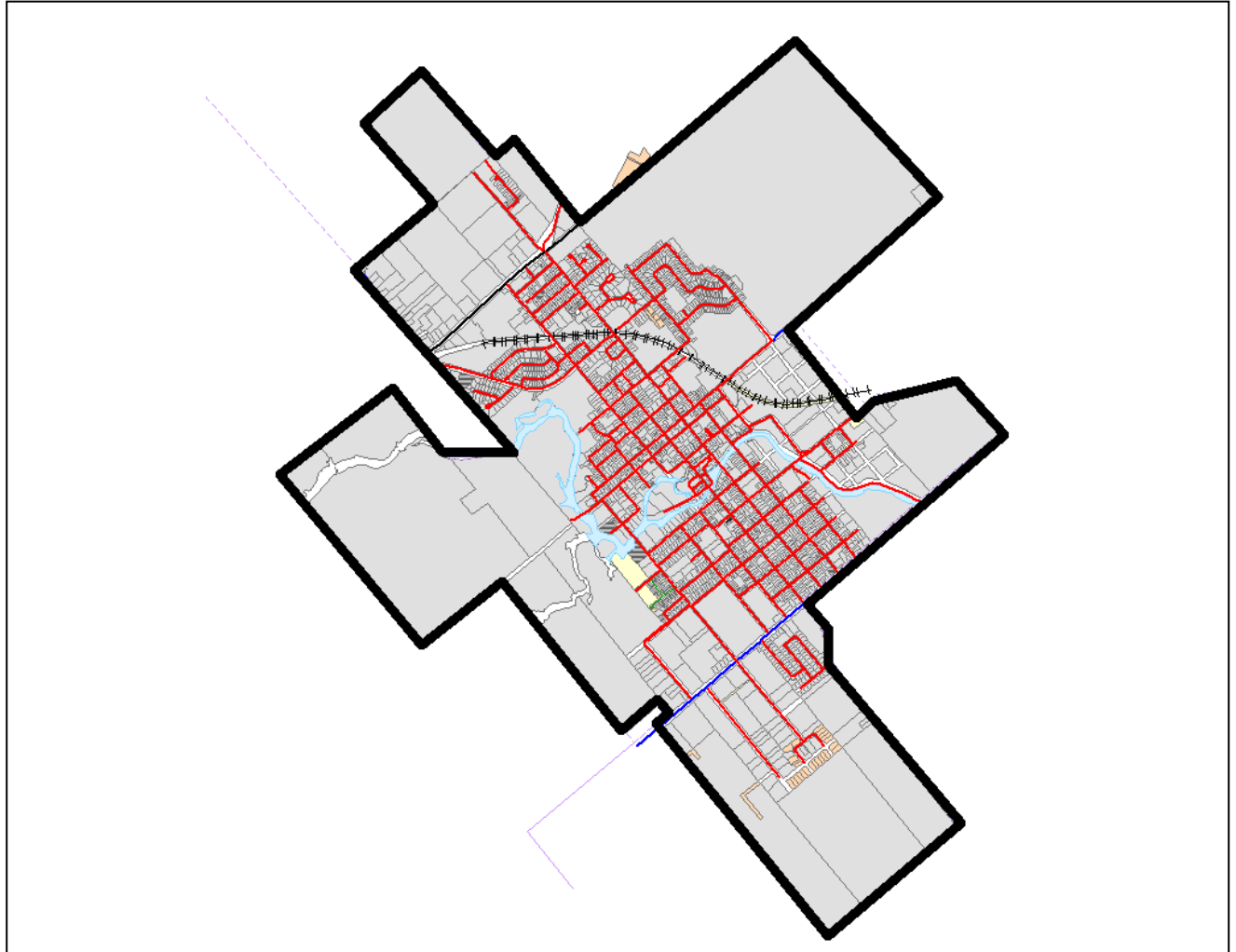
8.9.3 Future Development Policies

- a. Lands within the Future Development designation have been subject to detailed infrastructure design and incorporated into the long-term infrastructure planning for the Town. These lands will be required to accommodate future development at urban densities including: all forms of residential development, neighbourhood commercial uses, institutional and community service uses, and parks and open space uses. Future planning work will be required to determine the preferred land use mix.
- b. Future uses on the lands subject to this designation will be required to be serviced by municipal water supply sanitary, sewer and storm-water management facilities.
- c. Any new use that would limit the potential future use of the land or which would impede extension of municipal services or the extension of development in a form that would be compact and contiguous with development on adjacent lands currently designated for development shall not be permitted.
- d. The impact of development on Natural Heritage Features and other areas subject to the policies under Section 8.6 must be considered prior to any change in this designation.

12. The Schedules 'A' and 'B' to the Official Plan for the Town of Perth as amended, are hereby further amended by changing the location of the "Perth Urban Settlement Boundary" to coincide with the boundary of the Corporation of the Town of Perth and shown on Schedule 'A' to OPA #16.
13. The Schedule 'A', Land Use Designation, to the Official Plan for the Town of Perth, as amended, is hereby further amended by deleting the reference in the Legend, Land Use Designation of "Special Study Area" and replacing it with "Future Development".
14. The Schedule 'A', Land Use Designation, to the Official Plan for the Town of Perth, as amended, is hereby further amended by changing the land use designation of lands described as Part Lot 2, Concession 3, PIN 051710445 and shown on the Schedule 'B' to OPA #16 as the Subject Property from "Special Study Area" to "Residential" and "Future Development".
15. The Schedule 'A', Land Use Designation, to the Official Plan for the Town of Perth, as amended, is hereby further amended by changing the land use designation of lands described as Part Lot 2, Concession 3, PIN 051710168 and shown on the Schedule 'C' to OPA #16 as the Subject Property from "Special Study Area" to "Residential".
16. The Schedule 'A', Land Use Designation, to the Official Plan for the Town of Perth, as amended, is hereby further amended by changing the land use designation of the western half of the lands described as Part Lot 26, Concession 2, PIN 051860188 and shown on the Schedule 'D' to OPA #16 as the Subject Property from "Special Study Area" to "New Residential Area".
17. The Schedule 'A', Land Use Designation, to Official Plan for the Town of Perth, as amended, is hereby further amended by changing the land use designation on the easterly portion of lands described as Part Lot 1, Concession 3, PINs 051710147 and 051710148 and shown on the Schedule 'E' to OPA #16 as the Subject Property from "Residential" to "Business Park".
18. Official Plan Amendment #16 to the Town of Perth Official Plan shall not come into force and effect until such time as an amendment to the Lanark County Sustainable Communities Official Plan (LCSCOP), updating Appendix 2, Historical and Projection Population by Municipalities to reflect County Council motion #ED-2018-55 comes into force and effect.

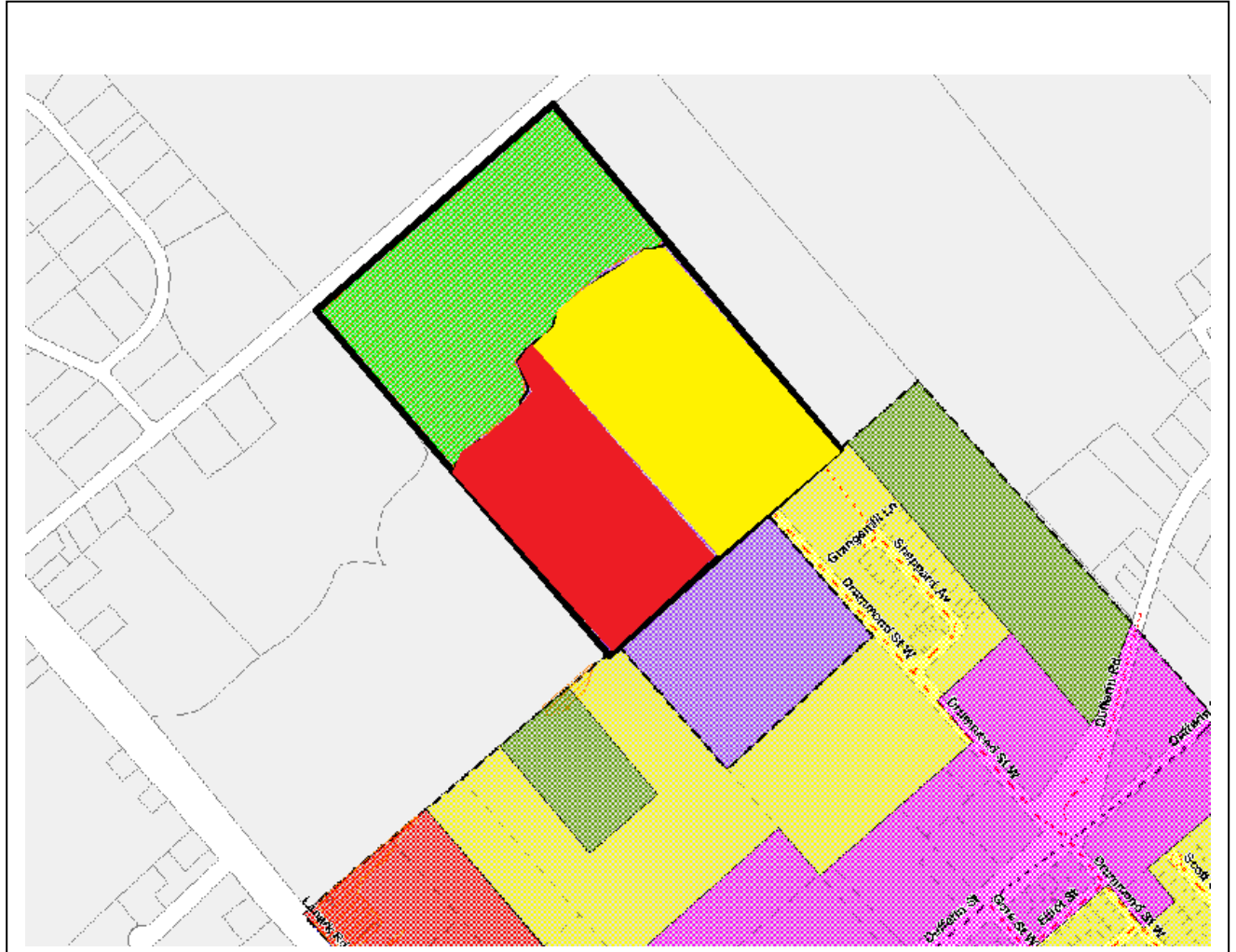
PART C: SCHEDULES

1. Schedule A: Town of Perth Urban Settlement Boundary



PERTH URBAN SETTLEMENT BOUNDARY

2. Schedule B: Part Lot 2, Concession 3, PIN 051710445



SUBJECT PROPERTY



LANDS TO BE DESIGNATED RESIDENTIAL

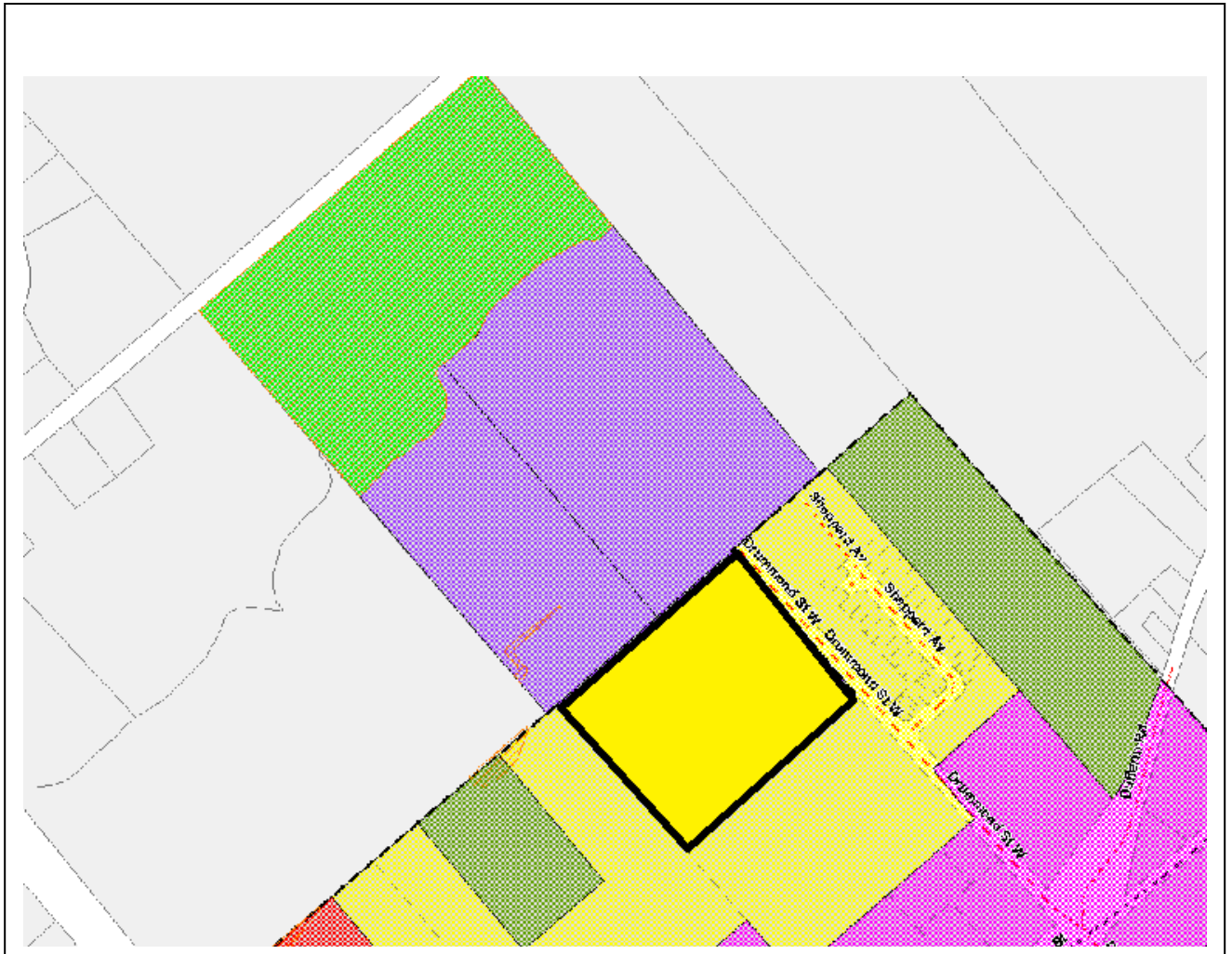


LANDS TO BE DESIGNATED FUTURE DEVELOPMENT



LANDS TO REMAIN ENVIRONMENTAL PROTECTION

3. Schedule C: Part Lot 2, Concession 3, PIN 051710168

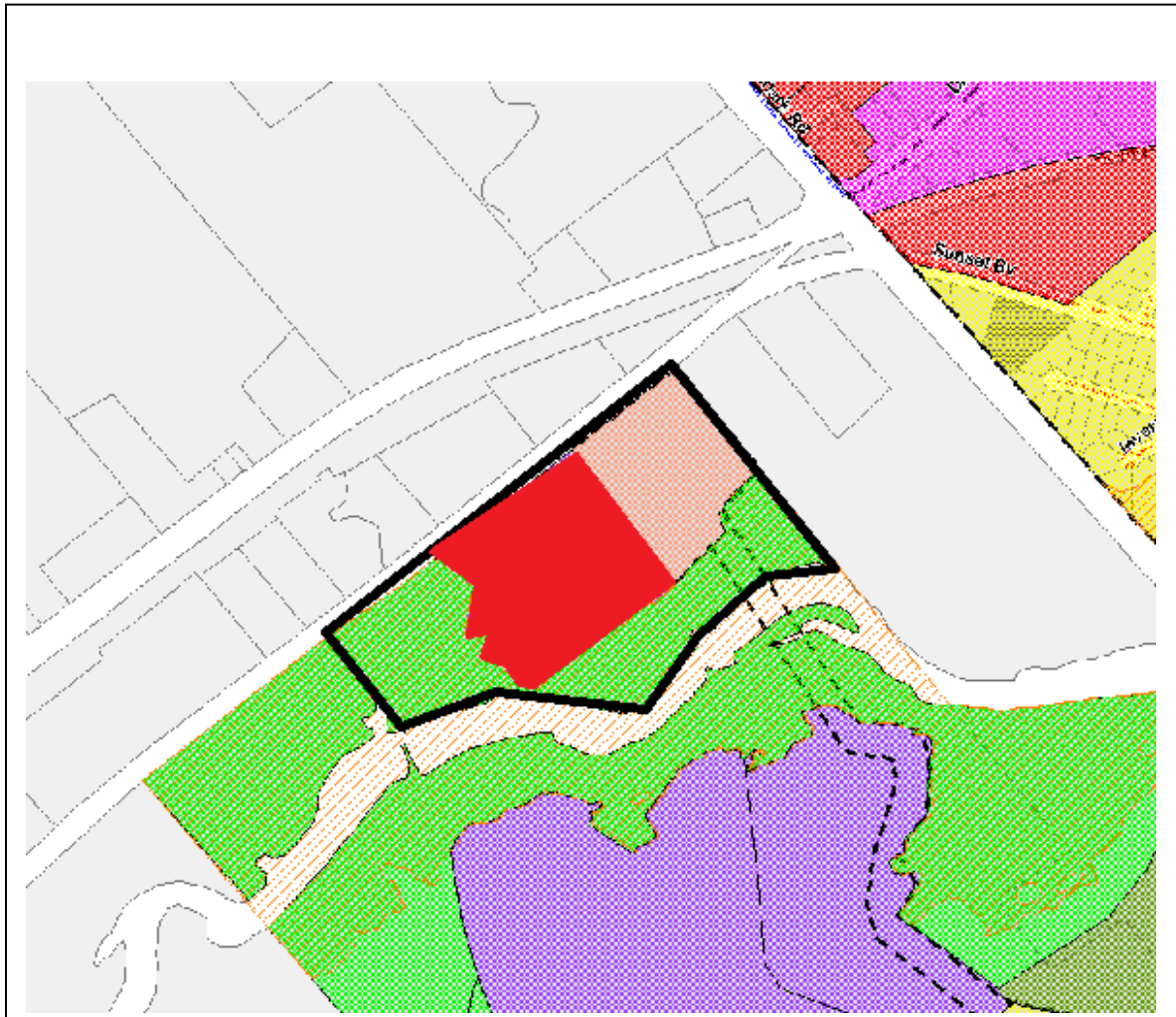


SUBJECT PROPERTY



LANDS TO BE DESIGNATED RESIDENTIAL

Schedule D: Part Lot 26, Concession 2, PIN 051860188



SUBJECT PROPERTY



LANDS TO BE DESIGNATED NEW RESIDENTIAL AREA



LANDS TO REMAIN NEW RESIDENTIAL AREA



LANDS TO REMAIN ENVIRONMENTAL PROTECTION

Schedule E: Part Lot 1, Concession 3, PINs 051710147 and 051710148



SUBJECT PROPERTY



LANDS TO BE DESIGNATED BUSINESS PARK



LANDS TO REMAIN BUSINESS PARK

Appendix B

Vegetation Communities

Appendix C – Species Lists

Vegetation Species Observed		Vegetation Communities											
Common Name	Latin Name	1 – Deciduous Forest	2 – Red Maple Deciduous Swamp	3 – Black Ash Deciduous Swamp	4 – Poplar Deciduous Forest	5 – Cultural Meadow	6 – White Elm Deciduous Forest	7 – Cultural Thicket	8 – Maple Deciduous Swamp	9 – Sugar Maple Deciduous Forest	10 – Sweet Gale Thicket Swamp	11 – Willow Thicket Swamp	12 – Buttonbush Swamp
Tree Species													
Silver maple	<i>Acer saccharinum</i>	X		X					X		X		X
Green ash	<i>Fraxinus pennsylvanica</i>	X	X	X	X	X	X	X	X	X			
American elm	<i>Ulmus americana</i>	X	X	X	X	X	X	X	X	X	X		
Red maple	<i>Acer rubrum</i>	X	X	X	X		X		X		X	X	X
Apple	<i>Malus</i> spp.					X							
Eastern white cedar	<i>Thuja occidentalis</i>	X				X							
Trembling aspen	<i>Populus tremuloides</i>	X			X	X				X		X	
Red pine	<i>Pinus resinosa</i>	X				X							
Black ash	<i>Fraxinus nigra</i>	X	X	X							X	X	
White oak	<i>Quercus alba</i>	X	X				X			X			
White spruce	<i>Picea glauca</i>	X											
Sugar maple	<i>Acer saccharum</i>	X	X	X						X			
Basswood	<i>Tilia americanum</i>	X								X			
Balsam poplar	<i>Populus balsamifera</i>	X			X	X	X						
Black cherry	<i>Prunus serotina</i>	X					X			X			
Large-toothed aspen	<i>Populus grandidentata</i>	X											
Manitoba maple	<i>Acer negundo</i>	X											
Mountain ash	<i>Sorbus americana</i>	X											
Eastern white pine	<i>Pinus strobus</i>					X							
Tamarack	<i>Larix laricina</i>				X		X						
Eastern hemlock	<i>Tsuga canadensis</i>							X		X			
White birch	<i>Betula papyrifera</i>						X	X					
Blue beech	<i>Carpinus carolinia</i>									X			
Balsam fir	<i>Abies balsamea</i>									X			
Bitternut hickory	<i>Carya cordiformis</i>									X			
Yellow birch	<i>Betula alleghaniensis</i>									X			
Ironwood	<i>Ostrya virginiana</i>									X			
Scott’s pine	<i>Pinus sylvestris</i>	X											
Bur oak	<i>Quercus macrocarpa</i>	X											
Colorado spruce	<i>Picea pungens</i>	X											
Butternut	<i>Juglans cinerea</i>	X								X			
Red cedar	<i>Thuja plicata</i>	X											
Shrub Species													
European buckthorn	<i>Rhamnus cathartica</i>	X	X	X	X	X	X	X	X	X	X		
Dwarf raspberry	<i>Rubus pubescens</i>			X				X	X				
Wild cucumber		X							X				
Sweet gale	<i>Myrica gale</i>	X	X	X					X		X		X
Speckled alder	<i>Alnus incana</i>	X	X	X		X	X		X		X	X	X
Prickly ash	<i>Xanthophyllum americanum</i>	X		X	X	X	X			X	X		
Wild red raspberry	<i>Rubus idaeus</i>	X				X							
Nannyberry	<i>Viburnum lentago</i>	X		X		X	X						
Narrow-leaved meadowsweet	<i>Spiraea alba</i>				X	X			X			X	X
Wild black currant	<i>Ribes americanum</i>			X		X							

Vegetation Species Observed		Vegetation Communities											
Common Name	Latin Name	1 – Deciduous Forest	2 – Red Maple Deciduous Swamp	3 – Black Ash Deciduous Swamp	4 – Poplar Deciduous Forest	5 – Cultural Meadow	6 – White Elm Deciduous Forest	7 – Cultural Thicket	8 – Maple Deciduous Swamp	9 – Sugar Maple Deciduous Forest	10 – Sweet Gale Thicket Swamp	11 – Willow Thicket Swamp	12 – Buttonbush Swamp
Hawthorn spp.	<i>Crataegus</i> spp.					X	X						
Pin cherry	<i>Prunus pensylvanica</i>	X				X						X	
Common juniper	<i>Juniperus communis</i>					X							
Lilac	<i>Syringa vulgaris</i>					X							
Wild rose	<i>Rosa</i> spp.	X	X			X							
Shrub willow spp.	<i>Salix</i> spp.	X	X			X					X	X	
Red osier dogwood	<i>Cornus sericea</i>	X			X	X					X	X	
Prickly gooseberry	<i>Ribes cynosbati</i>	X		X						X			
Fly honeysuckle	<i>Lonicera canadensis</i>	X		X						X			
Virginia creeper	<i>Parthenocissus quinquefolia</i>	X	X					X		X			
Tartarian honeysuckle	<i>Lonicera tartaria</i>	X			X					X			
Blackberry	<i>Rubus fruiticosus</i>	X				X	X	X		X			
Round-leaved dogwood	<i>Cornus rugosa</i>	X	X								X		
Black elderberry	<i>Sambucus nigra</i>	X				X							
Winterberry	<i>Ilex verticillata</i>	X	X		X				X				
Silky dogwood	<i>Cornus amomum</i>	X	X				X		X				
Riverbank grape	<i>Vitis riparia</i>	X		X			X	X					
Maple-leaf viburnum	<i>Viburnum acerifolium</i>	X											
Grey dogwood	<i>Cornus racemosa</i>				X				X	X			
Japanese barberry	<i>Eucryphia lucida</i>									X			
Leatherwood	<i>Cephalanthus occidentalis</i>									X			
Buttonbush			X										X
Choke cherry	<i>Prunus virginiana</i>	X											
Bush honeysuckle	<i>Diervilla lonicera</i>	X	X										
Beaked hazel	<i>Corylus cornuta</i>	X											
Wild raisin	<i>Viburnum cassinoides</i>	X											
Virgin’s bower	<i>Clematis virginiana</i>	X											
High bush cranberry	<i>Viburnum trilobum</i>	X											
Burning bush	<i>Euonymus alatus</i>		X										
Wild coffee	<i>Triosteum perfoliatum</i>	X											
Staghorn sumac	<i>Rhus typhina</i>	X											
Partridgeberry	<i>Mitchella ripens</i>	X											
Herbaceous/Fern/Sedge/etc. Species													
Sensitive Fern	<i>Onoclea sensibilis</i>	X	X	X			X	X	X	X			X
Fragrant bedstraw	<i>Galium triflorum</i>			X					X	X			
Buttercup spp.	<i>Ranunculus</i> spp.	X		X					X	X			
Canada anemone	<i>Anemone canadensis</i>	X							X				
Blue flag iris	<i>Iris versicolor</i>		X						X	X		X	
Purple loosestrife	<i>Lythrum salicaria</i>		X			X			X			X	
Wild calla	<i>Calla palustris</i>	X							X		X		X
Meadow horsetail	<i>Equisetum pratense</i>	X							X				
Rough-fruited cinquefoil	<i>Potentilla recta</i>					X			X				

Appendix _____

Description of Vegetation Communities

In 2010, McIntosh Perry delineated the vegetation communities present on the subject lands. The following information has been obtained from their report: Environmental Impact Statement, Perth Golf Course Community Concept, dated December 2012.

Community #	ELC	Description
1	Fresh – Moist Sugar Maple – Lowland Ash Deciduous Forest Type (FOD6-1)	Community 1 was classified as a Fresh – Moist Deciduous Forest (FOD) (Photo 1). This young to mid-age forest was located in multiple locations on the subject property (Figure 3). It was a relatively undisturbed forest on the west side of the property, with more influence from the golf course on the east side of the property. Dominant canopy species in this community included young to mid-age deciduous trees; sugar maple (<i>Acer saccharum</i>), green ash (<i>Fraxinus pennsylvanica</i>), trembling aspen (<i>Populus tremuloides</i>) and basswood (<i>Tilia americana</i>). Dominant woody vegetation in the sub-canopy included: red osier dogwood (<i>Cornus sericea</i>), prickly ash (<i>Zanthoxylum americanum</i>), tartarian honeysuckle (<i>Lonicera tartaria</i>), shrub willow and round-leaved dogwood (<i>Cornus rugosa</i>). Herbaceous vegetation present in the understory included: marsh violet (<i>Viola palustris</i>), woodland strawberry (<i>Fragaria vesca</i>), Canada anemone (<i>Anemone canadensis</i>), sarsaparilla (<i>Smilax regelii</i>), sensitive fern (<i>Onoclea sensibilis</i>), ostrich fern (<i>Matteuccia struthiopteris</i>), wood nettle (<i>Laportea canadensis</i>) and poison ivy (<i>Toxicodendron radicans</i>). The majority of habitat within Community 1 was very moist during the 2010 field investigations, with areas of ephemeral pooling evident within the community during the May field visit. Some of the more elevated areas of the community were dryer with associated vegetation. For a complete listing of vegetation species observed within Community 1, refer to Appendix 'C'.
2	Red Maple Deciduous Swamp Type (SWD3-1)	Community 2 was classified as a Red Maple Deciduous Swamp Type (SWD3-1) (Photo 2). This community was located on the north side of the subject property and contained young age trees (Figure 3). Dominant canopy species included: red maple, green ash and American elm (<i>Ulmus americana</i>). Sub-canopy species included: winterberry (<i>Ilex verticillata</i>), European buckthorn, silky dogwood (<i>Cornus amomum</i>) and shrub willow. Much of this community was flooded during the 2010 field investigations. However, there were some herbaceous vegetation species present on dry hummocks. These species included: sensitive fern, spotted jewelweed (<i>Impatiens capensis</i>), blue flag iris (<i>Iris versicolor</i>), swamp milkweed (<i>Asclepias incarnata</i>) and cuckoo flower (<i>Cardamine pratensis</i>). For a complete listing of vegetation species observed within Community 2, refer to Appendix 'C'.
3	Black Ash Mineral Deciduous Swamp Type (SWD2-1)	Community 3 was classified as a Black Ash Mineral Deciduous Swamp Type (SWD2-1) (Photo 3). This community was located adjacent to Grant's Creek on the east side of the subject property (Figure 3). This was a young community with dominant canopy species black ash (<i>Fraxinus nigra</i>), green ash, red maple and American elm. Dominant

		subcanopy species in this community included speckled alder (<i>Alnus incana</i>) and sweet gale (<i>Myrica gale</i>). There was a heavily vegetated understory in Community 3 that included multiple species of sedge, as well as royal fern (<i>Osmunda regalis</i>), sensitive fern, cinnamon fern (<i>Osmundastrum cinnamomeum</i>), jack-in-the-pulpit (<i>Arisaema triphyllum</i>) and tufted loosestrife (<i>Lysimachia thyrsiflora</i>). The transition zone between the black ash swamp and upland sites was dominated by European buckthorn. For a complete listing of vegetation species observed within Community 3, refer to Appendix 'C'.
4	Dry – Fresh Poplar Deciduous Forest Type (FOD3-1)	Community 4 was classified as a Dry – Fresh Poplar Deciduous Forest Type (FOD3-1) (Photo 4). This community contained young trees and was found south of the Tay River and adjacent to the golf course (Figure 3). The dominant canopy species included: trembling aspen, green ash and red maple. The dominant sub-canopy species were European buckthorn and prickly ash. The understory in this community during the 2010 field investigations was heavily vegetated including species of grasses and sedges, as well as narrow-leaved meadowsweet (<i>Spiraea alba</i>) and marsh violet. For a complete listing of vegetation species observed within Community 4, refer to Appendix 'C'.
5	Cultural Meadow (CUM)	Community 5 was classified as a Cultural Meadow (CUM) (Photo 5). There were three main locations of this community in the north end of the subject property separated by fairways of the golf course (Figure 3). Community 5 was an open, grassed community with very few trees present. Of the young scattered trees observed within Community 5, species included: trembling aspen, balsam poplar (<i>Populus balsamifera</i>) and white pine (<i>Pinus strobus</i>). There were also pockets of shrubs present throughout the community, including such species as: shrub willow spp., hawthorn (<i>Crataegus</i> spp.) and black elderberry (<i>Sambucus nigra</i>). Herbaceous vegetation included grass species, common milkweed (<i>Asclepias syriaca</i>), goldenrod spp. (<i>Solidago</i> spp.) and rough fruited cinquefoil (<i>Potentilla recta</i>). The areas of Community 5 on the west side of the subject property were in a more progressed state of regeneration (more heavily vegetated), than areas located on the north side of the property. For a complete listing of vegetation species observed within Community 5, refer to Appendix 'C'.
6	Fresh – Moist White Elm Lowland Deciduous Forest Type (FOD7-1)	Community 6 was classified as a Fresh – Moist White Elm Lowland Deciduous Forest Type (FOD7-1) (Photo 6). It was located in three sections adjacent to Community 5 in the north end of the subject property (Figure 3). Dominant canopy species in this community included: American elm, white oak (<i>Quercus alba</i>), green ash, tamarack (<i>Larix laricina</i>) and balsam poplar. The canopy trees were all of young age. The sub-canopy was heavily vegetated in this community and included species such as: European buckthorn, prickly ash, speckled alder and nannyberry (<i>Viburnum lentago</i>). Herbaceous understory vegetation included: sensitive fern, false Solomon's seal (<i>Maianthemum racemosum</i>), marsh violet, and woodland strawberry. For a complete listing of vegetation species observed within

		Community 6, refer to Appendix 'C'.
7	Cultural Thicket (CUT)	Community 7 was classified as a Cultural Thicket (CUT) (Photo 7). This relatively dry community was isolated and located in the northeast end of the property (Figure 3). Canopy species were mainly of a young age, and included white birch (<i>Betula papyrifera</i>) and American elm. The dominant sub-canopy species was European buckthorn. The understory was more sparsely vegetated than other more moist communities present on the subject property. Understory species included: poison ivy (<i>Toxicodendron radicans</i>), marginal wood fern (<i>Dryopteris marginalis</i>) and Virginia creeper (<i>Parthenocissus quinquefolia</i>). For a complete listing of vegetation species observed within Community 7, refer to Appendix 'C'.
8	Maple Organic Deciduous Swamp Ecosite (SWD6)	Community 8 was classified as a Maple Organic Deciduous Swamp Ecosite (SWD6) (Photo 8). This community was found in two locations on the subject property; the northern point of the property on the southern shore of the Tay River and also approximately 700 m to the west, on the north side of the Tay River (Figure 3). The dominant canopy species in this community was mature red and silver maple. The sub-canopy was sparsely vegetated. Species present in this layer included silky dogwood, sweet gale, winterberry and speckled alder. Herbaceous plants in the understory included species of grass and sedges as well as royal fern, sensitive fern and marsh fern (<i>Thelypteris palustris</i>). For a complete listing of vegetation species observed within Community 8, refer to Appendix 'C'.
9	Fresh – Moist Sugar Maple Deciduous Forest Ecosite (FOD6)	Community 9 was classified as a Fresh – Moist Sugar Maple Deciduous Forest Ecosite (FOD6) (Photo 9). This community was found in one large area in the southeast portion of the subject property (Figure 3). It was a large enough forested area to contain interior forest habitat. The dominant canopy species was mature sugar maple. The sub-canopy was dominated by sugar maple and ironwood (<i>Ostrya virginiana</i>) saplings. Fern species dominated the understory, including: sensitive fern, Christmas fern (<i>Polystichum acrostichoides</i>), ostrich fern, lady fern (<i>Athyrium filix-femina</i>) and bracken fern (<i>Pteridium aquilinum</i>). Other herbaceous species present in the understory included: enchanter's nightshade (<i>Circaea lutetiana</i>), Pennsylvania sedge (<i>Carex pensylvanica</i>) and poison ivy. For a complete listing of vegetation species observed within Community 9, refer to Appendix 'C'.
10	Sweet Gale Organic Thicket Swamp Type (SWT3-6)	Community 10 was classified as a Sweet Gale Organic Thicket Swamp Type (SWT3-6) (Photo 10). This community was found in the southern corner of the subject property, adjacent to Grant's Creek PSW (Figure 3). The majority of woody vegetation present in this community was comprised of shrubs, including: sweet gale, European buckthorn, red osier dogwood, round-leaved dogwood, speckled alder and shrub willow. Herbaceous vegetation species present in the understory included: early meadowrue (<i>Thalictrum dioicum</i>), swamp milkweed, wild calla (<i>Calla palustris</i>), sensitive fern and spotted jewelweed. For a complete listing of vegetation species observed within Community 10, refer to Appendix 'C'.
11	Willow Organic	Community 11 was classified as a Willow Organic Thicket Swamp Type

	Thicket Swamp Type (SWT3-1)	(SWT3-1) (Photo 11). This wet community was associated with Tributary 'A' on the west side of the subject property (Figure 3). The dominant woody vegetation species present in this community was willow spp. There were also sedge species growing in the understory. Due to the wet nature of this community very little herbaceous vegetation was present. For a complete listing of vegetation species observed within Community 11, refer to Appendix 'C'.
12	Buttonbush Mineral Thicket Swamp Type (SWT2-4)	Community 12 was classified as a Buttonbush Mineral Thicket Swamp Type (SWT2-4). This wet community was located on the edge of the Tay River on the east side of the subject property (Figure 3). The dominant woody vegetation species present in the community was buttonbush (<i>Cephalanthus occidentalis</i>). Although this community was not large in size, Buttonbush Mineral Thicket Swamp Type habitat is considered to be a rare community provincially (S3). For a complete listing of vegetation species observed within Community 12, refer to Appendix 'C'.

Vegetation Communities & Photo Location Map

Vegetation Species List

Photographs



Photo 1 - Community 1: Fresh – Moist Sugar Maple – Lowland Ash Deciduous Forest Type (FOD6-1). View Looking Southeast. Photo taken by Jp2g October 12, 2016.



Photo 2 - Community 2: Red Maple Deciduous Swamp Type (SWD3-1). View Looking Southeast. Photo taken by Jp2g October 12, 2016.



Photo 3 - Community 3: Black Ash Mineral Deciduous Swamp Type (SWD2-1). View Looking Southwest.
Photo taken by Jp2g October 12, 2016.



Photo 4 - Community 4: Dry – Fresh Poplar Deciduous Forest Type (FOD3-1). View Looking Northeast.
Photo taken by Jp2g October 12, 2016.



Photo 5 - Community 5: Cultural Meadow (CUM). View Looking Southwest.
Photo taken by Jp2g October 12, 2016.



Photo 6 - Community 6: Fresh – Moist White Elm Lowland Deciduous Forest Type (FOD7-1).
View Looking Northeast. Photo taken by Jp2g October 12, 2016.



Photo 7 - Community 7: Cultural Thicket (CUT). View Looking Southwest.
Photo taken by Jp2g October 12, 2016.



Photo 8 - Community 8: Maple Organic Deciduous Swamp Ecosite (SWD6). View Looking Northwest.
Photo taken by Jp2g October 12, 2016.



Photo 9 - Community 9: Fresh – Moist Sugar Maple Deciduous Forest Ecosite (FOD6). View Looking South.
Photo taken by Jp2g October 12, 2016.



Photo 10 - Community 10: Sweet Gale Organic Thicket Swamp Type (SWT3-6). View Looking Southeast.
Photo taken by Jp2g October 12, 2016.



Photo 11 - Community 11: Willow Organic Thicket Swamp Type (SWT3-1). View Looking Southwest.
Photo taken by Jp2g October 12, 2016.



Photo 12 - Community 12: Buttonbush Mineral Thicket Swamp Type (SWT2-4). View Looking Southeast.
Photo taken by Jp2g October 12, 2016.



Photo 13 – Forest Along River at Tayview Site. View Looking Southeast.
Photo taken by Jp2g October 12, 2016.



Photo 14 – Field on Tayview Site. View Looking Southwest.
Photo taken by Jp2g October 12, 2016.



Photo 15 – Field on Tayview Site. View Looking Northeast.
Photo taken by Jp2g October 12, 2016.

Appendix C

Preliminary Geotechnical Assessment



GEMTEC

www.gemtec.ca

**Preliminary Geotechnical Investigation
Proposed Residential Development
Perth West Annex
Perth, Ontario**

experience • knowledge • integrity



expérience • connaissance • intégrité



GEMTEC

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Submitted to:

Jp2g Consultants Inc.
1150 Morrison Drive, Suite 410
Ottawa, Ontario
K2H 8S9

**Preliminary Geotechnical Investigation
Proposed Residential Development
Perth West Annex
Perth, Ontario**

July 24, 2019
Project: 63988.75

GEMTEC Consulting Engineers and Scientists Limited
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July 24, 2019

File: 63988.75

Jp2g Consultants Inc.
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**Re: Preliminary Geotechnical Investigation
Proposed Residential Development
Perth West Annex
Perth, Ontario**

Enclosed is our preliminary investigation report for the above noted project based on the scope of work presented in our proposal dated August 17, 2018. This report was prepared by Joseph Berkers and Brent Wiebe, P.Eng.



Joseph Berkers, B.Eng.



Brent Wiebe, P.Eng.
Vice President of Operations - Ontario

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- Record of Previous Borehole and Test Pit Sheets

1.0 INTRODUCTION

This report presents an inventory of the expected soil, bedrock and groundwater conditions and preliminary geotechnical guidelines for a proposed residential development in Perth, Ontario. The purpose of the report is to identify the general soil, bedrock and groundwater conditions within the current study area using information and observations from our site investigation and previous subsurface investigations carried out by GEMTEC Consulting Engineers and Scientists Limited (GEMTEC).

This work was carried out for Jp2g Consultants Inc. in accordance with our proposal dated August 17, 2018.

2.0 BACKGROUND

It is understood that plans are being prepared to construct a residential development on two (2) parcels of land located in Perth, Ontario. Details of the sites are as follows:

- Area 1 is located south of the Tay River and west of Peter Street. The site is currently a recreational development (the Perth Golf Club).
- Area 2 is located on the north side of the Tay River and southeast of Sunset Boulevard. This site is generally vacant and has an existing commercial/agricultural building located on the site.

Internal roadways, site servicing (sewer and watermain), a sanitary pumping station and a possible bridge servicing the development are also included in the scope of the project. Details on the type of residential structures and quantity of lots are not available at this time.

3.0 METHODOLOGY

GEMTEC has carried out the following tasks as part of the preliminary geotechnical investigation for the proposed residential development:

- Desktop Study; and,
- Preliminary Subsurface Investigation and Site Reconnaissance.

3.1 Task 1 - Desktop Study

A desktop study has been carried out to provide a review of previous information on overburden thickness, soil types, and bedrock conditions. In addition to the reference material available in our files, available geological and geotechnical data has been obtained from the Geological Survey of Canada, the Ontario Geological Survey, and available historical air photographs/satellite imagery.

3.2 Task 2 - Preliminary Subsurface Investigation and Site Reconnaissance

A site reconnaissance has been carried out by a member of our engineering staff across the subject property. Evidence of bedrock outcrops have been observed and mapped. Four (4) hand augerholes have also been advanced at locations across the two areas using a spiral auger. The subsurface conditions at the augerhole locations were identified by visual and tactile examination of the recovered auger cuttings. Any other features of geotechnical interest were observed and mapped. A rock probe was also used to identify shallow rock or lack thereof.

4.0 DESKTOP STUDY

4.1 Site Geology

Based on surficial geology maps of the Perth area, the site is likely underlain by near surface Precambrian bedrock. The surficial geology maps indicate that overburden materials ranging from silty sand to clay are to be expected at this site.

The surficial geology maps also indicate that there may be a corridor of organic deposits extending beyond either side of the Tay River. The proposed bridge is within this corridor but the corridor does not extend into any proposed building locations.

Fill material associated with the previous development of the site should also be anticipated.

4.2 Previous Test Hole information

GEMTEC have previously carried out a number of boreholes and test pits within the vicinity of the proposed development. See Figure 1 and Figure 2 for the locations of the previous test holes, and Appendix A for the test hole logs.

4.2.1 Overburden

Overburden material identified in previous test holes typically consists of topsoil, fill material, native silt and clay, and glacial till. Thickness of the overburden ranges from 0 to 3.7 metres.

The following sections provide a general summary of the conditions encountered in the previous test holes.

4.2.2 Bedrock

Many of our previous test holes in the vicinity of the study area either reached refusal or confirmed bedrock through coring. This information provides an indication of the variability of bedrock depths that we are likely to encounter within the study area. Table 4.1 below presents the previous test hole number along with its corresponding bedrock depth, refusal depth, or voluntary test hole termination depth.

Table 4.1 - Bedrock/refusal depths at previous test holes

Test Hole	Bedrock	Refusal	Termination before bedrock or refusal	Depth
Borehole 16-1	✓			2.79
Borehole 16-2	✓			3.05
Test Pit 1		✓		1.80
Test Pit 2		✓		2.11
Test Pit 3		✓		2.87
Test Pit 4		✓		0.86
Test Pit 5		✓		2.21
Borehole 12-1		✓		3.13
Borehole 12-2			✓	3.66
Borehole 12-3	✓			2.61
Test Pit 10-1		✓		2.20
Test Pit 10-2		✓		2.90
Test Pit 10-3		✓		2.00
Test Pit 10-4		✓		3.00
Test Pit 10-5		✓		3.50
Test Pit 10-6		✓		3.00
Borehole H-1	✓			3.02
Borehole H-2	✓			0.89
Borehole H-3	✓			0.08
Borehole T-1	✓			1.07
Borehole T-2	✓			1.80
Borehole T-3	✓			1.30

Table 4.1 above shows the variability of bedrock and inferred bedrock depths within the vicinity of the study area. Bedrock and inferred bedrock depths range from 0.1 metres to beyond 3.7 metres below surface grade.

4.2.3 Groundwater

The majority of our previous test holes within the vicinity of the study area indicate the observed groundwater level. This information provides an indication of the variability of groundwater levels that we can expect to encounter within the study area. Table 4.2 below provides observed groundwater levels at previous test hole locations. Note that the previous boreholes H-1 to H-3 and T-1 to T-3 were performed either within or immediately adjacent to the Tay River, so we have omitted these test holes from the table below.

Table 4.2 - Observed groundwater depths at previous test holes

Test Hole	Groundwater Depth (metres)
Borehole 16-1	1.6
Borehole 16-2	1.3
Test Pit 1	0.9
Test Pit 2	0.7
Test Pit 3	1.0
Test Pit 4	0.9
Test Pit 5	0.9
Borehole 12-1	0.9
Borehole 12-3	1.0
Test Pit 10-1	1.7
Test Pit 10-2	1.4
Test Pit 10-3	1.7
Test Pit 10-4	1.8
Test Pit 10-5	1.5
Test Pit 10-6	1.3

The groundwater depth within the study area is expected to be variable. Based on the available borehole and test pit information, the groundwater level within the overburden ranges from 0.9 to 1.7 metres depth.

5.0 SUBSURFACE INVESTIGATION AND SITE RECONNAISSANCE

5.1 Hand Augerholes

A total of four (4) hand augerholes were carried out at the site. Three (3) were carried out within Area 1 and one (1) was carried out within Area 2. Hand augerhole locations are provided on Figure 1. The conditions encountered in the hand augerholes are presented in the Table 5.1 below.

Table 5.1 - Subsurface Conditions in Hand Augerholes

Hand Augerhole	Depth (m)	Soil Description
1	0 to 0.2	Dark brown silt with rootlets and organic material (TOPSOIL)
	0.2 to 0.4	Grey SILT, some fine sand
	0.4 to 1.0	Light brown, fine SANDY SILT
	1.0	Auger refusal, auger spinning on gravel or bedrock
2	0 to 0.3	Dark brown silt with rootlets and organic material (TOPSOIL)
	0.3 to 0.4	Grey SILT, trace fine sand
	0.4 to 0.7	Light brown, fine SANDY SILT
	0.7	Auger refusal, likely on bedrock or boulder
3	0 to 0.2	Dark brown silt with rootlets and organic material (TOPSOIL)
	0.2 to 0.6	Brown CLAYEY SILT
	0.6 to 0.7	Grey SILT, some fine to medium sand
	0.7 to 1.0	Grey brown SAND, some silt, trace gravel
	1.0	Auger refusal, likely on bedrock or boulder

Hand Augerhole	Depth (m)	Soil Description
4	0 to 0.3	Dark brown silt with rootlets and organic material (TOPSOIL)
	0.3 to 0.5	Brown CLAYEY SILT, trace gravel
	0.5	Auger refusal, auger spinning on gravel or bedrock

5.2 Subsurface Conditions

5.2.1 Overview

At the hand augerhole locations, the overburden consists of topsoil, native silt, and glacial till. Shallow bedrock is present across the site. Fill material should also be anticipated within the overburden.

5.2.2 Topsoil

Each of the four hand augerholes encountered a 0.2 to 0.3 metre thick layer of topsoil, comprised predominantly of organic silt.

5.2.3 Silt and Sandy Silt

Beneath the topsoil, the hand augerholes advanced at the site encountered soils comprised predominantly of silt and sandy silt. These deposits ranged in thickness from 0.3 to 0.8 metres.

5.2.4 Glacial Till

A 0.3 metre thick layer of glacial till was encountered in hand augerhole 3 at a depth of 0.7 metres. Glacial till is a heterogeneous mixture of all grainsizes, which at this site can be described as sand with some silt and trace gravel.

5.2.5 Bedrock

Frequent bedrock outcrops were observed during our site reconnaissance and are indicated on Figure 1. The four hand augerholes that were advanced all reached shallow refusal at depths ranging from 0.5 to 1.0 metres. The nature of refusal at hand augerholes 2 and 3 indicated a high probability of bedrock or boulders.

5.2.6 Groundwater Levels

Groundwater was observed in a layer of sand in hand augerhole 3 at a depth of 1.0 metres below ground surface. Groundwater was not observed in any of the other three hand augerholes. It is worth noting that hand augerhole 3 was the only augerhole that encountered sand, which increases the likelihood that groundwater would be observable. Groundwater may have been

present in the other holes, but the fine-grained soils would likely inhibit groundwater seepage into the test hole.

The groundwater levels are expected to be higher during wet periods of the year, such as early spring, or following periods of heavy precipitation.

6.0 PRELIMINARY GEOTECHNICAL GUIDELINES

6.1 General

This section of the report provides engineering guidelines on the preliminary geotechnical design aspects of the project based on our interpretation of the available test hole information and our observations recorded during the site reconnaissance. It is stressed that the information in the following sections is provided for the guidance of the designers and is intended for this project only. Contractors bidding on or undertaking the works should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction, and make their own interpretation of the factual data as it affects their construction techniques, schedule, safety and equipment capabilities. A site specific geotechnical investigation by means of test pits and/or boreholes is recommended prior to detailed design of the development.

The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at this site. The presence or implications of possible surface and/or subsurface contamination resulting from previous uses or activities of this site or adjacent properties, and/or resulting from the introduction onto the site from materials from off site sources are outside the terms of reference for this report and have not been investigated or addressed.

6.2 Excavation

6.2.1 Overburden Excavation

In overburden, the excavations for the proposed buildings and site services will be carried out through surficial topsoil, native silt, glacial till, and possibly fill material. The sides of the excavations in overburden should be sloped in accordance with the requirements of the Ontario Occupational Health and Safety Act. The native soils can be classified as Type 3 soils. As such, overburden excavations should be carried out using 1 horizontal to 1 vertical, or flatter, side slopes extending from the bottom of the excavation. In areas where space constraints dictate, the sides of the service trenches could be supported by a steel trench box designed for this purpose.

6.2.2 Bedrock Excavation

The Precambrian bedrock at this site is known to be hard and abrasive on drilling steel and pneumatic hoe ram equipment. Most of the bedrock removal at this site will likely require drill and blasting techniques. Excavations in bedrock should stand near vertically; however, the sides of the excavations should be scaled to remove any loose bedrock material.

Any blasting should be carried out under the supervision of a blasting specialist engineer. As a guideline for blasting, a maximum peak particle velocity of 50 millimetres per second could be used as the vibration criteria at the nearest structure or service. It is pointed out that this criteria, although conservative, was established to prevent damage to existing buildings and services; more stringent criteria may be required to prevent damage to freshly placed (uncured) concrete.

The bedrock in this area is known to contain random joints. To reduce, not prevent, over break and under break of bedrock in the excavation, line drilling on close centres is suggested along the design limits of the excavation. Monitoring of the blasting should be carried out throughout the blasting period to ensure that the blasting meets the limiting vibration criteria.

6.2.3 Groundwater Pumping

Groundwater seepage into excavations is expected and should be controlled, as necessary, by pumping from within the excavations. It is not expected that groundwater pumping will affect structures or services on adjacent properties.

6.3 Engineered Fill

In areas where proposed founding level is above the level of the native soil or bedrock, or where subexcavation of disturbed material is required below proposed founding level, imported granular material (engineered fill) should be used. The engineered fill should consist of granular material meeting Ontario Provincial Standard Specifications (OPSS) requirements for Granular B Type II and should be compacted in maximum 200 millimetre thick lifts to at least 95 percent of the standard Proctor maximum dry density.

In areas where groundwater inflow is encountered, pumping should be carried out from sumps in the excavation during placement of the engineered fill. To allow spread of load beneath the footings, the engineered fill should extend horizontally at least 0.3 metres beyond the footings and then down and out from the edges of the footings at 1 horizontal to 1 vertical, or flatter. The excavations for the proposed structures should be sized to accommodate this fill placement. It is suggested that, for environmental reasons, any granular materials used below founding level be composed of virgin material only.

6.4 Foundation Bearing Pressures

For preliminary design purposes the following geotechnical reactions at Serviceability Limit State (SLS) and Ultimate Limit State (ULS) may be used where applicable.

Table 6.1 - Geotechnical reactions at SLS and ULS

Foundation Material	Geotechnical Reaction at SLS	Geotechnical Reaction at ULS
Native Silt	100 kilopascals	200 kilopascals
Native Glacial Till	100 to 150 kilopascals	200 to 300 kilopascals
Sound Bedrock	Not Applicable	2000 kilopascals

The post construction total and differential settlement of the footings at SLS should be less than 25 millimetres, provided that all loose or disturbed soil is removed from the bearing surfaces.

6.5 Site Grade Raise Restrictions

Based on the results of our investigation, there are no restrictions on grade raise at this site from a geotechnical perspective.

6.6 Frost Protection

All exterior footings in unheated portions of the proposed buildings should be provided with at least 1.5 metres of earth cover for frost protection purposes. Isolated, unheated exterior footings adjacent to surfaces which are cleaned of snow cover during the winter months should be provided with a minimum of 1.8 metres of earth cover. The required depth of frost protection can be reduced by the thickness of any engineered fill beneath the foundations. Alternatively, the required frost protection could be provided by means of a combination of earth cover and extruded polystyrene insulation. For footings bearing on sound bedrock, the requirement for frost protection could likely be waived. In this case the frost susceptibility of the bedrock should be confirmed at the time of construction by geotechnical personnel

6.7 Foundation Backfill

To avoid frost adhesion and possible heaving, the foundations should be backfilled with imported, free-draining, non-frost susceptible granular material such as that meeting OPSS Granular B Type I or II requirements.

Where the backfill will ultimately support areas of hard surfacing (pavement, sidewalks or other similar surfaces), the backfill should be placed in maximum 200 millimetre thick lifts and should be compacted to at least 95 percent of the standard Proctor maximum dry density value using suitable vibratory compaction equipment. Light, walk behind compaction equipment should be used next to foundation walls to avoid excessive compaction induced stress on the foundation walls. Where future landscaped areas will exist next to the proposed structure and if some settlement of the backfill is acceptable, the backfill could be compacted to at least 90 percent of the standard Proctor maximum dry density value.

Where areas of hard surfacing (pavement or pathways, etc.) abut the proposed structure, a gradual transition should be provided between those areas of hard surfacing underlain by non-frost susceptible granular wall backfill and those areas underlain by existing frost susceptible material to reduce the effects of differential frost heaving. It is suggested that granular frost tapers be constructed from 1.5 metres below finished grade to the underside of the granular subbase material for the hard surfaced areas. The frost tapers should be sloped at 1 horizontal to 1 vertical, or flatter.

6.8 Site Services

6.8.1 Excavation

In the overburden, the excavation for flexible service pipes should be in accordance with Ontario Provincial Standard Drawing (OPSD) 802.010 for Type 3 soil. The excavation for rigid service pipes should be in accordance with OPSD 802.031 for Type 3 soil. The sides of the excavations within overburden soils should be sloped in accordance with the requirements in Ontario Regulation 213/91 under the Occupational Health and Safety Act. According to the Act, the soils at this site can be classified as Type 3 soils. Therefore, for design purposes, allowance should be made for 1 horizontal to 1 vertical, or flatter, excavation slopes. As an alternative or where space constraints dictate, the service installations could be carried out within a tightly fitting, braced steel trench box, which is specifically designed for this purpose.

Bedrock removal will likely be required in order to install the site services. The excavation for flexible and rigid service pipes in bedrock could be in accordance with OPSD 802.013 and 802.033, respectively. See section 6.2.2 for additional comment on bedrock excavation.

Groundwater seepage into excavations is expected and should be controlled, as necessary, by pumping from within the excavations. It is not expected that short term pumping during excavation will have a significant effect on nearby structures and services.

6.8.2 Pipe Bedding

The bedding for sewers and watermains should be in accordance with OPSD 802.010 and 802.031 for flexible and rigid pipes in Type 3 soils, respectively. The bedding for flexible and rigid service pipes in bedrock should be in accordance with OPSD 802.013 and 802.033, respectively.

The bedding for service pipes should consist of at least 150 millimetres of crushed stone meeting OPSS requirements for Granular A. Cover material, from spring line to at least 300 millimetres above the tops of the pipes, should consist of granular material, such as that meeting OPSS Granular A.

Where bedrock excavation is required, some over break should be expected and allowance should be made for thickening the bedding material, as required.

In areas where the subsoil is disturbed or where unsuitable material (fill or organic material) exists below the pipe subgrade level, the disturbed/unsuitable material should be removed and replaced with a subbedding layer of compacted granular material, such as that meeting OPSS Granular B Type I or II. To provide adequate support for the sewer pipes in the long term in areas where subexcavation of material is required below design subgrade level, the excavations should be sized to allow a 1 horizontal to 1 vertical or 2 horizontal to 1 vertical spread of granular material down and out from the bottom of the pipes.

The granular bedding and subbedding materials should be compacted in maximum 200 millimetre thick lifts to at least 95 percent of the standard Proctor dry density value.

6.8.3 Trench Backfill

In areas where the service trenches will be located below or in close proximity to existing or future areas of hard surfacing (pavement, sidewalk, etc.), acceptable native materials should be used as backfill between the roadway subgrade level and the depth of seasonal frost penetration in order to reduce the potential for differential frost heaving between the area over the trench and the adjacent hard surfaced area. The depth of frost penetration in exposed areas can normally be taken as 1.8 metres below finished grade. Where native backfill is used, it should match the native materials exposed on the trench walls. Backfill below the zone of seasonal frost penetration could consist of either acceptable native material, imported granular material conforming to OPSS Granular B Type I, or well shattered and graded excavated bedrock.

To minimize future settlement of the backfill and achieve an acceptable subgrade for the roadways, sidewalks, driveways, etc., the trench backfill should be compacted in maximum 300 millimetre thick lifts to at least 95 percent of the standard Proctor dry density value. Rock fill should be placed in maximum 500 millimetre thick lifts and compacted with the haulage and spreading equipment. The specified density for compaction of the backfill materials may be reduced where the trench backfill is not located below or in close proximity to existing or future areas of hard surfacing and/or structures.

6.9 Pavement Design

For the roadways within this residential development, the following minimum pavement structures are suggested:

Local Roads:

- 90 millimetres of hot mix asphaltic concrete
- 150 millimetres of OPSS Granular A base over
- 300 millimetres of OPSS Granular B, Type II subbase

Minor Collector Roads:

- 90 millimetres of hot mix asphaltic concrete

150 millimetres of OPSS Granular A base over
450 millimetres of OPSS Granular B, Type II subbase

In areas where bedrock or well shattered and graded rock fill is encountered at the pavement subgrade level, the thickness of the OPSS Granular B Type II subbase could be reduced to 150 millimetres.

The above pavement structure assumes that any trench backfill is adequately compacted and that the roadway subgrade surface is prepared adequately. If the roadway subgrade surface is disturbed or wetted due to construction operations or precipitation, the granular thickness given above may not be adequate and it may be necessary to increase the thickness of the Granular B Type II subbase and/or to incorporate a woven geotextile separator between the roadway subgrade surface and the granular subbase material. The adequacy of the design pavement thickness should be assessed by geotechnical personnel at the time of construction.

6.10 Bridge Considerations

Bedrock outcrops were identified at the possible location of the southern bridge abutment during our site reconnaissance, indicating that shallow bedrock is likely. Bridge foundations are therefore likely to be founded on bedrock.

Erosion protection will be required to protect both bridge abutments. This will likely be in the form of rock rip rap.

It is worth noting that the surficial geological maps indicate a corridor of organic deposits that extends beyond either side of the Tay River. Although any organic deposits at the abutment locations are likely to be shallow, it is possible that settlement risks may need to be mitigated as the design progresses. Boreholes should be advanced in the vicinity of the abutments as part of the geotechnical investigation.

6.11 Seismic Site Class

Based on the results of the investigation, it is anticipated that the proposed foundations will either be:

- Supported on the native overburden deposits over relatively shallow bedrock;
- Supported on a pad of engineered fill constructed on a thin soil veneer or bedrock; or
- Supported directly on the bedrock.

Based on the above, it is considered that seismic site class A or B are likely appropriate for this site. However, it is noted that the Ontario Building Code stipulates that determination of the shear

wave velocity is required to assign site class A or B. Site class C would be the highest designation available in the absence of shear wave velocity data.

Based on the size of the proposed development it is considered likely that cost savings in design and construction associated with improving the site class to A or B would warrant the cost of site specific shear wave velocity testing.

The risk of liquefaction at this site is low. Any granular material that exists below the water table is likely to be glacial till and typically too dense to liquefy. Any deposits of loose sand may be removed as necessary, or compacted in place.

We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.

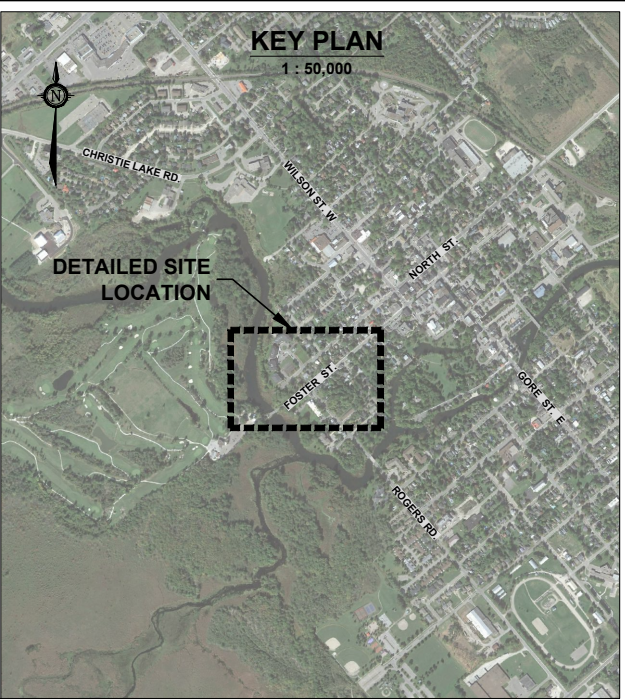


Joseph Berkers, B.Eng



Brent Wiebe, P.Eng
Vice President of Operations - Ontario

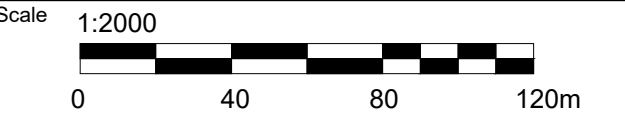




LEGEND

BH # **BOREHOLE LOCATION IN PLAN**
(previous investigation by Houle Chevrier Engineering Ltd.)

TP # **TEST PIT LOCATION IN PLAN**
(previous investigation by Houle Chevrier Engineering Ltd.)



 **GEMTEC**
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ottawa@gemtec.ca

Client		Jp2g Consultants Inc.		Project	
				63988.75	
Location		PERTH WEST ANNEX PERTH, ON			
Drwn by	Chkd by	DETAILED SITE PLAN			
P.C.	J.B.				
Date	OCTOBER 2018		Rev.	0	
			FIGURE 2		



Hand Augerhole 1



Hand Augerhole 1
Proposed Residential Development
October 5, 2018

FIGURE 3



Hand Augerhole 2



Hand Auger 2
Proposed Residential Development
October 5, 2018

FIGURE 4



Hand Augerhole 3
Proposed Residential Development
October 16, 2018

FIGURE 5



Hand Augerhole 4
Proposed Residential Development
October 16, 2018

FIGURE 6



Proposed Bridge Location
Proposed Residential Development
October 5, 2018

FIGURE 7



Rock Outcrops
Proposed Residential Development
October 5, 2018

FIGURE 8



APPENDIX A

List of Abbreviations and Terminology
Record of Previous Borehole and Test Pit Sheets

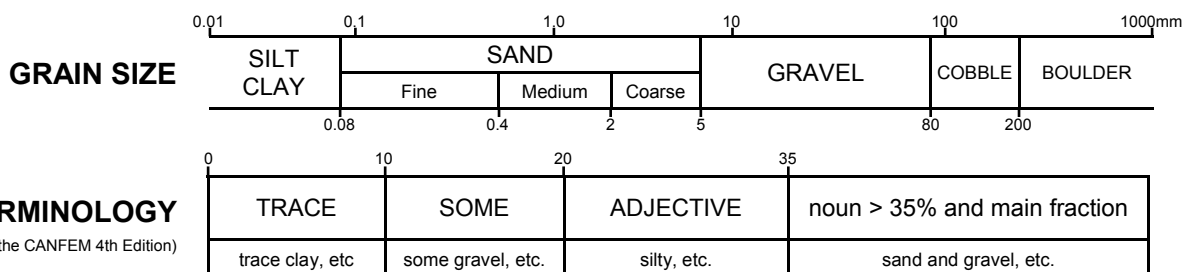
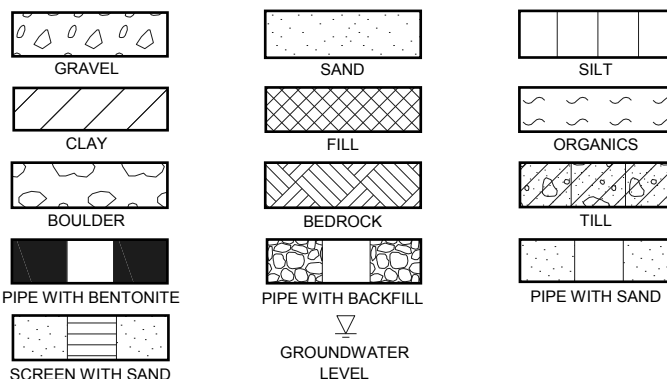
ABBREVIATIONS AND TERMINOLOGY USED ON RECORDS OF BOREHOLES AND TEST PITS

SAMPLE TYPES	
AS	Auger sample
CA	Casing sample
CS	Chunk sample
BS	Borros piston sample
GS	Grab sample
MS	Manual sample
RC	Rock core
SS	Split spoon sampler
ST	Slotted tube
TO	Thin-walled open shelby tube
TP	Thin-walled piston shelby tube
WS	Wash sample

SOIL TESTS	
w	Water content
PL, w_p	Plastic limit
LL, w_L	Liquid limit
C	Consolidation (oedometer) test
D_R	Relative density
DS	Direct shear test
G_s	Specific gravity
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	Organic content test
UC	Unconfined compression test
γ	Unit weight

PENETRATION RESISTANCE	
Standard Penetration Resistance, N The number of blows by a 63.5 kg (140 lb) hammer dropped 760 millimetres (30 in.) required to drive a 50 mm split spoon sampler for a distance of 300 mm (12 in.). For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.	
Dynamic Penetration Resistance The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive a 50 mm (2 in.) diameter 60° cone attached to 'A' size drill rods for a distance of 300 mm (12 in.).	
WH	Sampler advanced by static weight of hammer and drill rods
WR	Sampler advanced by static weight of drill rods
PH	Sampler advanced by hydraulic pressure from drill rig
PM	Sampler advanced by manual pressure

COHESIONLESS SOIL Compactness		COHESIVE SOIL Consistency	
SPT N-Values	Description	C_u , kPa	Description
0-4	Very Loose	0-12	Very Soft
4-10	Loose	12-25	Soft
10-30	Compact	25-50	Firm
30-50	Dense	50-100	Stiff
>50	Very Dense	100-200	Very Stiff
		>200	Hard



RECORD OF BOREHOLE 16-1

CLIENT:
PROJECT:
JOB#:
LOCATION: See Borehole Location Plan, Figure 2

SHEET: 1 OF 2
DATUM:
BORING DATE: Dec 19 2016

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m												SHEAR STRENGTH (Cu), kPa				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m												WATER CONTENT, %					
									▲												W _p — W — W _L					
									10	20	30	40	50	60	70	80	90									
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface																								
		Dark brown silty sand, with organics (TOPSOIL)			1	50 D.O.		60 for 0.18m																		
		Brown to light brown silty sand, some clay, gravel, trace boulders near surface, rootlets (FILL MATERIAL)		0.33	2	50 D.O.	5		●																	
1																										
	HQ Rotary Diamond Drill Bit	Light brown silty sand, trace clay and gravel, possible cobbles and boulders (GLACIAL TILL)		1.37	3	50 D.O.	6	●																		
2					4	50 D.O.	24				●															
3		Fresh to slightly decomposed, slightly to moderately fractured, grey GRANITE BEDROCK with interbedded quartz		2.79	5	R.C.		TCR = 84%, SCR = 82%, RQD = 82%																		
4					6	R.C.		TCR = 100%, SCR = 93% RQD = 93%																		
5																										
6					7	R.C.		TCR = 95%, SCR = 92%, RQD = 92%																		
7																										
8					8	R.C.		TCR = 100%, SCR = 95% RQD = 67%																		
9																										
					9	R.C.		TCR = 97%, SCR = 94%, RQD = 93%																		
10																										

Bentonite seal

PHCs,
BTEX,
VOCs,
Metals

PHCs,
BTEX,
VOCs,
Metals

UCS
#1

UCS
#2

Filter sand

38 mm
Diameter, 1.52
metre long well
screen

RECORD OF BOREHOLE 16-1

CLIENT:
PROJECT:
JOB#:
LOCATION: See Borehole Location Plan, Figure 2

SHEET: 2 OF 2
DATUM:
BORING DATE: Dec 19 2016

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPA		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	●	▲	± NATURAL ⊕ REMOULDED	WATER CONTENT, %		
10					10	R.C.		TCR = 100%, SCR = 95%, RQD = 95%						38 mm Diameter, 1.52 metre long well screen
11		End of borehole		10.82										
12														
13														
14														
15														
16														
17														
18														
19														
20														

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
17/01/04	1.70	▽
17/01/06	1.60	▼

RECORD OF BOREHOLE 16-2

CLIENT:
PROJECT:
JOB#:
LOCATION: See Borehole Location Plan, Figure 2

SHEET: 1 OF 2
DATUM:
BORING DATE: Dec 19 2016

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m										SHEAR STRENGTH (Cu), kPa										ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m										WATER CONTENT, %																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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Bentonite seal



Filter sand

38 mm
Diameter, 1.52
metre long well
screen

Bentonite seal

RECORD OF BOREHOLE 16-2

CLIENT:
PROJECT:
JOB#:
LOCATION: See Borehole Location Plan, Figure 2

SHEET: 2 OF 2
DATUM:
BORING DATE: Dec 19 2016

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m 10 20 30 40 50 60 70 80 90	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED WATER CONTENT, % W _p — W — W _L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m				
10					10	R.C.		TCR = 100%, SCR = 100%, RQD = 84%			UCS #4	Bentonite seal 
11		End of Borehole		10.59								
12												
13												
14												
15												
16												
17												
18												
19												
20												

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
17/01/04	1.30	▽

PROJECT: 09-079

LOCATION: See Site Plan, Figure 2

DATE OF EXCAVATION: April 23, 2009

RECORD OF TEST PIT 1

SHEET 1 OF 1

DATUM: Not Applicable

TYPE OF EXCAVATOR: Mini Excavator

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa)				WATER CONTENT (PERCENT)				ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)											
0	Ground Surface													
	Dark brown silt, organic material (TOPSOIL / PEAT)													
	Apparent loose grey brown silty sand, gravel, cobbles and boulders (GLACIAL TILL)		0.45											
1														
	Practical Refusal to excavating on possible bedrock or boulders End of test pit		1.80											
2														
3														

DEPTH SCALE

1 to 15

Houle Chevrier Engineering Ltd.

LOGGED: A.N.

CHECKED:

TESTPIT_RECORD_09-079 BH LOGS.GPJ MHECL.GDT 5/14/09

Groundwater
inflow
observed at
0.86 metres
below
ground
surface on
April 23,
2009.

PROJECT: 09-079

LOCATION: See Site Plan, Figure 2

DATE OF EXCAVATION: April 23, 2009

RECORD OF TEST PIT 2

SHEET 1 OF 1

DATUM: Not Applicable

TYPE OF EXCAVATOR: Backhoe

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa)				WATER CONTENT (PERCENT)				ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)											
0	Ground Surface													
	Dark brown silt, some organic material (TOPSOIL)													
	Stiff grey brown SILTY CLAY (Weathered Crust)		0.30											
1	Apparent loose grey brown sandy silt, trace clay, gravel, cobbles and boulders (GLACIAL TILL)		1.11											
2	Practical Refusal to excavating on possible bedrock or boulders End of test pit		2.11											
3														



Groundwater
inflow
observed at
0.8 metres
below
ground
surface on
April 23,
2009.

DEPTH SCALE

1 to 15

Houle Chevrier Engineering Ltd.

LOGGED: A.N.

CHECKED:

TESTPIT RECORD 09-079 BH LOGS.GPJ MHECL.GDT 5/14/09

PROJECT: 09-079

LOCATION: See Site Plan, Figure 2

DATE OF EXCAVATION: April 23, 2009

RECORD OF TEST PIT 3

SHEET 1 OF 1

DATUM: Not Applicable

TYPE OF EXCAVATOR: Backhoe

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa)				WATER CONTENT (PERCENT)				ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)											
0	Ground Surface													
	Dark brown sandy silt, organic material (TOPSOIL)			1										
	Grey brown fine to coarse grained SILTY SAND, trace gravel		0.33	2										
1	Apparent loose grey brown silty sand, gravel, some cobbles and boulders (GLACIAL TILL)		1.04	3										
2														
3	Practical Refusal to excavating on possible bedrock or boulders End of test pit		2.87											



Groundwater
inflow
observed at
1.02 metres
below
ground
surface on
April 23,
2009.

DEPTH SCALE

1 to 15

Houle Chevrier Engineering Ltd.

LOGGED: A.N.

CHECKED:

TESTPIT RECORD 09-079 BH LOGS.GPJ MHECL.GDT 5/14/09

PROJECT: 09-079

RECORD OF TEST PIT 4

SHEET 1 OF 1

LOCATION: See Site Plan, Figure 2

DATUM: Not Applicable

DATE OF EXCAVATION: April 23, 2009

TYPE OF EXCAVATOR: Backhoe

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa)				WATER CONTENT (PERCENT)				ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)											
0	Ground Surface													
	Dark brown silt, some organic material (TOPSOIL)			1										
	Stiff grey brown SILTY CLAY, frequent roots and rootlets (Weathered Crust)		0.30	2										
1	Practical Refusal to excavating on possible bedrock or boulders End of test pit		0.86											
2														
3														

Groundwater
inflow
observed at
about 0.9
metres
below
ground
surface on
April 23,
2009.

DEPTH SCALE

1 to 15

Houle Chevrier Engineering Ltd.

LOGGED: A.N.

CHECKED:

TESTPIT_RECORD_09-079 BH LOGS.GPJ MHECL.GDT 5/14/09

PROJECT: 09-079

LOCATION: See Site Plan, Figure 2

DATE OF EXCAVATION: April 23, 2009

RECORD OF TEST PIT 5

SHEET 1 OF 1

DATUM: Not Applicable

TYPE OF EXCAVATOR: Backhoe

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa)					WATER CONTENT (PERCENT)					ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)													
0	Ground Surface															
	Grey brown medium to coarse grained sand, trace silt, some gravel (FILL MATERIAL)			1												
	Brown fine to medium silty sand, trace gravel (FILL MATERIAL)		0.23	2												
	Dark brown sandy silt, trace to some brick (TOPSOIL / FILL)		0.36	3												
	Stiff grey brown SILTY CLAY, trace sand (Weathered Crust)		0.61	4												
1																
	Apparent loose grey brown sandy silt, trace clay, gravel, cobbles and boulders (GLACIAL TILL)		1.37	5												
2																
	Practical Refusal to excavating on possible bedrock or boulders End of test pit		2.21													
3																

DEPTH SCALE

1 to 15

Houle Chevrier Engineering Ltd.

LOGGED: A.N.

CHECKED:

Groundwater
inflow
observed at
about 0.9
metres
below
ground
surface on
April 23,
2009.

TESTPIT_RECORD_09-079 BH LOGS.GPJ MHECL.GDT 5/14/09

RECORD OF BOREHOLE 12-1

CLIENT:
PROJECT:
JOB#:
LOCATION: See Borehole Location Plan, Figure 2

SHEET: 1 OF 1
DATUM: Geodetic
BORING DATE: Apr 26 2012

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPa		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m	●	WATER CONTENT, % W _p — W — W _L	± NATURAL ⊕ REMOULDED		
0	Power Auger 200 mm Diameter Hollow Stem Auger	Ground Surface		135.28									M (see Fig. 3)	
		Asphaltic concrete		135.22 0.06										
		Brown sand and gravel, trace to some silt (BASE/SUBBASE MATERIAL)		134.59 0.69	1	GS								
1		Stiff to very stiff, grey brown SILTY CLAY, trace sand seams (Weathered Crust)			2	50 D.O.		8						
2					3	50 D.O.		11						
				132.43 2.85	4	50 D.O.		14						
3		Blackish grey silty sand, some gravel, trace clay with possible cobbles and boulders (GLACIAL TILL)												
		End of Borehole Auger Refusal		132.15 3.13	5	50 D.O.		>50 for 50 mm						
4														
5														

RECORD OF BOREHOLE 12-2

CLIENT:
PROJECT:
JOB#:
LOCATION: See Borehole Location Plan, Figure 2

SHEET: 1 OF 1
DATUM: Geodetic
BORING DATE: Apr 26 2012

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPa		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m	●	W _p — W — W _L	WATER CONTENT, %		
0	Power Auger 200 mm Diameter Hollow Stem Auger	Ground Surface		134.91										
		Grey brown sand and gravel, trace to some silt (BASE MATERIAL)		134.78 0.13	1	GS			○					
		Dark grey brown sand and gravel, some silt, trace clay with fragments of asphaltic concrete (SUBBASE MATERIAL)		134.40 0.51	2	GS				○				
		Stiff, grey brown SILTY CLAY, trace sand (Weathered Crust)												
1					3	50 D.O.		6	●		○			
2					4	50 D.O.		8	●		○			
					5	50 D.O.		11	●		○			
3					6	50 D.O.		9	●		○			
		End of borehole		131.25 3.66										
4														
5														

Backfilled with soil cuttings

RECORD OF BOREHOLE 12-3

CLIENT:
PROJECT:
JOB#:
LOCATION: See Borehole Location Plan, Figure 2

SHEET: 1 OF 1
DATUM: Geodetic
BORING DATE: Apr 26 2012

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m										SHEAR STRENGTH (Cu), kPA										ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m					WATER CONTENT, %					+ NATURAL					⊕ REMOULDED																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
									10 20 30 40 50					W _p W W _L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
0	Power Auger 200 mm Diameter Hollow Stem Auger	Ground Surface		135.18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														

GEO - BOREHOLE LOG 12-115 GINT.GPJ GEMTEC 2018.GDT 17/10/18

PROJECT: 10-512

RECORD OF TEST PIT 10-1

SHEET 1 OF 1

LOCATION: See Site Plan, Figure 2

DATUM: N/A

DATE OF EXCAVATION: November 2, 2010

TYPE OF EXCAVATOR: Mini Excavator

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa)				WATER CONTENT (PERCENT)				ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)		Natural. V - Remoulded. V -	+	⊕	Wp	W	Wi				
0	Ground Surface TOPSOIL													
	Grey brown to dark brown sandy silt, some gravel with cobbles, boulders and pieces of steel (FILL MATERIAL)		0.20											
1				1										
2	Grey brown SANDY SILT		1.90	2										
	End of test pit Refusal to excavating on inferred bedrock		2.20											
3														
4														

Groundwater
seepage at
1.7 metres
below
ground
surface.

DEPTH SCALE

1 to 20

Houle Chevrier Engineering Ltd.

LOGGED: J.C.

CHECKED:

TESTPIT RECORD 10-512 TEST PITS 1-8.GPJ HCE DATA TEMPLATE GDT 11/26/10

PROJECT: 10-512

RECORD OF TEST PIT 10-2

SHEET 1 OF 1

LOCATION: See Site Plan, Figure 2

DATUM: N/A

DATE OF EXCAVATION: November 2, 2010

TYPE OF EXCAVATOR: Mini Excavator

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa)				WATER CONTENT (PERCENT)				ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)		Natural. V - Remoulded. V -	+	⊕		Wp	W	Wi			
0	Ground Surface TOPSOIL				20	40	60	80	20	40	60	80		
	Grey brown silty sand, trace gravel with cobbles, boulders and construction debris (FILL MATERIAL)		0.20											
1				1										
2	White to dark grey, unclassified sand and gravel, possibly clinker (FILL MATERIAL)		2.00	2										
	Dark brown sandy silt with organic material and pieces of wood (Former TOPSOIL)		2.10	3										
	Grey brown SILTY SAND		2.40	4										
3	End of test pit Refusal to excavating on inferred bedrock		2.90											Groundwater inflow at 1.4 metres below ground surface.
4														

TESTPIT RECORD 10-512 TEST PITS 1-8 GRJ HCE DATA TEMPLATE GDT 11/19/10

DEPTH SCALE

1 to 20

Houle Chevrier Engineering Ltd.

LOGGED: J.C.

CHECKED: *J.C.*

PROJECT: 10-512

RECORD OF TEST PIT 10-3

SHEET 1 OF 1

LOCATION: See Site Plan, Figure 2

DATUM: N/A

DATE OF EXCAVATION: November 2, 2010

TYPE OF EXCAVATOR: Mini Excavator

DEPTH SCALE METRES	SOIL PROFILE		SAMPLE NUMBER	SHEAR STRENGTH, C _u (kPa)				WATER CONTENT (PERCENT)				ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT		ELEV. DEPTH (m)	Natural. V - Remoulded. V - ⊕	+	+	W _p	W	W _i			
0	Ground Surface TOPSOIL												
	Grey brown silty sand, trace gravel, cobbles and boulders and pieces of concrete (FILL MATERIAL)		0.20										
1													
	Dark brown sandy silt with organic material and pieces of wood (Former TOPSOIL)		1.40										
	Grey brown SANDY SILT, some clay		1.60										
2	End of test pit Refusal to excavating on inferred bedrock		2.00										
3													
4													



Groundwater
inflow at 1.7
metres
below
ground
surface.

TESTPIT RECORD 10-512 TESTPITS 1-6 GPJ HCE DATA TEMPLATE GDT 11/8/10

DEPTH SCALE

1 to 20

Houle Chevrier Engineering Ltd.

LOGGED: J.C.

CHECKED: 

PROJECT: 10-512

RECORD OF TEST PIT 10-4

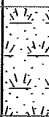
SHEET 1 OF 1

LOCATION: See Site Plan, Figure 2

DATUM: N/A

DATE OF EXCAVATION: November 2, 2010

TYPE OF EXCAVATOR: Mini Excavator

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa)				WATER CONTENT (PERCENT)				ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)		Natural. V - +	Remoulded. V - ⊕			Wp	W	Wi			
0	Ground Surface TOPSOIL													
	Grey brown silty sand, trace gravel, cobbles and boulders and pieces of concrete and concrete pipes (FILL MATERIAL)		0.30											
1														
	Dark brown sandy silt with organic material and pieces of wood (Former TOPSOIL)		1.60											
2	Grey SILTY CLAY, trace to some sand Note: Appears to have a stiff to very stiff consistency.		1.80	1										
3	End of test pit Refusal to excavating on inferred bedrock		3.00											
4														

▽

Groundwater
seepage at
1.8 metres
below
ground
surface.

TESTPIT RECORD 10-512 TESTPIT PITS 1-6 GPJ HCE DATA TEMPLATE.GDT 11/8/10

DEPTH SCALE

1 to 20

Houle Chevrier Engineering Ltd.

LOGGED: J.C.

CHECKED: 

PROJECT: 10-512

RECORD OF TEST PIT 10-5

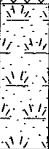
SHEET 1 OF 1

LOCATION: See Site Plan, Figure 2

DATUM: N/A

DATE OF EXCAVATION: November 2, 2010

TYPE OF EXCAVATOR: Mini Excavator

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa)				WATER CONTENT (PERCENT)				ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)		Natural. V - +	Remoulded. V - ⊕			Wp	W	Wi			
0	Ground Surface TOPSOIL													
	Grey brown silty sand, some gravel with cobbles, boulders and construction debris (FILL MATERIAL)		0.20											
1														
	Dark brown sandy silt with organic material and pieces of wood (Former TOPSOIL)		1.50											
2	Grey SILTY CLAY Note: Appears to have a stiff to very stiff consistency.		1.90											
3														
	End of test pit Refusal to excavating on inferred bedrock		3.50											
4														

▽

Groundwater
inflow at 1.5
metres
below
ground
surface.

TESTPIT RECORD 10-512 TESTPIT 1-6 GPJ HCE DATA TEMPLATE GDT 11/8/10

DEPTH SCALE

1 to 20

Houle Chevrier Engineering Ltd.

LOGGED: J.C.

CHECKED: 

TESTPIT RECORD 10-512 TESTPITS 1-6.GPJ HCE DATA TEMPLATE.GDT 11/8/10

PROJECT: 10-512

RECORD OF TEST PIT 10-6

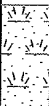
SHEET 1 OF 1

LOCATION: See Site Plan, Figure 2

DATUM: N/A

DATE OF EXCAVATION: November 2, 2010

TYPE OF EXCAVATOR: Mini Excavator

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa)				WATER CONTENT (PERCENT)				ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV DEPTH (m)											
0	Ground Surface TOPSOIL													
	Grey brown silty sand with numerous large boulders, cobbles and gravel, wood, metal (FILL MATERIAL)		0.30											
1														
2	Dark brown sandy silt with organic material and pieces of wood (Former TOPSOIL)		2.00											
	Grey SILTY CLAY Note: Appears to have a stiff to very stiff consistency.		2.20											
3	End of test pit Refusal to excavating on inferred bedrock		3.00											Groundwater inflow at 1.3 metres below ground surface.
4														

DEPTH SCALE

1 to 20

Houle Chevrier Engineering Ltd.

LOGGED: J.C.

CHECKED: *jc*

RECORD OF BOREHOLE H-1

CLIENT:
PROJECT:
JOB#:
LOCATION: Refer to Figure 2B

SHEET: 1 OF 1
DATUM: Top of Abutment
BORING DATE: Jul 27 2005

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED WATER CONTENT, % W_p — W — W_L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m				
0	Portable Drill Rig Rotary Drilling	Ground Surface		97.16								
		WATER		96.78 0.38								
		GRAVEL AND BOULDERS										
1												
		Very stiff grey brown SILTY CLAY		95.43 1.73								
2												
		SAND and GRAVEL		94.29 2.87 94.14 3.02								
3		Fresh, grey and pink GRANITE, some open joints			1	RC		REC-100% SCR=78% RQD=43%				
		End of borehole		93.38 3.78								
4												
5												
6												
7												
8												
9												
10												

GEO - BOREHOLE LOG 05-146 GPJ GEMTEC 2018 GDT 10-17-18

RECORD OF BOREHOLE H-2

CLIENT:
PROJECT:
JOB#:
LOCATION: Refer to Figure 2B

SHEET: 1 OF 1
DATUM: Top of Abutment
BORING DATE: Jul 27 2005

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m	SHEAR STRENGTH (Cu), kPa + NATURAL ⊕ REMOULDED WATER CONTENT, % W _p — W — W _L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m				
0	Portable Drill Rig Rotary Drilling	Ground Surface		97.16								
		WATER		96.78 0.38								
		GRAVEL AND BOULDERS		96.27 0.89	1	RC		REC=80% SCR=45% RQD=25%				
1		Fresh, grey and pink GRANITE, some open joints		95.23 1.93	2	RC		REC=95% SCR=63% RQD=21%				
2		End of Borehole										
3												
4												
5												
6												
7												
8												
9												
10												

GEO - BOREHOLE LOG 05-146 GPJ GEMTEC 2018 GDT 10-17-18

RECORD OF BOREHOLE H-3

CLIENT:
PROJECT:
JOB#:
LOCATION: Refer to Figure 2B

SHEET: 1 OF 1
DATUM: Top of Abutment
BORING DATE: Jul 28 2005

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m	SHEAR STRENGTH (Cu), kPa + NATURAL ⊕ REMOULDED WATER CONTENT, % W_p — W — W_L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m				
0	Portable Drill Rig	Ground Surface		97.16								
		WATER		97.08								
	Portable Drill Rig	Fresh, grey and pink GRANITE, some open joints, near vertical open joint from 0.53 to 1.14 metres depth			1	RC		REC-100% SCR=67% RQD=28%				
1					2	RC		REC-100% SCR=0% RQD=0%				
		End of Borehole		96.02 1.14								
2												
3												
4												
5												
6												
7												
8												
9												
10												

RECORD OF BOREHOLE T-1

CLIENT:
PROJECT:
JOB#:
LOCATION: Refer to Figure 2A

SHEET: 1 OF 1
DATUM: Top of Abutment
BORING DATE: Jul 26 2005

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED WATER CONTENT, % W_p — W — W_L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m				
0	Portable Drill Rig Rotary Drilling	Ground Surface		97.71								
		WATER		97.33 0.38								
		BOULDERS										
1		Fresh, grey and pink GRANITE, some open joints		96.64 1.07	1	RC		REC=95% SCR=63% RQD=21%				
2					2	RC		REC=95% SCR=70% RQD=23%				
2		End of Borehole		95.65 2.06								
3												
4												
5												
6												
7												
8												
9												
10												

GEO - BOREHOLE LOG 05-146 GPJ, GEMTEC 2018 GDT 10-17-18

RECORD OF BOREHOLE T-2

CLIENT:
PROJECT:
JOB#:
LOCATION: Refer to Figure 2A

SHEET: 1 OF 1
DATUM: Top of Abutment
BORING DATE: Jul 26 2005

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPA		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION														
		DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	RESISTANCE (N), BLOWS/0.3m	NATURAL REMOULDED																		
				DEPTH (m)						W _p	W _L																	
0	Portable Drill Rig Rotary Drilling	Ground Surface		97.71	1	RC	REC=37% SCR=32% RQD=24%	10	20	30	40	50	60	70	80	90												
		WATER																										
1		BOULDERS		96.64 1.07																								
2		Fresh, grey and pink GRANITE, some open joints, void starting at 2.6 metres depth		95.91 1.80																								
3		End of Borehole		94.92 2.79																								
4																												
5																												
6																												
7																												
8																												
9																												
10																												

GEO - BOREHOLE LOG 05-146 GPJ, GEMTEC 2018 GDT 10-17-18

RECORD OF BOREHOLE T-3

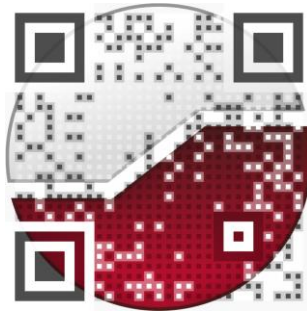
CLIENT:
PROJECT:
JOB#:
LOCATION: Refer to Figure 2A

SHEET: 1 OF 1
DATUM: Top of Abutment
BORING DATE: Jul 26 2005

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m	SHEAR STRENGTH (Cu), kPa + NATURAL ⊕ REMOULDED WATER CONTENT, % W_p — W — W_L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m				
0	Portable Drill Rig Rotary Drilling	Ground Surface		97.76								
		WATER		97.38								
		BOULDERS		0.38								
1				96.46								
		Fresh, grey and pink GRANITE, some open joints, upper 0.2 metres fractured		1.30	1	RC		REC=94% SCR=47% RQD=0%				
2					2	RC		REC=92% SCR=72% RQD=53%				
		End of Borehole		95.27								
2.49												
3												
4												
5												
6												
7												
8												
9												
10												

GEO - BOREHOLE LOG 05-146 GPJ, GEMTEC 2018 GDT 10-17-18

experience • knowledge • integrity



civil
geotechnical
environmental
field services
materials testing

civil
géotechnique
environnementale
surveillance de chantier
service de laboratoire des matériaux

expérience • connaissance • intégrité



Appendix D
Archeological and Cultural Heritage
Checklists

The purpose of the checklist is to determine:

- if a property(ies) or project area may contain archaeological resources i.e., have archaeological potential
- it includes all areas that may be impacted by project activities, including – but not limited to:
 - the main project area
 - temporary storage
 - staging and working areas
 - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Archaeological assessment

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a licensed consultant archaeologist (see page 4 for definitions) to undertake an archaeological assessment.

The assessment will help you:

- identify, evaluate and protect archaeological resources on your property or project area
- reduce potential delays and risks to your project

Note: By law, archaeological assessments **must** be done by a licensed consultant archaeologist. Only a licensed archaeologist can assess – or alter – an archaeological site.

What to do if you:

- **find an archaeological resource**

If you find something you think may be of archaeological value during project work, you must – by law – stop all activities immediately and contact a licensed consultant archaeologist

The archaeologist will carry out the fieldwork in compliance with the *Ontario Heritage Act* [s.48(1)].

- **unearth a burial site**

If you find a burial site containing human remains, you must immediately notify the appropriate authorities (i.e., police, coroner's office, and/or Registrar of Cemeteries) and comply with the *Funeral, Burial and Cremation Services Act*.

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages when completing this form.

Project or Property Name

Western Annex

Project or Property Location (upper and lower or single tier municipality)

Town of Perth, Lanark County

Proponent Name

Town of Perth

Proponent Contact Information

Forbes Symon, Director of Development and Protective Services, Town of Perth, (613)267-3311

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☒

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

	Yes	No
2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?	☐	☒

If Yes, do not complete the rest of the checklist. You are expected to follow the recommendations in the archaeological assessment report(s).

The proponent, property owner and/or approval authority will:

- summarize the previous assessment
- add this checklist to the project file, with the appropriate documents that demonstrate an archaeological assessment was undertaken e.g., MTCS letter stating acceptance of archaeological assessment report

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., environmental assessment document
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Are there known archaeological sites on or within 300 metres of the property (or the project area)?	☐	☒

	Yes	No
4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property (or project area)?	☐	☒

	Yes	No
5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or project area)?	☐	☒

	Yes	No
6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?	☐	☒

	Yes	No
7. Has the property (or project area) been recognized for its cultural heritage value?	☐	☒

If Yes to any of the above questions (3 to 7), do not complete the checklist. Instead, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment of your property or project area.

If No, continue to question 8.

	Yes	No
8. Has the entire property (or project area) been subjected to recent, extensive and intensive disturbance?	☐	☒

If Yes to the preceding question, do not complete the checklist. Instead, please keep and maintain a summary of documentation that provides evidence of the recent disturbance.

An archaeological assessment is not required.

If No, continue to question 9.

9. Are there present or past water sources within 300 metres of the property (or project area)?

Yes	No
☒	☐

If Yes, an archaeological assessment is required.

If No, continue to question 10.

10. Is there evidence of two or more of the following on the property (or project area)?

Yes	No
☒	☐

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

If Yes, an archaeological assessment is required.

If No, there is low potential for archaeological resources at the property (or project area).

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., under the *Environmental Assessment Act, Planning Act* processes
 - maintained by the property owner, proponent or approval authority
-

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
 - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

In this context, the following definitions apply:

- **consultant archaeologist** means, as defined in Ontario regulation as an archaeologist who enters into an agreement with a client to carry out or supervise archaeological fieldwork on behalf of the client, produce reports for or on behalf of the client and provide technical advice to the client. In Ontario, these people also are required to hold a valid professional archaeological licence issued by the Ministry of Tourism, Culture and Sport.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may be already in place for identifying archaeological potential, including:

- one prepared and adopted by the municipality e.g., archaeological management plan
- an environmental assessment process e.g., screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s. B-2.]

2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?

Respond 'yes' to this question, if all of the following are true:

- an archaeological assessment report has been prepared and is in compliance with MTCS requirements
 - a letter has been sent by MTCS to the licensed archaeologist confirming that MTCS has added the report to the Ontario Public Register of Archaeological Reports (Register)
- the report states that there are no concerns regarding impacts to archaeological sites

Otherwise, if an assessment has been completed and deemed compliant by the MTCS, and the ministry recommends further archaeological assessment work, this work will need to be completed.

For more information about archaeological assessments, contact:

- approval authority
- proponent
- consultant archaeologist
- Ministry of Tourism, Culture and Sport at archaeology@ontario.ca

3. Are there known archaeological sites on or within 300 metres of the property (or project area)?

MTCS maintains a database of archaeological sites reported to the ministry.

For more information, contact MTCS Archaeological Data Coordinator at archaeology@ontario.ca.

4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property?

Check with:

- Aboriginal communities in your area
- local municipal staff

They may have information about archaeological sites that are not included in MTCS' database.

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or property area)?

Check with:

- Aboriginal communities in your area
- local municipal staff

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulation Unit, Ontario Ministry of Consumer Services – for database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, 'adjacent' means 'contiguous', or as otherwise defined in a municipal official plan.

7. Has the property (or project area) been recognized for its cultural heritage value?

There is a strong chance there may be archaeological resources on your property (or immediate area) if it has been listed, designated or otherwise identified as being of cultural heritage value by:

- your municipality
- Ontario government
- Canadian government

This includes a property that is:

- designated under *Ontario Heritage Act* (the OHA), including:
 - individual designation (Part IV)
 - part of a heritage conservation district (Part V)
 - an archaeological site (Part VI)
- subject to:
 - an agreement, covenant or easement entered into under the OHA (Parts II or IV)
 - a notice of intention to designate (Part IV)
 - a heritage conservation district study area by-law (Part V) of the OHA
- listed on:
 - a municipal register or inventory of heritage properties
 - Ontario government's list of provincial heritage properties
 - Federal government's list of federal heritage buildings
- part of a:
 - National Historic Site
 - UNESCO World Heritage Site
- designated under:
 - *Heritage Railway Station Protection Act*
 - *Heritage Lighthouse Protection Act*
- subject of a municipal, provincial or federal commemorative or interpretive plaque.

To determine if your property or project area is covered by any of the above, see:

- Part A of the MTCS Criteria for Evaluating Potential for Built Heritage and Cultural Heritage Landscapes

Part VI – Archaeological Sites

Includes five sites designated by the Minister under Regulation 875 of the Revised Regulation of Ontario, 1990 (Archaeological Sites) and 3 marine archaeological sites prescribed under Ontario Regulation 11/06.

For more information, check [Regulation 875](#) and [Ontario Regulation 11/06](#).

8. Has the entire property (or project area) been subjected to recent extensive and intensive ground disturbance?

Recent: after-1960

Extensive: over all or most of the area

Intensive: thorough or complete disturbance

Examples of ground disturbance include:

- quarrying
- major landscaping – involving grading below topsoil
- building footprints and associated construction area
 - where the building has deep foundations or a basement
- infrastructure development such as:
 - sewer lines
 - gas lines
 - underground hydro lines
 - roads
 - any associated trenches, ditches, interchanges. **Note:** this applies only to the excavated part of the right-of-way; the remainder of the right-of-way or corridor may not have been impacted.

A ground disturbance does **not** include:

- agricultural cultivation
- gardening
- landscaping

Site visits

You can typically get this information from a site visit. In that case, please document your visit in the process (e.g., report) with:

- photographs
- maps
- detailed descriptions

If a disturbance isn't clear from a site visit or other research, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment.

9. Are there present or past water bodies within 300 metres of the property (or project area)?

Water bodies are associated with past human occupations and use of the land. About 80-90% of archaeological sites are found within 300 metres of water bodies.

Present

- Water bodies:
 - primary - lakes, rivers, streams, creeks
 - secondary - springs, marshes, swamps and intermittent streams and creeks
- accessible or inaccessible shoreline, for example:
 - high bluffs
 - swamps
 - marsh fields by the edge of a lake
 - sandbars stretching into marsh

Water bodies not included:

- man-made water bodies, for example:
 - temporary channels for surface drainage
 - rock chutes and spillways
 - temporarily ponded areas that are normally farmed
 - dugout ponds
- artificial bodies of water intended for storage, treatment or recirculation of:
 - runoff from farm animal yards
 - manure storage facilities
 - sites and outdoor confinement areas

Past

Features indicating past water bodies:

- raised sand or gravel beach ridges – can indicate glacial lake shorelines
- clear dip in the land – can indicate an old river or stream
- shorelines of drained lakes or marshes
- cobble beaches

You can get information about water bodies through:

- a site visit
- aerial photographs
- 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

10. Is there evidence of two or more of the following on the property (or project area)?

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

• Elevated topography

Higher ground and elevated positions - surrounded by low or level topography - often indicate past settlement and land use.

Features such as eskers, drumlins, sizeable knolls, plateaus next to lowlands, or other such features are a strong indication of archaeological potential.

Find out if your property or project area has elevated topography, through:

- site inspection
- aerial photographs
- topographical maps

• Pockets of well-drained sandy soil, especially within areas of heavy soil or rocky ground

Sandy, well-drained soil - in areas characterized by heavy soil or rocky ground - may indicate archaeological potential

Find out if your property or project area has sandy soil through:

- site inspection
- soil survey reports

- **Distinctive land formations**

Distinctive land formations include – but are not limited to:

- waterfalls
- rock outcrops
- rock faces
- caverns
- mounds, etc.

They were often important to past inhabitants as special or sacred places. The following sites may be present – or close to – these formations:

- burials
- structures
- offerings
- rock paintings or carvings

Find out if your property or project areas has a distinctive land formation through:

- a site visit
- aerial photographs
- 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

- **Resource extraction areas**

The following resources were collected in these extraction areas:

- food or medicinal plants e.g., migratory routes, spawning areas, prairie
- scarce raw materials e.g., quartz, copper, ochre or outcrops of chert
- resources associated with early historic industry e.g., fur trade, logging, prospecting, mining

Aboriginal communities may hold traditional knowledge about their past use or resources in the area.

- **Early historic settlement**

Early Euro-Canadian settlement include – but are not limited to:

- early military or pioneer settlement e.g., pioneer homesteads, isolated cabins, farmstead complexes
- early wharf or dock complexes
- pioneers churches and early cemeteries

For more information, see below – under the early historic transportation routes.

- **Early historic transportation routes** - such as trails, passes, roads, railways, portage routes, canals.

For more information, see:

- historical maps and/or historical atlases
 - for information on early settlement patterns such as trails (including Aboriginal trails), monuments, structures, fences, mills, historic roads, rail corridors, canals, etc.
 - Archives of Ontario holds a large collection of historical maps and historical atlases
 - digital versions of historic atlases are available on the Canadian County Atlas Digital Project
- commemorative markers or plaques such as local, provincial or federal agencies
- municipal heritage committee or other local heritage organizations
 - for information on early historic settlements or landscape features (e.g., fences, mill races, etc.)
 - for information on commemorative markers or plaques

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
 - is a recognized heritage property
 - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
 - the main project area
 - temporary storage
 - staging and working areas
 - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – [separate checklist](#)
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Project or Property Name

Perth Golf Course

Project or Property Location (upper and lower or single tier municipality)

Town of Perth

Proponent Name

Town of Perth

Proponent Contact Information

Forbes Symon

Screening Questions

- | | | |
|--|--------------------------|-------------------------------------|
| | Yes | No |
| 1. Is there a pre-approved screening checklist, methodology or process in place? | ☐ | ☒ |

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

- | | | |
|--|--------------------------|-------------------------------------|
| | Yes | No |
| 2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value? | ☐ | ☒ |

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

- | | | |
|---|--------------------------|-------------------------------------|
| | Yes | No |
| 3. Is the property (or project area): | | |
| a. identified, designated or otherwise protected under the <i>Ontario Heritage Act</i> as being of cultural heritage value? | ☐ | ☒ |
| b. a National Historic Site (or part of)? | ☐ | ☒ |
| c. designated under the <i>Heritage Railway Stations Protection Act</i> ? | ☐ | ☒ |
| d. designated under the <i>Heritage Lighthouse Protection Act</i> ? | ☐ | ☒ |
| e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)? | ☐ | ☒ |
| f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site? | ☐ | ☒ |

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☐	☒
b. has or is adjacent to a known burial site and/or cemetery?	☐	☒
c. is in a Canadian Heritage River watershed?	☐	☒
d. contains buildings or structures that are 40 or more years old?	☐	☒

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☒
b. has a special association with a community, person or historical event?	☐	☒
c. contains or is part of a cultural heritage landscape?	☐	☒

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act*, *Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
 - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's [Ontario Heritage Toolkit](#) or [Standards and Guidelines for Conservation of Provincial Heritage Properties](#).

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's [Standards & Guidelines for Conservation of Provincial Heritage Properties](#) [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

- i. designated under the *Ontario Heritage Act*
 - individual designation (Part IV)
 - part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note:** To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
 - [Ontario Heritage Trust](#)
 - local land registry office (for a title search)
-

ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- [Ontario Heritage Trust](#) - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
 - municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
 - local land registry office (for a title search)
-

iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
 - municipal heritage planning staff
 - municipal heritage committee
-

iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act*. **Note:** To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
 - [Ontario Heritage Trust](#)
-

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the [National Historic Sites website](#).

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the [Directory of Designated Heritage Railway Stations](#).

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the [Heritage Lighthouses of Canada](#) website.

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the [Federal Heritage Buildings Review Office](#).

See a [directory of all federal heritage designations](#).

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – [World Heritage Site website](#).

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- [municipal heritage committees](#) or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's [Heritage directory](#) – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a [list of plaques](#) commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a [list of plaques](#) commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a [database of registered cemeteries](#)
- Ontario Genealogical Society (OGS) – to [locate records of Ontario cemeteries](#), both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to [locate early cemeteries](#)

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the [Canadian Heritage River System](#).

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide [Heritage Property Evaluation](#).

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- [municipal heritage committees](#) or local heritage organizations
- Ontario Historical Society's "[Heritage Directory](#)" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through [Ontario Trails](#).

**Criteria for Evaluating Potential
for Built Heritage Resources and
Cultural Heritage Landscapes**
A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
 - is a recognized heritage property
 - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
 - the main project area
 - temporary storage
 - staging and working areas
 - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – [separate checklist](#)
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Project or Property Name

Perth Golf Course

Project or Property Location (upper and lower or single tier municipality)

Town of Perth

Proponent Name

Town of Perth

Proponent Contact Information

Forbes Symon

Screening Questions

- | | | |
|--|--------------------------|-------------------------------------|
| | Yes | No |
| 1. Is there a pre-approved screening checklist, methodology or process in place? | ☐ | ☒ |
- If Yes, please follow the pre-approved screening checklist, methodology or process.
- If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

- | | | |
|--|--------------------------|-------------------------------------|
| | Yes | No |
| 2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value? | ☐ | ☒ |
- If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

- | | | |
|---|--------------------------|-------------------------------------|
| | Yes | No |
| 3. Is the property (or project area): | | |
| a. identified, designated or otherwise protected under the <i>Ontario Heritage Act</i> as being of cultural heritage value? | ☐ | ☒ |
| b. a National Historic Site (or part of)? | ☐ | ☒ |
| c. designated under the <i>Heritage Railway Stations Protection Act</i> ? | ☐ | ☒ |
| d. designated under the <i>Heritage Lighthouse Protection Act</i> ? | ☐ | ☒ |
| e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)? | ☐ | ☒ |
| f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site? | ☐ | ☒ |

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☒	☐
b. has or is adjacent to a known burial site and/or cemetery?	☐	☒
c. is in a Canadian Heritage River watershed?	☐	☒
d. contains buildings or structures that are 40 or more years old?	☐	☒

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☒
b. has a special association with a community, person or historical event?	☐	☒
c. contains or is part of a cultural heritage landscape?	☐	☒

If **Yes** to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If **No** to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act*, *Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
 - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's [Ontario Heritage Toolkit](#) or [Standards and Guidelines for Conservation of Provincial Heritage Properties](#).

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's [Standards & Guidelines for Conservation of Provincial Heritage Properties](#) [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note:** To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
 - [Ontario Heritage Trust](#)
 - local land registry office (for a title search)
-

ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- [Ontario Heritage Trust](#) - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
 - municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
 - local land registry office (for a title search)
-

iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
 - municipal heritage planning staff
 - municipal heritage committee
-

iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act*. **Note:** To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
 - [Ontario Heritage Trust](#)
-

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the [National Historic Sites website](#).

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the [Directory of Designated Heritage Railway Stations](#).

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the [Heritage Lighthouses of Canada website](#).

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the [Federal Heritage Buildings Review Office](#).

See a [directory of all federal heritage designations](#).

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – [World Heritage Site website](#).

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- [municipal heritage committees](#) or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's [Heritage directory](#) – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a [list of plaques](#) commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a [list of plaques](#) commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a [database of registered cemeteries](#)
- Ontario Genealogical Society (OGS) – to [locate records of Ontario cemeteries](#), both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to [locate early cemeteries](#)

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the [Canadian Heritage River System](#).

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide [Heritage Property Evaluation](#).

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- municipal heritage committees or local heritage organizations
- Ontario Historical Society's "Heritage Directory" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through Ontario Trails.

**Criteria for Evaluating Potential
for Built Heritage Resources and
Cultural Heritage Landscapes**
A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
 - is a recognized heritage property
 - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
 - the main project area
 - temporary storage
 - staging and working areas
 - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – [separate checklist](#)
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Project or Property Name

Tayview

Project or Property Location (upper and lower or single tier municipality)

Town of Perth

Proponent Name

Town of Perth

Proponent Contact Information

Forbes Symon

Screening Questions

- | | | |
|---|--------------------------|-------------------------------------|
| | Yes | No |
| 1. Is there a pre-approved screening checklist, methodology or process in place? | ☐ | ☒ |
| If Yes, please follow the pre-approved screening checklist, methodology or process. | | |
| If No, continue to Question 2. | | |

Part A: Screening for known (or recognized) Cultural Heritage Value

- | | | |
|--|-------------------------------------|--------------------------|
| | Yes | No |
| 2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value? | ☒ | ☐ |
| If Yes, do not complete the rest of the checklist. | | |

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

- | | | |
|---|--------------------------|-------------------------------------|
| | Yes | No |
| 3. Is the property (or project area): | | |
| a. identified, designated or otherwise protected under the <i>Ontario Heritage Act</i> as being of cultural heritage value? | ☐ | ☒ |
| b. a National Historic Site (or part of)? | ☐ | ☒ |
| c. designated under the <i>Heritage Railway Stations Protection Act</i> ? | ☐ | ☒ |
| d. designated under the <i>Heritage Lighthouse Protection Act</i> ? | ☐ | ☒ |
| e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)? | ☐ | ☒ |
| f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site? | ☐ | ☒ |

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☐	☒
b. has or is adjacent to a known burial site and/or cemetery?	☐	☒
c. is in a Canadian Heritage River watershed?	☐	☒
d. contains buildings or structures that are 40 or more years old?	☒	☐

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☒
b. has a special association with a community, person or historical event?	☐	☒
c. contains or is part of a cultural heritage landscape?	☐	☒

If **Yes** to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If **No** to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act*, *Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
 - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's [Ontario Heritage Toolkit](#) or [Standards and Guidelines for Conservation of Provincial Heritage Properties](#).

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's [Standards & Guidelines for Conservation of Provincial Heritage Properties](#) [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note:** To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
 - [Ontario Heritage Trust](#)
 - local land registry office (for a title search)
-

ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- [Ontario Heritage Trust](#) - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
 - municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
 - local land registry office (for a title search)
-

iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
 - municipal heritage planning staff
 - municipal heritage committee
-

iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act*. **Note:** To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
 - [Ontario Heritage Trust](#)
-

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the [National Historic Sites website](#).

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the [Directory of Designated Heritage Railway Stations](#).

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the [Heritage Lighthouses of Canada website](#).

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the [Federal Heritage Buildings Review Office](#).

See a [directory of all federal heritage designations](#).

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – [World Heritage Site website](#).

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- [municipal heritage committees](#) or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's [Heritage directory](#) – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a [list of plaques](#) commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a [list of plaques](#) commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a [database of registered cemeteries](#)
- Ontario Genealogical Society (OGS) – to [locate records of Ontario cemeteries](#), both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to [locate early cemeteries](#)

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the [Canadian Heritage River System](#).

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide [Heritage Property Evaluation](#).

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- [municipal heritage committees](#) or local heritage organizations
- Ontario Historical Society's "[Heritage Directory](#)" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through [Ontario Trails](#).

Appendix E

Transportation Exhibits

EXHIBIT 1

OPTION 1 - 2041 PEAK AM HOUR TRAFFIC - Peter (Foster)/Wilson

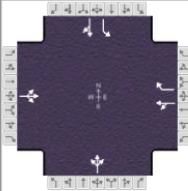
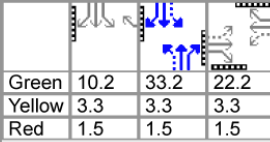
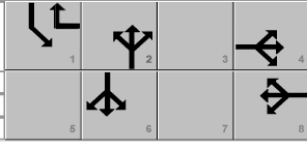
HCS7 Signalized Intersection Results Summary															
General Information								Intersection Information							
Agency								Duration, h		0.25					
Analyst				Analysis Date		2/27/2018		Area Type		Other					
Jurisdiction				Time Period		Peak AM Hour		PHF		0.92					
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00					
Intersection		Peter/Wilson		File Name		2041_AM_OPTION 1.xus									
Project Description		West Annex - OPTION 1													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				164	264	4	7	108	362	4	30	10	389	57	123
Signal Information															
Cycle, s	80.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	No	Simult. Gap E/W	Off												
Force Mode	Fixed	Simult. Gap N/S	Off												
Green	10.2	33.2	22.2	0.0	0.0	0.0									
Yellow	3.3	3.3	3.3	0.0	0.0	0.0									
Red	1.5	1.5	1.5	0.0	0.0	0.0									
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					4		8		2		1	6			
Case Number					8.0		7.0		8.3		1.0	4.0			
Phase Duration, s					27.0		27.0		38.0		15.0	53.0			
Change Period, (Y+R c), s					4.8		4.8		4.8		4.8	4.8			
Max Allow Headway (MAH), s					3.1		3.2		0.0		3.1	0.0			
Queue Clearance Time (g s), s					24.2		7.8				9.5				
Green Extension Time (g e), s					0.0		0.5		0.0		0.7	0.0			
Phase Call Probability					1.00		1.00				1.00				
Max Out Probability					1.00		0.00				0.00				
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h					470		125	176		48		423	174		
Adjusted Saturation Flow Rate (s), veh/h/ln					1623		1875	1610		1779		1810	1703		
Queue Service Time (g s), s					18.1		0.0	5.8		0.0		7.5	3.6		
Cycle Queue Clearance Time (g c), s					22.2		4.1	5.8		1.2		7.5	3.6		
Green Ratio (g/C)					0.28		0.28	0.41		0.41		0.69	0.60		
Capacity (c), veh/h					512		568	652		898		1073	1026		
Volume-to-Capacity Ratio (X)					0.916		0.220	0.270		0.053		0.394	0.170		
Back of Queue (Q), ft/ln (50 th percentile)					288.3		43.6	50.1		12.3		51.4	30.3		
Back of Queue (Q), veh/ln (50 th percentile)					11.5		1.7	2.0		0.5		2.1	1.2		
Queue Storage Ratio (RQ) (50 th percentile)					0.68		0.10	0.53		0.03		0.30	0.18		
Uniform Delay (d 1), s/veh					29.3		22.4	15.9		12.5		5.0	7.0		
Incremental Delay (d 2), s/veh					20.9		0.1	0.1		0.1		0.1	0.4		
Initial Queue Delay (d 3), s/veh					0.0		0.0	0.0		0.0		0.0	0.0		
Control Delay (d), s/veh					50.2		22.4	16.0		12.6		5.1	7.4		
Level of Service (LOS)					D		C	B		B		A	A		
Approach Delay, s/veh / LOS				50.2	D		18.7	B		12.6	B		5.8	A	
Intersection Delay, s/veh / LOS				23.5						C					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				1.69	B		1.95	B		2.19	B		1.65	B	
Bicycle LOS Score / LOS				1.26	A		0.98	A		0.57	A		1.47	A	

EXHIBIT 2

OPTION 1 - 2041 PEAK PM HOUR TRAFFIC - Peter (Foster)/Wilson

HCS7 Signalized Intersection Results Summary																			
General Information								Intersection Information											
Agency								Duration, h		0.25									
Analyst				Analysis Date		2/27/2018		Area Type		Other									
Jurisdiction				Time Period		Peak PM Hour		PHF		0.92									
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00									
Intersection		Peter/Wilson		File Name		2041_PM_OPTION 1.xus													
Project Description		West Annex - OPTION 1																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h				143	171	8	24	262	564	5	76	23	547	82	171				
Signal Information																			
Cycle, s	80.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	Off																
Force Mode	Fixed	Simult. Gap N/S	Off																
Green	14.9	28.5	22.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Yellow	3.3	3.3	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Red	1.5	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase						4				8				2		1		6	
Case Number						8.0				7.0				8.3		1.0		4.0	
Phase Duration, s						27.0				27.0				33.3		19.7		53.0	
Change Period, (Y+R c), s						4.8				4.8				4.8		4.8		4.8	
Max Allow Headway (MAH), s						3.4				3.3				0.0		3.1		0.0	
Queue Clearance Time (g s), s						22.9				21.6						14.0			
Green Extension Time (g e), s						0.0				0.2				0.0		0.9		0.0	
Phase Call Probability						1.00				1.00						1.00			
Max Out Probability						1.00				1.00						0.13			
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16				
Adjusted Flow Rate (v), veh/h				350			311 504			113			595 253						
Adjusted Saturation Flow Rate (s), veh/h/ln				1323			1833 1610			1807			1810 1702						
Queue Service Time (g s), s				9.5			0.0 19.6			0.0			12.0 5.6						
Cycle Queue Clearance Time (g c), s				20.9			11.4 19.6			3.4			12.0 5.6						
Green Ratio (g/C)				0.28			0.28 0.46			0.36			0.69 0.60						
Capacity (c), veh/h				432			558 747			803			1033 1025						
Volume-to-Capacity Ratio (X)				0.810			0.558 0.675			0.141			0.576 0.247						
Back of Queue (Q), ft/ln (50 th percentile)				186.4			123.4 171.7			34.8			83.3 46.8						
Back of Queue (Q), veh/ln (50 th percentile)				7.5			4.9 6.9			1.4			3.3 1.9						
Queue Storage Ratio (RQ) (50 th percentile)				0.44			0.29 1.81			0.08			0.49 0.28						
Uniform Delay (d 1), s/veh				28.7			25.0 16.7			16.0			6.0 7.4						
Incremental Delay (d 2), s/veh				10.3			0.8 2.0			0.4			0.2 0.6						
Initial Queue Delay (d 3), s/veh				0.0			0.0 0.0			0.0			0.0 0.0						
Control Delay (d), s/veh				39.0			25.7 18.7			16.4			6.2 8.0						
Level of Service (LOS)				D			C B			B			A A						
Approach Delay, s/veh / LOS				39.0 D			21.4 C			16.4 B			6.7 A						
Intersection Delay, s/veh / LOS				18.2									B						
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.69 B			1.95 B			2.05 B			1.65 B						
Bicycle LOS Score / LOS				1.07 A			1.83 B			0.67 A			1.89 B						

EXHIBIT 3

OPTION 1 - 2041 PEAK AM HOUR TRAFFIC - Foster/Gore

HCS7 Signalized Intersection Results Summary

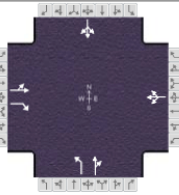
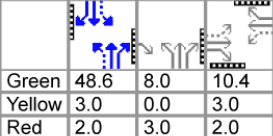
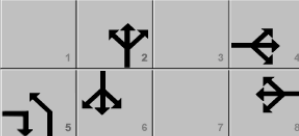
General Information						Intersection Information													
Agency						Duration, h		0.25											
Analyst						Analysis Date		2/27/2018											
Jurisdiction						Time Period		Peak AM Hour											
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00									
Intersection		Gore/Foster		File Name		2041_AM_OPTION 1.xus													
Project Description		West Annex - OPTION 1																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h				13	163	464	16	54	10	405	160	16	3	127	13				
Signal Information																			
Cycle, s	80.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	Off																
Force Mode	Fixed	Simult. Gap N/S	Off																
Green				48.6	8.0	10.4	0.0	0.0	0.0										
Yellow				3.0	0.0	3.0	0.0	0.0	0.0										
Red				2.0	3.0	2.0	0.0	0.0	0.0										
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase						4				8		5		2				6	
Case Number						7.0				8.0		1.0		4.0				8.3	
Phase Duration, s						15.4				15.4		11.0		64.6				53.6	
Change Period, (Y+R c), s						5.0				5.0		5.0		5.0				5.0	
Max Allow Headway (MAH), s						3.2				3.1		3.1		0.0				0.0	
Queue Clearance Time (g s), s						9.9				4.9		2.0							
Green Extension Time (g e), s						0.5				0.1		0.4		0.0				0.0	
Phase Call Probability						1.00				0.82		1.00							
Max Out Probability						0.03				0.00		0.57							
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16				
Adjusted Flow Rate (v), veh/h					191	178		76		440	175			155					
Adjusted Saturation Flow Rate (s), veh/h/ln					1873	1610		1779		1810	1898			1864					
Queue Service Time (g s), s					2.8	7.9		0.0		0.0	2.1			0.0					
Cycle Queue Clearance Time (g c), s					7.9	7.9		2.9		0.0	2.1			2.8					
Green Ratio (g/C)					0.13	0.21		0.13		0.72	0.74			0.61					
Capacity (c), veh/h					292	330		287		1025	1413			1294					
Volume-to-Capacity Ratio (X)					0.655	0.539		0.265		0.429	0.124			0.120					
Back of Queue (Q), ft/ln (50 th percentile)					88.1	74		32.5		67.1	14.2			23.3					
Back of Queue (Q), veh/ln (50 th percentile)					3.5	3.0		1.3		2.7	0.6			0.9					
Queue Storage Ratio (RQ) (50 th percentile)					0.21	0.30		0.08		0.71	0.03			0.14					
Uniform Delay (d 1), s/veh					33.7	28.4		31.5		6.1	2.9			5.7					
Incremental Delay (d 2), s/veh					0.9	0.5		0.2		0.1	0.2			0.2					
Initial Queue Delay (d 3), s/veh					0.0	0.0		0.0		0.0	0.0			0.0					
Control Delay (d), s/veh					34.6	28.9		31.7		6.2	3.1			5.9					
Level of Service (LOS)					C	C		C		A	A			A					
Approach Delay, s/veh / LOS				31.9	C		31.7	C		5.3	A		5.9	A					
Intersection Delay, s/veh / LOS				15.1						B									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.96	B		1.71	B		1.62	B		2.37	B					
Bicycle LOS Score / LOS				1.10	A		0.61	A		1.50	B		0.74	A					

EXHIBIT 4

OPTION 1 - 2041 PEAK PM HOUR TRAFFIC - Foster/Gore

HCS7 Signalized Intersection Results Summary

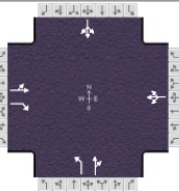
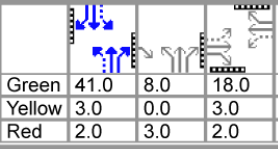
General Information					Intersection Information															
Agency					Duration, h		0.25													
Analyst					Analysis Date		2/27/2018								Area Type		Other			
Jurisdiction					Time Period		Peak PM Hour								PHF		0.92			
Urban Street		West Annex			Analysis Year		2041								Analysis Period		1> 7:00			
Intersection		Gore/Foster			File Name		2041_PM_OPTION 1.xus													
Project Description					West Annex - OPTION 1															
Demand Information					EB			WB			NB			SB						
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h					14	102	646	19	163	14	655	167	26	3	145	29				
Signal Information																				
Cycle, s	80.0	Reference Phase	2																	
Offset, s	0	Reference Point	End																	
Uncoordinated	No	Simult. Gap E/W	Off																	
Force Mode	Fixed	Simult. Gap N/S	Off																	
					Green	41.0	8.0	18.0	0.0	0.0	0.0									
					Yellow	3.0	0.0	3.0	0.0	0.0	0.0									
					Red	2.0	3.0	2.0	0.0	0.0	0.0									
Timer Results					EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase							4				8		5		2				6	
Case Number							7.0				8.0		1.0		4.0				8.3	
Phase Duration, s							23.0				23.0		11.0		57.0				46.0	
Change Period, (Y+R c), s							5.0				5.0		5.0		5.0				5.0	
Max Allow Headway (MAH), s							3.3				3.1		3.1		0.0				0.0	
Queue Clearance Time (g s), s							19.1				9.4		2.0							
Green Extension Time (g e), s							0.0				0.2		0.8		0.0				0.0	
Phase Call Probability							1.00				0.99		1.00							
Max Out Probability							1.00				0.00		0.70							
Movement Group Results					EB			WB			NB			SB						
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement					7	4	14	3	8	18	5	2	12	1	6	16				
Adjusted Flow Rate (v), veh/h					126 376			202			712 193			192						
Adjusted Saturation Flow Rate (s), veh/h/ln					1847 1610			1849			1810 1879			1841						
Queue Service Time (g s), s					0.0 17.1			0.0			0.0 3.2			0.0						
Cycle Queue Clearance Time (g c), s					4.4 17.1			7.4			0.0 3.2			4.5						
Green Ratio (g/C)					0.22 0.30			0.22			0.62 0.65			0.51						
Capacity (c), veh/h					466 483			466			862 1221			1104						
Volume-to-Capacity Ratio (X)					0.271 0.779			0.434			0.826 0.158			0.174						
Back of Queue (Q), ft/ln (50 th percentile)					48.1 109.7			80.7			316.1 27.5			42.4						
Back of Queue (Q), veh/ln (50 th percentile)					1.9 4.4			3.2			12.6 1.1			1.7						
Queue Storage Ratio (RQ) (50 th percentile)					0.11 0.44			0.19			3.33 0.06			0.25						
Uniform Delay (d 1), s/veh					25.7 25.6			26.9			17.1 5.5			9.4						
Incremental Delay (d 2), s/veh					0.1 7.2			0.2			6.2 0.3			0.3						
Initial Queue Delay (d 3), s/veh					0.0 0.0			0.0			0.0 0.0			0.0						
Control Delay (d), s/veh					25.8 32.8			27.1			23.3 5.7			9.7						
Level of Service (LOS)					C C			C			C A			A						
Approach Delay, s/veh / LOS					31.1 C			27.1 C			19.5 B			9.7 A						
Intersection Delay, s/veh / LOS					22.6						C									
Multimodal Results					EB			WB			NB			SB						
Pedestrian LOS Score / LOS					1.95 B			1.70 B			1.65 B			2.37 B						
Bicycle LOS Score / LOS					1.32 A			0.82 A			1.98 B			0.81 A						

EXHIBIT 5

OPTION 1 - 2041 PEAK AM HOUR TRAFFIC – Sunset (Harris)/Wilson

HCS7 Signalized Intersection Results Summary

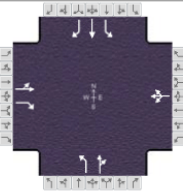
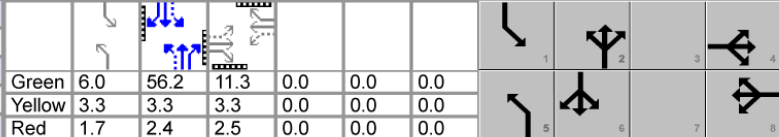
General Information						Intersection Information									
Agency						Duration, h		0.25							
Analyst				Analysis Date		2/27/2018		Area Type		Other					
Jurisdiction				Time Period		Peak AM Hour		PHF		0.92					
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00					
Intersection		Wilson/Sunset		File Name		2041_AM_OPTION 1.xus									
Project Description		West Annex - OPTION 1													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				118	11	139	8	50	11	159	525	5	7	559	123
Signal Information															
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End		Green	6.0	56.2	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	Off		Yellow	3.3	3.3	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	Off		Red	1.7	2.4	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					4		8	5	2	1	6				
Case Number					7.0		8.0	1.1	4.0	1.1	3.0				
Phase Duration, s					17.1		17.1	11.0	61.9	11.0	61.9				
Change Period, (Y+R c), s					5.8		5.8	5.0	5.7	5.0	5.7				
Max Allow Headway (MAH), s					3.3		3.1	3.1	0.0	3.1	0.0				
Queue Clearance Time (g s), s					10.8		5.2	3.7		2.1					
Green Extension Time (g e), s					0.5		0.1	0.3	0.0	0.0	0.0				
Phase Call Probability					1.00		0.83	1.00		1.00					
Max Out Probability					0.00		0.00	0.00		0.00					
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h					140	140		72		173	576		8	608	25
Adjusted Saturation Flow Rate (s), veh/h/ln					1394	1610		1836		1810	1897		1810	1900	1610
Queue Service Time (g s), s					5.6	7.5		0.0		1.7	14.7		0.1	15.9	0.5
Cycle Queue Clearance Time (g c), s					8.8	7.5		3.2		1.7	14.7		0.1	15.9	0.5
Green Ratio (g/C)					0.13	0.13		0.13		0.82	0.62		0.82	0.62	0.62
Capacity (c), veh/h					251	202		275		653	1185		740	1187	1006
Volume-to-Capacity Ratio (X)					0.558	0.696		0.261		0.265	0.486		0.010	0.512	0.025
Back of Queue (Q), ft/ln (50 th percentile)					74.4	74.3		35.4		21.1	141.4		0.3	153.1	4.3
Back of Queue (Q), veh/ln (50 th percentile)					3.0	3.0		1.4		0.8	5.7		0.0	6.1	0.2
Queue Storage Ratio (RQ) (50 th percentile)					0.30	0.30		0.09		0.22	0.21		0.01	0.73	0.02
Uniform Delay (d 1), s/veh					38.3	37.7		35.8		5.9	9.1		3.0	9.3	6.4
Incremental Delay (d 2), s/veh					0.7	1.6		0.2		0.1	1.4		0.0	1.6	0.0
Initial Queue Delay (d 3), s/veh					0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh					39.0	39.3		36.0		6.0	10.5		3.0	10.9	6.5
Level of Service (LOS)					D	D		D		A	B		A	B	A
Approach Delay, s/veh / LOS				39.2		D	36.0		D	9.5		A	10.6		B
Intersection Delay, s/veh / LOS				15.8						B					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				1.94		B	2.27		B	1.65		B	1.89		B
Bicycle LOS Score / LOS				0.95		A	0.61		A	1.72		B	1.54		B

EXHIBIT 6

OPTION 1 - 2041 PEAK PM HOUR TRAFFIC – Sunset (Harris)/Wilson

HCS7 Signalized Intersection Results Summary

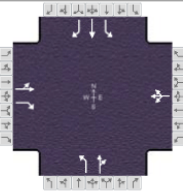
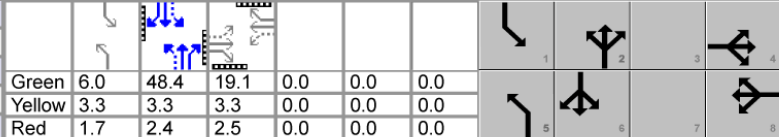
General Information						Intersection Information									
Agency						Duration, h		0.25							
Analyst				Analysis Date		2/27/2018		Area Type		Other					
Jurisdiction				Time Period		Peak PM Hour		PHF		0.92					
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00					
Intersection		Wilson/Sunset		File Name		2041_PM_OPTION 1.xus									
Project Description		West Annex - OPTION 1													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				210	37	190	8	32	30	153	844	1	13	771	122
Signal Information															
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	No	Simult. Gap E/W	Off												
Force Mode	Fixed	Simult. Gap N/S	Off												
				Green	6.0	48.4	19.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				Yellow	3.3	3.3	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				Red	1.7	2.4	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					4		8	5	2	1	6				
Case Number					7.0		8.0	1.1	4.0	1.1	3.0				
Phase Duration, s					24.9		24.9	11.0	54.1	11.0	54.1				
Change Period, (Y+R c), s					5.8		5.8	5.0	5.7	5.0	5.7				
Max Allow Headway (MAH), s					3.2		3.2	3.1	0.0	3.1	0.0				
Queue Clearance Time (g s), s					18.5		5.0	4.4		2.2					
Green Extension Time (g e), s					0.6		0.1	0.2	0.0	0.0	0.0				
Phase Call Probability					1.00		0.84	1.00		1.00					
Max Out Probability					0.23		0.00	0.01		0.00					
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h					268	196		73		166	918		14	838	78
Adjusted Saturation Flow Rate (s), veh/h/ln					1419	1610		1778		1810	1900		1810	1900	1610
Queue Service Time (g s), s					13.5	9.8		0.0		2.4	38.9		0.2	32.8	2.1
Cycle Queue Clearance Time (g c), s					16.5	9.8		3.0		2.4	38.9		0.2	32.8	2.1
Green Ratio (g/C)					0.21	0.21		0.21		0.74	0.54		0.74	0.54	0.54
Capacity (c), veh/h					375	342		422		453	1021		352	1022	866
Volume-to-Capacity Ratio (X)					0.715	0.572		0.173		0.367	0.899		0.040	0.820	0.090
Back of Queue (Q), ft/ln (50 th percentile)					144.7	93.6		31.7		37	464		3.7	369.5	18.6
Back of Queue (Q), veh/ln (50 th percentile)					5.8	3.7		1.3		1.5	18.6		0.1	14.8	0.7
Queue Storage Ratio (RQ) (50 th percentile)					0.58	0.37		0.08		0.39	0.68		0.07	1.76	0.09
Uniform Delay (d 1), s/veh					34.4	31.8		29.1		12.4	18.6		16.2	17.2	10.1
Incremental Delay (d 2), s/veh					2.9	0.6		0.1		0.2	12.4		0.0	7.4	0.2
Initial Queue Delay (d 3), s/veh					0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh					37.3	32.3		29.2		12.6	31.0		16.2	24.6	10.3
Level of Service (LOS)					D	C		C		B	C		B	C	B
Approach Delay, s/veh / LOS				35.2		D	29.2		C	28.2		C	23.2		C
Intersection Delay, s/veh / LOS				27.7						C					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				1.93		B	2.19		B	1.67		B	1.90		B
Bicycle LOS Score / LOS				1.25		A	0.61		A	2.28		B	2.02		B

EXHIBIT 7

OPTION 1 - 2041 PEAK AM HOUR TRAFFIC – Dufferin (Highway 7)/Wilson

HCS7 Signalized Intersection Results Summary

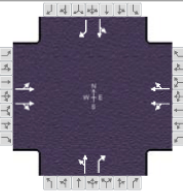
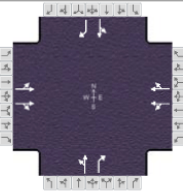
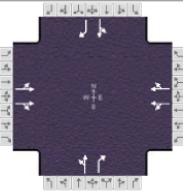
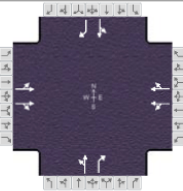
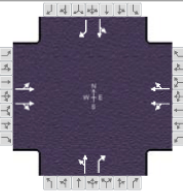
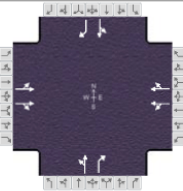
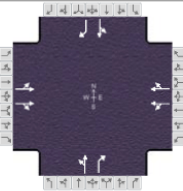
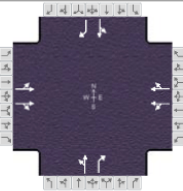
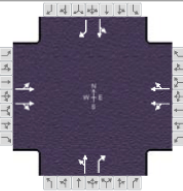
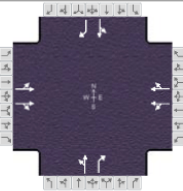
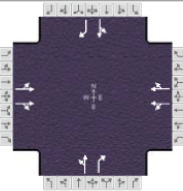
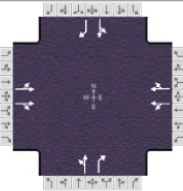
General Information						Intersection Information													
Agency						Duration, h		0.25											
Analyst				Analysis Date		4/24/2018		Area Type		Other									
Jurisdiction				Time Period		Peak AM Hour		PHF		0.92									
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00									
Intersection		Dufferin/Wilson		File Name		2041_AM_OPTION 1.xus													
Project Description		West Annex - OPTION 1																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h				77	537	297	178	579	26	188	220	140	29	152	39				
Signal Information																			
Cycle, s	95.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	On																
Force Mode	Fixed	Simult. Gap N/S	On																
Green				0.0	54.8	0.0	28.6	0.0	0.0										
Yellow				3.3	3.3	3.3	3.3	0.0	0.0										
Red				0.0	2.5	0.0	2.5	0.0	0.0										
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase						2		1		6		3		8				4	
Case Number						8.3		0.0		14.0		0.0		13.0				7.3	
Phase Duration, s						60.6		0.0		60.6		0.0		34.4				34.4	
Change Period, (Y+R c), s						5.8		3.3		5.8		3.3		5.8				5.8	
Max Allow Headway (MAH), s						0.0		0.0		0.0		0.0		3.2				3.2	
Queue Clearance Time (g s), s														26.9				9.7	
Green Extension Time (g e), s						0.0		0.0		0.0		0.0		1.7				1.8	
Phase Call Probability														1.00				1.00	
Max Out Probability														0.00				0.00	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate (v), veh/h				507		484	295		556		443	152		197	42				
Adjusted Saturation Flow Rate (s), veh/h/ln				1297		1519	566		1687		1539	1585		1736	1610				
Queue Service Time (g s), s				12.3		18.8	6.0		19.7		6.0	7.1		0.0	1.8				
Cycle Queue Clearance Time (g c), s				32.1		18.8	27.9		19.7		24.9	7.1		7.7	1.8				
Green Ratio (g/C)				0.58		0.58	0.58		0.58		0.30	0.30		0.30	0.30				
Capacity (c), veh/h				792		877	389		973		518	477		566	484				
Volume-to-Capacity Ratio (X)				0.639		0.552	0.759		0.571		0.855	0.319		0.347	0.088				
Back of Queue (Q), ft/ln (50 th percentile)				216.5		158	180.2		183.1		252.5	66		84.7	16.8				
Back of Queue (Q), veh/ln (50 th percentile)				8.7		6.3	7.2		7.3		10.1	2.6		3.4	0.7				
Queue Storage Ratio (RQ) (50 th percentile)				0.00		0.00	0.00		0.00		0.00	0.00		0.00	0.00				
Uniform Delay (d 1), s/veh				14.9		12.5	25.1		12.7		32.5	25.7		25.9	23.8				
Incremental Delay (d 2), s/veh				3.9		2.5	13.0		2.4		4.3	0.1		0.1	0.0				
Initial Queue Delay (d 3), s/veh				0.0		0.0	0.0		0.0		0.0	0.0		0.0	0.0				
Control Delay (d), s/veh				18.9		15.0	38.2		15.1		36.7	25.8		26.0	23.9				
Level of Service (LOS)				B		B	D		B		D	C		C	C				
Approach Delay, s/veh / LOS				17.0		B	23.1		C		33.9	C		25.7	C				
Intersection Delay, s/veh / LOS				23.5						C									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.88		B	1.88		B		2.11	B		2.11	B				
Bicycle LOS Score / LOS				1.30		A	1.19		A		1.47	A		0.88	A				

EXHIBIT 8

OPTION 1 - 2041 PEAK PM HOUR TRAFFIC – Dufferin (Highway 7)/Wilson

HCS7 Signalized Intersection Results Summary

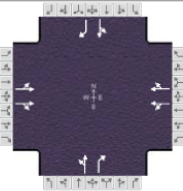
General Information						Intersection Information													
Agency						Duration, h		0.25											
Analyst		Analysis Date		4/24/2018		Area Type		Other											
Jurisdiction		Time Period		Peak PM Hour		PHF		0.92											
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00									
Intersection		Dufferin/Wilson		File Name		2041_PM_OPTION 1.xus													
Project Description		West Annex - OPTION 1																	
																			
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h				82	686	262	217	779	21	312	312	227	31	285	69				
Signal Information																			
Cycle, s	120.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	On	Green	0.0	64.2	0.0	44.2	0.0	0.0									
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.3	3.3	3.3	3.3	0.0	0.0									
				Red	0.0	2.5	0.0	2.5	0.0	0.0									
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase						2		1		6		3		8				4	
Case Number						8.3		0.0		14.0		0.0		13.0				7.3	
Phase Duration, s						70.0		0.0		70.0		0.0		50.0				50.0	
Change Period, (Y+R c), s						5.8		3.3		5.8		3.3		5.8				5.8	
Max Allow Headway (MAH), s						0.0		0.0		0.0		0.0		3.3				3.3	
Queue Clearance Time (g s), s														46.2				18.9	
Green Extension Time (g e), s						0.0		0.0		0.0		0.0		0.0				3.5	
Phase Call Probability														1.00				1.00	
Max Out Probability														1.00				0.01	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate (v), veh/h				542		578	355		750		678	247		343	75				
Adjusted Saturation Flow Rate (s), veh/h/ln				652		1563	384		1693		1162	1585		1788	1610				
Queue Service Time (g s), s				19.8		32.7	6.0		44.4		6.0	14.0		0.0	3.7				
Cycle Queue Clearance Time (g c), s				64.2		32.7	64.2		44.4		44.2	14.0		16.9	3.7				
Green Ratio (g/C)				0.53		0.53	0.54		0.54		0.37	0.37		0.37	0.37				
Capacity (c), veh/h				384		836	256		906		473	584		692	593				
Volume-to-Capacity Ratio (X)				1.413		0.691	1.390		0.828		1.434	0.423		0.497	0.126				
Back of Queue (Q), ft/ln (50 th percentile)				824.1		311	542.7		472.2		680.1	133.9		189.2	35.5				
Back of Queue (Q), veh/ln (50 th percentile)				33.0		12.4	21.7		18.9		27.2	5.3		7.6	1.4				
Queue Storage Ratio (RQ) (50 th percentile)				0.00		0.00	0.00		0.00		0.00	0.00		0.00	0.00				
Uniform Delay (d 1), s/veh				35.9		20.6	44.1		23.3		42.3	28.4		29.2	25.1				
Incremental Delay (d 2), s/veh				200.7		4.7	197.7		8.6		207.0	0.2		0.2	0.0				
Initial Queue Delay (d 3), s/veh				0.0		0.0	0.0		0.0		0.0	0.0		0.0	0.0				
Control Delay (d), s/veh				236.6		25.2	241.8		31.9		249.3	28.5		29.4	25.1				
Level of Service (LOS)				F		C	F		C		F	C		C	C				
Approach Delay, s/veh / LOS				127.5		F	99.3		F		190.4		F	28.7	C				
Intersection Delay, s/veh / LOS				123.5						F									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.90	B	1.90	B	2.12	B	2.12	B								
Bicycle LOS Score / LOS				1.41	A	1.40	A	2.01	B	1.18	A								

EXHIBIT 9

OPTION 1 - 2041 PEAK AM HOUR TRAFFIC – Sunset/Lanark County Office Access

HCS7 Two-Way Stop-Control Report

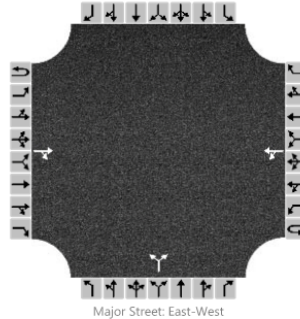
General Information

Analyst	
Agency/Co.	
Date Performed	2/27/2018
Analysis Year	2041
Time Analyzed	Peak AM Hour
Intersection Orientation	East-West
Project Description	West Annex - OPTION 1

Site Information

Intersection	Sunset/County Offices
Jurisdiction	
East/West Street	Sunset Boulevard
North/South Street	Lanark County Offices Acc
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			226	0		52	139			0		7				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						57					8					
Capacity, c (veh/h)						1307					775					
v/c Ratio						0.04					0.01					
95% Queue Length, Q ₉₅ (veh)						0.1					0.0					
Control Delay (s/veh)						7.9					9.7					
Level of Service, LOS						A					A					
Approach Delay (s/veh)					2.4				9.7							
Approach LOS									A							

EXHIBIT 10

OPTION 1 - 2041 PEAK PM HOUR TRAFFIC – Sunset/Lanark County Office Access

HCS7 Two-Way Stop-Control Report

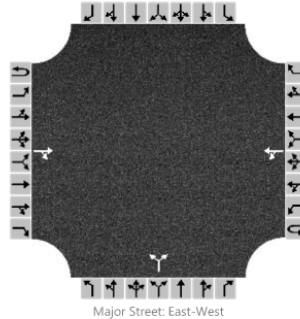
General Information

Analyst	
Agency/Co.	
Date Performed	2/27/2018
Analysis Year	2041
Time Analyzed	Peak PM Hour
Intersection Orientation	East-West
Project Description	West Annex - OPTION 1

Site Information

Intersection	Sunset/County Offices
Jurisdiction	
East/West Street	Sunset Boulevard
North/South Street	Lanark County Offices Acc
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			247	1		2	270			7		49				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized			No			No				No				No		
Median Type/Storage																

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						2					61					
Capacity, c (veh/h)						1281					701					
v/c Ratio						0.00					0.09					
95% Queue Length, Q ₉₅ (veh)						0.0					0.3					
Control Delay (s/veh)						7.8					10.6					
Level of Service, LOS						A					B					
Approach Delay (s/veh)						0.1				10.6						
Approach LOS										B						

EXHIBIT 11

OPTION 2 - 2041 PEAK AM HOUR TRAFFIC – Peter (Foster)/Wilson

HCS7 Signalized Intersection Results Summary

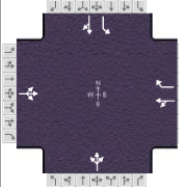
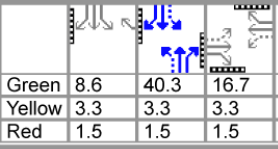
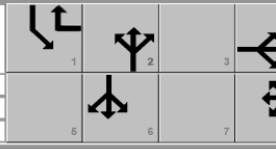
General Information					Intersection Information											
Agency					Duration, h		0.25									
Analyst					Analysis Date		2/27/2018		Area Type					Other		
Jurisdiction					Time Period		Peak AM Hour		PHF					0.92		
Urban Street		West Annex			Analysis Year		2041		Analysis Period					1> 7:00		
Intersection		Peter/Wilson			File Name		2041_AM_OPTION 2.xus									
Project Description		West Annex - OPTION 2														
Demand Information					EB			WB			NB			SB		
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h					42	264	4	7	108	362	4	30	10	389	57	82
Signal Information																
Cycle, s	80.0	Reference Phase	2													
Offset, s	0	Reference Point	End													
Uncoordinated	No	Simult. Gap E/W	Off													
Force Mode	Fixed	Simult. Gap N/S	Off													
Green	8.6	40.3	16.7	0.0	0.0	0.0										
Yellow	3.3	3.3	3.3	0.0	0.0	0.0										
Red	1.5	1.5	1.5	0.0	0.0	0.0										
Timer Results					EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase						4		8		2	1	6				
Case Number						8.0		7.0		8.3	1.0	4.0				
Phase Duration, s						21.5		21.5		45.1	13.4	58.5				
Change Period, (Y+R c), s						4.8		4.8		4.8	4.8	4.8				
Max Allow Headway (MAH), s						3.1		3.2		0.0	3.1	0.0				
Queue Clearance Time (g s), s						16.4		8.7			7.8					
Green Extension Time (g e), s						0.4		0.5		0.0	0.8	0.0				
Phase Call Probability						1.00		1.00			1.00					
Max Out Probability						0.12		0.00			0.00					
Movement Group Results					EB			WB			NB			SB		
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement					7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h						337			125	176		48		423	129	
Adjusted Saturation Flow Rate (s), veh/h/ln						1817			1873	1610		1780		1810	1737	
Queue Service Time (g s), s						9.3			0.0	6.7		0.0		5.8	2.1	
Cycle Queue Clearance Time (g c), s						14.4			4.5	6.7		1.1		5.8	2.1	
Green Ratio (g/C)						0.21			0.21	0.32		0.50		0.76	0.67	
Capacity (c), veh/h						430			439	510		1056		1163	1166	
Volume-to-Capacity Ratio (X)						0.783			0.285	0.345		0.045		0.363	0.111	
Back of Queue (Q), ft/ln (50 th percentile)						161.5			48.8	60.1		9.7		30.2	16.3	
Back of Queue (Q), veh/ln (50 th percentile)						6.5			2.0	2.4		0.4		1.2	0.7	
Queue Storage Ratio (RQ) (50 th percentile)						0.38			0.11	0.63		0.02		0.18	0.10	
Uniform Delay (d 1), s/veh						30.6			26.8	21.0		8.8		3.1	4.7	
Incremental Delay (d 2), s/veh						4.1			0.1	0.1		0.1		0.1	0.2	
Initial Queue Delay (d 3), s/veh						0.0			0.0	0.0		0.0		0.0	0.0	
Control Delay (d), s/veh						34.7			26.9	21.1		8.9		3.1	4.9	
Level of Service (LOS)						C			C	C		A		A	A	
Approach Delay, s/veh / LOS					34.7	C	23.5	C	8.9	A	3.5	A				
Intersection Delay, s/veh / LOS					17.1					B						
Multimodal Results					EB			WB			NB			SB		
Pedestrian LOS Score / LOS					1.70	B	1.96	B	2.17	B	1.63	B				
Bicycle LOS Score / LOS					1.04	A	0.98	A	0.57	A	1.40	A				

EXHIBIT 12

OPTION 2 - 2041 PEAK PM HOUR TRAFFIC – Peter (Foster)/Wilson

HCS7 Signalized Intersection Results Summary

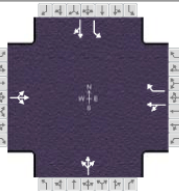
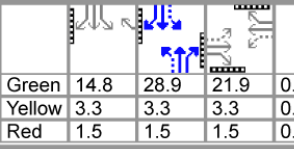
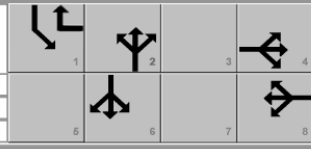
General Information						Intersection Information									
Agency						Duration, h		0.25							
Analyst						Analysis Date		2/27/2018							
Jurisdiction						Time Period		Peak PM Hour							
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00					
Intersection		Peter/Wilson		File Name		2041_PM_OPTION 2.xus									
Project Description		West Annex - OPTION 2													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				73	171	8	24	262	564	5	76	23	547	82	52
Signal Information															
Cycle, s	80.0	Reference Phase	2	Green	14.8	28.9	21.9	0.0	0.0	0.0					
Offset, s	0	Reference Point	End	Yellow	3.3	3.3	3.3	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	Off	Red	1.5	1.5	1.5	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	Off												
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					4		8		2	1	6				
Case Number					8.0		7.0		8.3	1.0	4.0				
Phase Duration, s					26.7		26.7		33.7	19.6	53.3				
Change Period, (Y+R c), s					4.8		4.8		4.8	4.8	4.8				
Max Allow Headway (MAH), s					3.3		3.3		0.0	3.1	0.0				
Queue Clearance Time (g s), s					13.5		21.8			13.9					
Green Extension Time (g e), s					0.4		0.1		0.0	0.9	0.0				
Phase Call Probability					1.00		1.00			1.00					
Max Out Probability					0.01		1.00			0.10					
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h					274			311	504		113		595	124	
Adjusted Saturation Flow Rate (s), veh/h/ln					1616			1853	1610		1812		1810	1809	
Queue Service Time (g s), s					0.1			0.0	19.8		0.0		11.9	2.3	
Cycle Queue Clearance Time (g c), s					11.5			11.4	19.8		3.3		11.9	2.3	
Green Ratio (g/C)					0.27			0.27	0.46		0.36		0.70	0.61	
Capacity (c), veh/h					500			556	739		815		1037	1097	
Volume-to-Capacity Ratio (X)					0.548			0.559	0.683		0.139		0.573	0.113	
Back of Queue (Q), ft/ln (50 th percentile)					108.9			123.9	174.4		34.4		80.6	20.3	
Back of Queue (Q), veh/ln (50 th percentile)					4.4			5.0	7.0		1.4		3.2	0.8	
Queue Storage Ratio (RQ) (50 th percentile)					0.26			0.29	1.84		0.08		0.47	0.12	
Uniform Delay (d 1), s/veh					25.0			25.2	17.1		15.7		5.8	6.7	
Incremental Delay (d 2), s/veh					0.7			0.7	2.1		0.4		0.2	0.2	
Initial Queue Delay (d 3), s/veh					0.0			0.0	0.0		0.0		0.0	0.0	
Control Delay (d), s/veh					25.7			26.0	19.2		16.1		6.0	6.9	
Level of Service (LOS)					C			C	B		B		A	A	
Approach Delay, s/veh / LOS				25.7	C	21.8	C	16.1	B	6.2	A				
Intersection Delay, s/veh / LOS				16.1						B					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				1.69	B	1.95	B	2.05	B	1.65	B				
Bicycle LOS Score / LOS				0.94	A	1.83	B	0.67	A	1.67	B				

EXHIBIT 13

OPTION 2 - 2041 PEAK AM HOUR TRAFFIC – Foster/Gore

HCS7 Signalized Intersection Results Summary

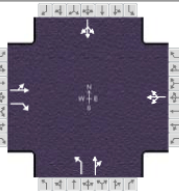
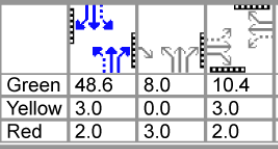
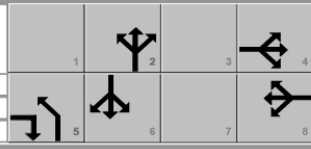
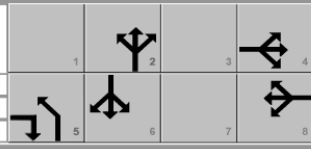
General Information						Intersection Information															
Agency						Duration, h		0.25													
Analyst				Analysis Date		2/27/2018		Area Type		Other											
Jurisdiction				Time Period		Peak AM Hour		PHF		0.92											
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00											
Intersection		Gore/Foster		File Name		2041_AM_OPTION 2.xus															
Project Description		West Annex - OPTION 2																			
Demand Information						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h						13	163	464	16	54	10	405	160	16	3	127	13				
Signal Information																					
Cycle, s		80.0	Reference Phase		2																
Offset, s		0	Reference Point		End																
Uncoordinated		No	Simult. Gap E/W		Off																
Force Mode		Fixed	Simult. Gap N/S		Off	Green	48.6	8.0	10.4	0.0	0.0	0.0									
						Yellow	3.0	0.0	3.0	0.0	0.0	0.0									
						Red	2.0	3.0	2.0	0.0	0.0	0.0									
Timer Results						EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase								4				8		5		2				6	
Case Number								7.0				8.0		1.0		4.0				8.3	
Phase Duration, s								15.4				15.4		11.0		64.6				53.6	
Change Period, (Y+R c), s								5.0				5.0		5.0		5.0				5.0	
Max Allow Headway (MAH), s								3.2				3.1		3.1		0.0				0.0	
Queue Clearance Time (g s), s								9.9				4.9		2.0							
Green Extension Time (g e), s								0.5				0.1		0.4		0.0				0.0	
Phase Call Probability								1.00				0.82		1.00							
Max Out Probability								0.03				0.00		0.57							
Movement Group Results						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement						7	4	14	3	8	18	5	2	12	1	6	16				
Adjusted Flow Rate (v), veh/h							191	178		76		440	175			155					
Adjusted Saturation Flow Rate (s), veh/h/ln							1873	1610		1779		1810	1898			1864					
Queue Service Time (g s), s							2.8	7.9		0.0		0.0	2.1			0.0					
Cycle Queue Clearance Time (g c), s							7.9	7.9		2.9		0.0	2.1			2.8					
Green Ratio (g/C)							0.13	0.21		0.13		0.72	0.74			0.61					
Capacity (c), veh/h							292	330		287		1025	1413			1294					
Volume-to-Capacity Ratio (X)							0.655	0.539		0.265		0.429	0.124			0.120					
Back of Queue (Q), ft/ln (50 th percentile)							88.1	74		32.5		67.1	14.2			23.3					
Back of Queue (Q), veh/ln (50 th percentile)							3.5	3.0		1.3		2.7	0.6			0.9					
Queue Storage Ratio (RQ) (50 th percentile)							0.21	0.30		0.08		0.71	0.03			0.14					
Uniform Delay (d 1), s/veh							33.7	28.4		31.5		6.1	2.9			5.7					
Incremental Delay (d 2), s/veh							0.9	0.5		0.2		0.1	0.2			0.2					
Initial Queue Delay (d 3), s/veh							0.0	0.0		0.0		0.0	0.0			0.0					
Control Delay (d), s/veh							34.6	28.9		31.7		6.2	3.1			5.9					
Level of Service (LOS)							C	C		C		A	A			A					
Approach Delay, s/veh / LOS						31.9	C		31.7	C		5.3	A		5.9	A					
Intersection Delay, s/veh / LOS						15.1						B									
Multimodal Results						EB			WB			NB			SB						
Pedestrian LOS Score / LOS						1.96	B		1.71	B		1.62	B		2.37	B					
Bicycle LOS Score / LOS						1.10	A		0.61	A		1.50	B		0.74	A					

EXHIBIT 14

OPTION 2 - 2041 PEAK PM HOUR TRAFFIC – Foster/Gore

HCS7 Signalized Intersection Results Summary

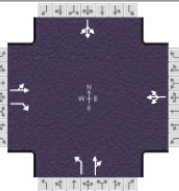
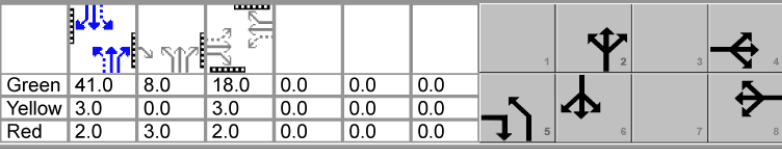
General Information					Intersection Information											
Agency					Duration, h		0.25									
Analyst					Analysis Date		2/27/2018									
Jurisdiction					Time Period		Peak PM Hour									
Urban Street		West Annex			Analysis Year		2041									
Intersection		Gore/Foster			File Name		2041_PM_OPTION 2.xus									
Project Description		West Annex - OPTION 2														
Demand Information					EB			WB			NB			SB		
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h					14	102	646	19	163	14	655	167	26	3	145	29
Signal Information																
Cycle, s	80.0	Reference Phase	2													
Offset, s	0	Reference Point	End													
Uncoordinated	No	Simult. Gap E/W	Off													
Force Mode	Fixed	Simult. Gap N/S	Off													
					Green	41.0	8.0	18.0	0.0	0.0	0.0					
					Yellow	3.0	0.0	3.0	0.0	0.0	0.0					
					Red	2.0	3.0	2.0	0.0	0.0	0.0					
Timer Results					EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase						4		8	5	2		6				
Case Number						7.0		8.0	1.0	4.0		8.3				
Phase Duration, s						23.0		23.0	11.0	57.0		46.0				
Change Period, (Y+R c), s						5.0		5.0	5.0	5.0		5.0				
Max Allow Headway (MAH), s						3.3		3.1	3.1	0.0		0.0				
Queue Clearance Time (g s), s						19.1		9.4	2.0							
Green Extension Time (g e), s						0.0		0.2	0.8	0.0		0.0				
Phase Call Probability						1.00		0.99	1.00							
Max Out Probability						1.00		0.00	0.70							
Movement Group Results					EB			WB			NB			SB		
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement					7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h						126	376		202		712	193		192		
Adjusted Saturation Flow Rate (s), veh/h/ln						1847	1610		1849		1810	1879		1841		
Queue Service Time (g s), s						0.0	17.1		0.0		0.0	3.2		0.0		
Cycle Queue Clearance Time (g c), s						4.4	17.1		7.4		0.0	3.2		4.5		
Green Ratio (g/C)						0.22	0.30		0.22		0.62	0.65		0.51		
Capacity (c), veh/h						466	483		466		862	1221		1104		
Volume-to-Capacity Ratio (X)						0.271	0.779		0.434		0.826	0.158		0.174		
Back of Queue (Q), ft/ln (50 th percentile)						48.1	109.7		80.7		316.1	27.5		42.4		
Back of Queue (Q), veh/ln (50 th percentile)						1.9	4.4		3.2		12.6	1.1		1.7		
Queue Storage Ratio (RQ) (50 th percentile)						0.11	0.44		0.19		3.33	0.06		0.25		
Uniform Delay (d 1), s/veh						25.7	25.6		26.9		17.1	5.5		9.4		
Incremental Delay (d 2), s/veh						0.1	7.2		0.2		6.2	0.3		0.3		
Initial Queue Delay (d 3), s/veh						0.0	0.0		0.0		0.0	0.0		0.0		
Control Delay (d), s/veh						25.8	32.8		27.1		23.3	5.7		9.7		
Level of Service (LOS)						C	C		C		C	A		A		
Approach Delay, s/veh / LOS					31.1		C	27.1		C	19.5		B	9.7		A
Intersection Delay, s/veh / LOS					22.6					C						
Multimodal Results					EB			WB			NB			SB		
Pedestrian LOS Score / LOS					1.95		B	1.70		B	1.65		B	2.37		B
Bicycle LOS Score / LOS					1.32		A	0.82		A	1.98		B	0.81		A

EXHIBIT 15

OPTION 2 - 2041 PEAK AM HOUR TRAFFIC – Sunset (Harris)/Wilson

HCS7 Signalized Intersection Results Summary

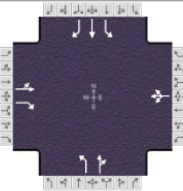
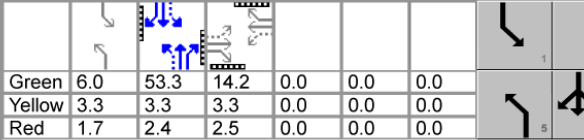
General Information						Intersection Information													
Agency						Duration, h	0.25												
Analyst				Analysis Date	2/27/2018	Area Type	Other												
Jurisdiction				Time Period	Peak AM Hour	PHF	0.92												
Urban Street	West Annex	Analysis Year			2041	Analysis Period	1> 7:00												
Intersection	Wilson/Sunset	File Name			2041_AM_OPTION 2.xus														
Project Description	West Annex - OPTION 2																		
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h				205	11	127	8	50	11	124	438	5	7	562	177				
Signal Information																			
Cycle, s	90.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	Off																
Force Mode	Fixed	Simult. Gap N/S	Off																
				Green	6.0	53.3	14.2	0.0	0.0	0.0									
				Yellow	3.3	3.3	3.3	0.0	0.0	0.0									
				Red	1.7	2.4	2.5	0.0	0.0	0.0									
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase						4				8		5		2		1		6	
Case Number						7.0				8.0		1.1		4.0		1.1		3.0	
Phase Duration, s						20.0				20.0		11.0		59.0		11.0		59.0	
Change Period, (Y+R c), s						5.8				5.8		5.0		5.7		5.0		5.7	
Max Allow Headway (MAH), s						3.2				3.1		3.1		0.0		3.1		0.0	
Queue Clearance Time (g s), s						16.2				5.0		3.5				2.1			
Green Extension Time (g e), s						0.0				0.1		0.1		0.0		0.0		0.0	
Phase Call Probability						1.00				0.83		1.00				1.00			
Max Out Probability						1.00				0.00		0.64				0.01			
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16				
Adjusted Flow Rate (v), veh/h				235 116			72			135 482			8 611 57						
Adjusted Saturation Flow Rate (s), veh/h/ln				1380 1610			1845			1810 1896			1810 1900 1610						
Queue Service Time (g s), s				11.2 5.9			0.0			1.5 12.5			0.1 17.4 1.3						
Cycle Queue Clearance Time (g c), s				14.2 5.9			3.0			1.5 12.5			0.1 17.4 1.3						
Green Ratio (g/C)				0.16 0.16			0.16			0.79 0.59			0.79 0.59 0.59						
Capacity (c), veh/h				296 254			336			611 1123			773 1125 954						
Volume-to-Capacity Ratio (X)				0.794 0.458			0.214			0.220 0.429			0.010 0.543 0.059						
Back of Queue (Q), ft/ln (50 th percentile)				153.1 57			33.7			17.2 124			0.4 174.6 11.2						
Back of Queue (Q), veh/ln (50 th percentile)				6.1 2.3			1.3			0.7 5.0			0.0 7.0 0.4						
Queue Storage Ratio (RQ) (50 th percentile)				0.61 0.23			0.08			0.18 0.18			0.01 0.83 0.05						
Uniform Delay (d 1), s/veh				38.4 34.4			33.2			6.7 10.0			3.1 11.0 7.8						
Incremental Delay (d 2), s/veh				12.8 0.5			0.1			0.1 1.2			0.0 1.9 0.1						
Initial Queue Delay (d 3), s/veh				0.0 0.0			0.0			0.0 0.0			0.0 0.0 0.0						
Control Delay (d), s/veh				51.2 34.9			33.3			6.8 11.2			3.1 12.9 7.9						
Level of Service (LOS)				D C			C			A B			A B A						
Approach Delay, s/veh / LOS				45.8 D			33.3 C			10.3 B			12.4 B						
Intersection Delay, s/veh / LOS				19.3									B						
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.94 B			2.31 B			1.66 B			1.91 B						
Bicycle LOS Score / LOS				1.07 A			0.61 A			1.50 B			1.60 B						

EXHIBIT 16

OPTION 2 - 2041 PEAK PM HOUR TRAFFIC – Sunset (Harris)/Wilson

HCS7 Signalized Intersection Results Summary

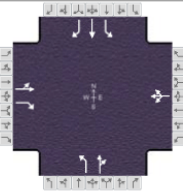
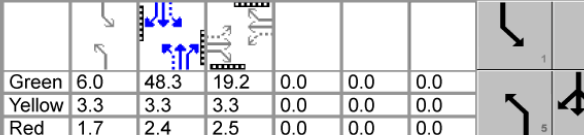
General Information						Intersection Information											
Agency						Duration, h		0.25									
Analyst						Analysis Date		2/27/2018		Area Type			Other				
Jurisdiction						Time Period		Peak PM Hour		PHF			0.92				
Urban Street		West Annex				Analysis Year		2041		Analysis Period			1> 7:00				
Intersection		Wilson/Sunset				File Name		2041_PM_OPTION 2.xus									
Project Description		West Annex - OPTION 2															
Demand Information						EB			WB			NB			SB		
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h						260	37	156	8	32	30	133	794	1	13	758	292
Signal Information																	
Cycle, s	90.0	Reference Phase	2														
Offset, s	0	Reference Point	End														
Uncoordinated	No	Simult. Gap E/W	Off	Green	6.0		48.3	19.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Force Mode	Fixed	Simult. Gap N/S	Off	Yellow	3.3		3.3	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
				Red	1.7	2.4	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Timer Results						EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase							4		8	5	2	1	6				
Case Number							7.0		8.0	1.1	4.0	1.1	3.0				
Phase Duration, s							25.0		25.0	11.0	54.0	11.0	54.0				
Change Period, (Y+R c), s							5.8		5.8	5.0	5.7	5.0	5.7				
Max Allow Headway (MAH), s							3.2		3.2	3.1	0.0	3.1	0.0				
Queue Clearance Time (g s), s							21.2		5.0	4.1		2.2					
Green Extension Time (g e), s							0.0		0.1	0.0	0.0	0.0	0.0				
Phase Call Probability							1.00		0.84	1.00		1.00					
Max Out Probability							1.00		0.00	1.00		0.21					
Movement Group Results						EB			WB			NB			SB		
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement						7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h							323	148		73		145	864		14	824	154
Adjusted Saturation Flow Rate (s), veh/h/ln							1409	1610		1794		1810	1900		1810	1900	1610
Queue Service Time (g s), s							16.2	7.2		0.0		2.1	34.8		0.2	31.9	4.4
Cycle Queue Clearance Time (g c), s							19.2	7.2		3.0		2.1	34.8		0.2	31.9	4.4
Green Ratio (g/C)							0.21	0.21		0.21		0.74	0.54		0.74	0.54	0.54
Capacity (c), veh/h							376	344		427		409	1019		435	1020	864
Volume-to-Capacity Ratio (X)							0.860	0.430		0.170		0.353	0.848		0.032	0.808	0.179
Back of Queue (Q), ft/ln (50 th percentile)							217.9	68.1		31.6		38.6	397.2		2.6	356.6	38.8
Back of Queue (Q), veh/ln (50 th percentile)							8.7	2.7		1.3		1.5	15.9		0.1	14.3	1.6
Queue Storage Ratio (RQ) (50 th percentile)							0.87	0.27		0.08		0.41	0.58		0.05	1.70	0.18
Uniform Delay (d 1), s/veh							36.1	30.7		29.0		15.2	17.7		10.8	17.1	10.7
Incremental Delay (d 2), s/veh							17.1	0.3		0.1		0.2	8.7		0.0	6.9	0.5
Initial Queue Delay (d 3), s/veh							0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh							53.2	31.0		29.1		15.4	26.4		10.8	23.9	11.1
Level of Service (LOS)							D	C		C		B	C		B	C	B
Approach Delay, s/veh / LOS						46.2		D	29.1		C	24.9		C	21.8		C
Intersection Delay, s/veh / LOS						27.7						C					
Multimodal Results						EB			WB			NB			SB		
Pedestrian LOS Score / LOS						1.93		B	2.34		B	1.67		B	1.92		B
Bicycle LOS Score / LOS						1.26		A	0.61		A	2.15		B	2.13		B

EXHIBIT 17

OPTION 2 - 2041 PEAK AM HOUR TRAFFIC – Dufferin (Highway 7)/Wilson

HCS7 Signalized Intersection Results Summary

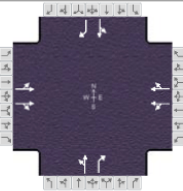
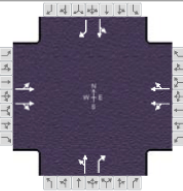
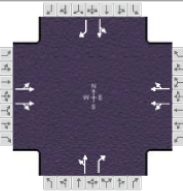
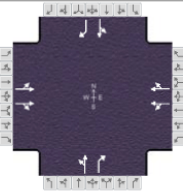
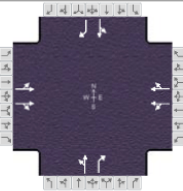
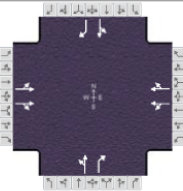
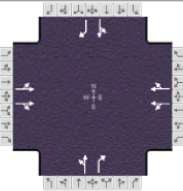
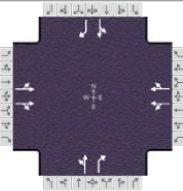
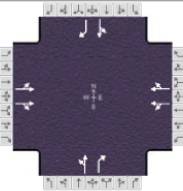
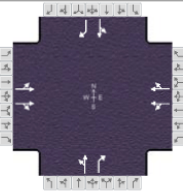
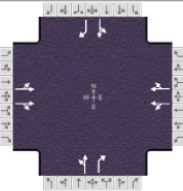
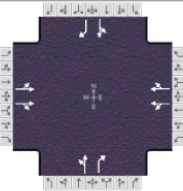
General Information						Intersection Information									
Agency						Duration, h		0.25							
Analyst				Analysis Date		4/24/2018		Area Type		Other					
Jurisdiction				Time Period		Peak AM Hour		PHF		0.92					
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00					
Intersection		Dufferin/Wilson		File Name		2041_AM_OPTION 2.xus									
Project Description		West Annex - OPTION 2													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				77	537	297	178	579	26	188	220	140	29	152	39
Signal Information															
Cycle, s	95.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	No	Simult. Gap E/W	On												
Force Mode	Fixed	Simult. Gap N/S	On												
Green				0.0	54.8	0.0	28.6	0.0	0.0						
Yellow				3.3	3.3	3.3	3.3	0.0	0.0						
Red				0.0	2.5	0.0	2.5	0.0	0.0						
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					2	1	6	3	8						
Case Number					8.3	0.0	14.0	0.0	13.0						
Phase Duration, s					60.6	0.0	60.6	0.0	34.4						
Change Period, (Y+R c), s					5.8	3.3	5.8	3.3	5.8						
Max Allow Headway (MAH), s					0.0	0.0	0.0	0.0	3.2						
Queue Clearance Time (g s), s									26.9						
Green Extension Time (g e), s					0.0	0.0	0.0	0.0	1.7						
Phase Call Probability									1.00						
Max Out Probability									0.00						
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h				507		484	295		556		443	152		197	42
Adjusted Saturation Flow Rate (s), veh/h/ln				1297		1519	566		1687		1539	1585		1736	1610
Queue Service Time (g s), s				12.3		18.8	6.0		19.7		6.0	7.1		0.0	1.8
Cycle Queue Clearance Time (g c), s				32.1		18.8	27.9		19.7		24.9	7.1		7.7	1.8
Green Ratio (g/C)				0.58		0.58	0.58		0.58		0.30	0.30		0.30	0.30
Capacity (c), veh/h				792		877	389		973		518	477		566	484
Volume-to-Capacity Ratio (X)				0.639		0.552	0.759		0.571		0.855	0.319		0.347	0.088
Back of Queue (Q), ft/ln (50 th percentile)				216.5		158	180.2		183.1		252.5	66		84.7	16.8
Back of Queue (Q), veh/ln (50 th percentile)				8.7		6.3	7.2		7.3		10.1	2.6		3.4	0.7
Queue Storage Ratio (RQ) (50 th percentile)				0.00		0.00	0.00		0.00		0.00	0.00		0.00	0.00
Uniform Delay (d 1), s/veh				14.9		12.5	25.1		12.7		32.5	25.7		25.9	23.8
Incremental Delay (d 2), s/veh				3.9		2.5	13.0		2.4		4.3	0.1		0.1	0.0
Initial Queue Delay (d 3), s/veh				0.0		0.0	0.0		0.0		0.0	0.0		0.0	0.0
Control Delay (d), s/veh				18.9		15.0	38.2		15.1		36.7	25.8		26.0	23.9
Level of Service (LOS)				B		B	D		B		D	C		C	C
Approach Delay, s/veh / LOS				17.0		B	23.1		C		33.9	C		25.7	C
Intersection Delay, s/veh / LOS				23.5						C					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				1.88		B	1.88		B		2.11	B		2.11	B
Bicycle LOS Score / LOS				1.30		A	1.19		A		1.47	A		0.88	A

EXHIBIT 18

OPTION 2 - 2041 PEAK PM HOUR TRAFFIC – Dufferin (Highway 7)/Wilson

HCS7 Signalized Intersection Results Summary

General Information						Intersection Information											
Agency						Duration, h		0.25									
Analyst				Analysis Date		4/24/2018		Area Type		Other							
Jurisdiction				Time Period		Peak PM Hour		PHF		0.92							
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00							
Intersection		Dufferin/Wilson		File Name		2041_PM_OPTION 2.xus											
Project Description		West Annex - OPTION 2															
Demand Information						EB			WB			NB			SB		
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h						82	686	262	217	779	21	312	312	227	31	285	69
Signal Information																	
Cycle, s	120.0	Reference Phase	2														
Offset, s	0	Reference Point	End														
Uncoordinated	No	Simult. Gap E/W	On														
Force Mode	Fixed	Simult. Gap N/S	On														
Timer Results						EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase							2	1	6	3	8		4				
Case Number							8.3	0.0	14.0	0.0	13.0		7.3				
Phase Duration, s							70.0	0.0	70.0	0.0	50.0		50.0				
Change Period, (Y+R c), s							5.8	3.3	5.8	3.3	5.8		5.8				
Max Allow Headway (MAH), s							0.0	0.0	0.0	0.0	3.3		3.3				
Queue Clearance Time (g s), s											46.2		18.9				
Green Extension Time (g e), s							0.0	0.0	0.0	0.0	0.0		3.5				
Phase Call Probability											1.00		1.00				
Max Out Probability											1.00		0.01				
Movement Group Results						EB			WB			NB			SB		
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement						5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h						542		578	355		750		678	247		343	75
Adjusted Saturation Flow Rate (s), veh/h/ln						652		1563	384		1693		1162	1585		1788	1610
Queue Service Time (g s), s						19.8		32.7	6.0		44.4		6.0	14.0		0.0	3.7
Cycle Queue Clearance Time (g c), s						64.2		32.7	64.2		44.4		44.2	14.0		16.9	3.7
Green Ratio (g/C)						0.53		0.53	0.54		0.54		0.37	0.37		0.37	0.37
Capacity (c), veh/h						384		836	256		906		473	584		692	593
Volume-to-Capacity Ratio (X)						1.413		0.691	1.390		0.828		1.434	0.423		0.497	0.126
Back of Queue (Q), ft/ln (50 th percentile)						824.1		311	542.7		472.2		680.1	133.9		189.2	35.5
Back of Queue (Q), veh/ln (50 th percentile)						33.0		12.4	21.7		18.9		27.2	5.3		7.6	1.4
Queue Storage Ratio (RQ) (50 th percentile)						0.00		0.00	0.00		0.00		0.00	0.00		0.00	0.00
Uniform Delay (d 1), s/veh						35.9		20.6	44.1		23.3		42.3	28.4		29.2	25.1
Incremental Delay (d 2), s/veh						200.7		4.7	197.7		8.6		207.0	0.2		0.2	0.0
Initial Queue Delay (d 3), s/veh						0.0		0.0	0.0		0.0		0.0	0.0		0.0	0.0
Control Delay (d), s/veh						236.6		25.2	241.8		31.9		249.3	28.5		29.4	25.1
Level of Service (LOS)						F		C	F		C		F	C		C	C
Approach Delay, s/veh / LOS						127.5		F	99.3		F		190.4	F		28.7	C
Intersection Delay, s/veh / LOS						123.5						F					
Multimodal Results						EB			WB			NB			SB		
Pedestrian LOS Score / LOS						1.90		B	1.90		B	2.12		B	2.12		B
Bicycle LOS Score / LOS						1.41		A	1.40		A	2.01		B	1.18		A

EXHIBIT 19

OPTION 2 - 2041 LEFT TURN LANE WARRANT – Sunset/Lanark County Office Access

TRAFFIC

$V_o = 234$ vph
 $V_A = 185$ vph
 $V_L = 81$ vph

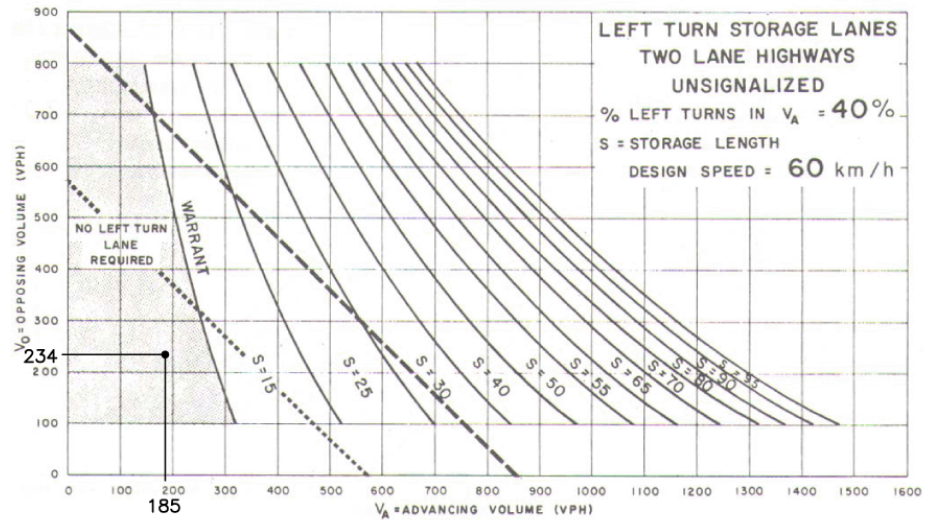
$$\frac{V_L}{V_A} = 43.8\%$$

POSTED SPEED
50 km/h

WARRANT

NO LEFT TURN
LANE REQUIRED

**WESTBOUND LEFT
PEAK AM HOUR**



--- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL
AREAS OR URBAN AREAS WITH RESTRICTED FLOW

..... TRAFFIC SIGNALS MAY BE WARRANTED IN
"FREE FLOW" URBAN AREAS

TRAFFIC

$V_o = 248$ vph
 $V_A = 337$ vph
 $V_L = 87$ vph

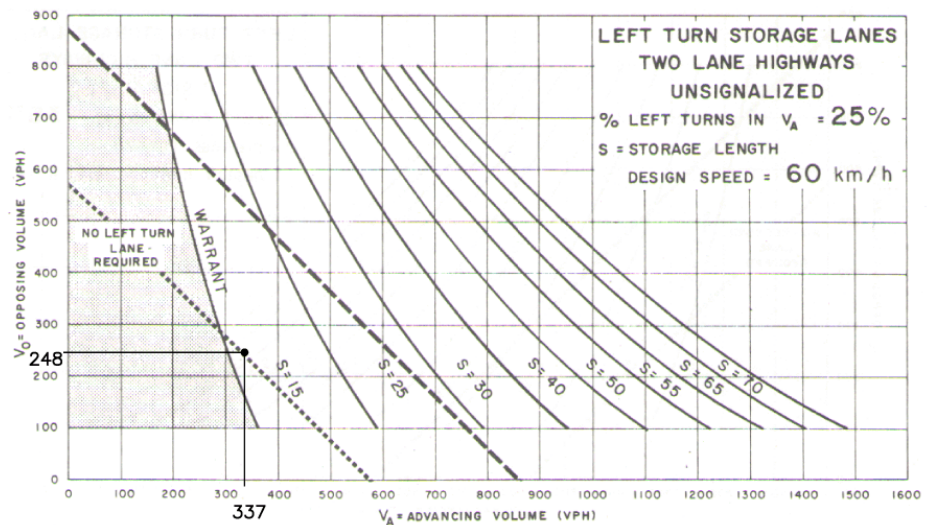
$$\frac{V_L}{V_A} = 25.8\%$$

POSTED SPEED
50 km/h

WARRANT

15m LEFT TURN
LANE REQUIRED

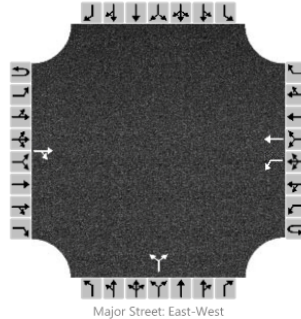
**WESTBOUND LEFT
PEAK PM HOUR**



HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Sunset/County Offices
Agency/Co.		Jurisdiction	
Date Performed	2/27/2018	East/West Street	Sunset Boulevard
Analysis Year	2041	North/South Street	Lanark County Offices Acc
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	West Annex - OPTION 2		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			214	20		81	104			35		94				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1					7.1		6.2			
Critical Headway (sec)						4.12					6.42		6.22			
Base Follow-Up Headway (sec)						2.2					3.5		3.3			
Follow-Up Headway (sec)						2.22					3.52		3.32			

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						88					140					
Capacity, c (veh/h)						1298					656					
v/c Ratio						0.07					0.21					
95% Queue Length, Q ₉₅ (veh)						0.2					0.8					
Control Delay (s/veh)						8.0					12.0					
Level of Service, LOS						A					B					
Approach Delay (s/veh)					3.5				12.0							
Approach LOS									B							

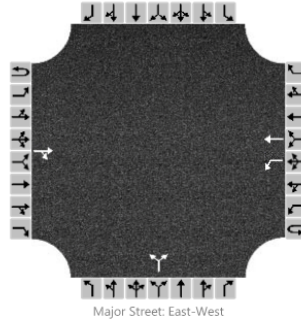
EXHIBIT 21

OPTION 2 - 2041 PEAK PM HOUR TRAFFIC – Sunset/Lanark County Office Access

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Sunset/County Offices
Agency/Co.		Jurisdiction	
Date Performed	2/27/2018	East/West Street	Sunset Boulevard
Analysis Year	2041	North/South Street	Lanark County Offices Acc
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	West Annex - OPTION 2		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			213	35		87	250			20		99				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1					7.1		6.2			
Critical Headway (sec)						4.12					6.42		6.22			
Base Follow-Up Headway (sec)						2.2					3.5		3.3			
Follow-Up Headway (sec)						2.22					3.52		3.32			

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						95					129					
Capacity, c (veh/h)						1281					647					
v/c Ratio						0.07					0.20					
95% Queue Length, Q ₉₅ (veh)						0.2					0.7					
Control Delay (s/veh)						8.0					11.9					
Level of Service, LOS						A					B					
Approach Delay (s/veh)					2.1				11.9							
Approach LOS									B							

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HCS7™ TWSC Version 7.4
2041_PM_OPTION 2.xtw

Generated: 2/27/2018 9:33:02 PM

EXHIBIT 22

OPTION 3 - 2041 PEAK AM HOUR TRAFFIC – Peter (Foster)/Wilson

HCS7 Signalized Intersection Results Summary

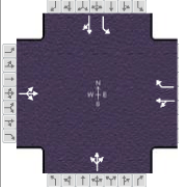
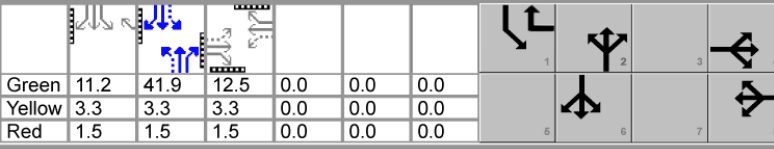
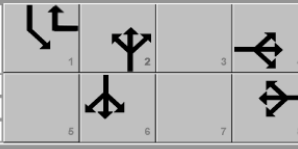
General Information					Intersection Information											
Agency					Duration, h		0.25									
Analyst					Analysis Date		2/27/2018		Area Type					Other		
Jurisdiction					Time Period		Peak AM Hour		PHF					0.92		
Urban Street		West Annex			Analysis Year		2041		Analysis Period					1> 7:00		
Intersection		Peter/Wilson			File Name		2041_AM_OPTION 3.xus									
Project Description		West Annex - OPTION 3														
Demand Information					EB			WB			NB			SB		
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h					65	79	4	7	47	424	4	30	10	574	57	89
Signal Information																
Cycle, s	80.0	Reference Phase	2													
Offset, s	0	Reference Point	End													
Uncoordinated	No	Simult. Gap E/W	Off													
Force Mode	Fixed	Simult. Gap N/S	Off													
				Green	11.2	41.9	12.5	0.0	0.0	0.0						
				Yellow	3.3	3.3	3.3	0.0	0.0	0.0						
				Red	1.5	1.5	1.5	0.0	0.0	0.0						
Timer Results					EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase						4		8		2	1	6				
Case Number						8.0		7.0		8.3	1.0	4.0				
Phase Duration, s						17.3		17.3		46.7	16.0	62.7				
Change Period, (Y+R c), s						4.8		4.8		4.8	4.8	4.8				
Max Allow Headway (MAH), s						3.1		3.3		0.0	3.1	0.0				
Queue Clearance Time (g s), s						9.1		12.0			9.8					
Green Extension Time (g e), s						0.2		0.5		0.0	1.3	0.0				
Phase Call Probability						0.97		1.00			1.00					
Max Out Probability						0.00		0.01			0.00					
Movement Group Results					EB			WB			NB			SB		
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement					7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h						161			59	243		48		624	137	
Adjusted Saturation Flow Rate (s), veh/h/ln						1664			1862	1610		1779		1810	1730	
Queue Service Time (g s), s						4.9			0.0	10.0		0.0		7.8	1.9	
Cycle Queue Clearance Time (g c), s						7.1			2.2	10.0		1.0		7.8	1.9	
Green Ratio (g/C)						0.16			0.16	0.30		0.52		0.81	0.72	
Capacity (c), veh/h						325			342	476		1093		1250	1252	
Volume-to-Capacity Ratio (X)						0.495			0.172	0.511		0.044		0.499	0.109	
Back of Queue (Q), ft/ln (50 th percentile)						70.4			23.8	90.9		9.1		24.4	12.9	
Back of Queue (Q), veh/ln (50 th percentile)						2.8			1.0	3.6		0.4		1.0	0.5	
Queue Storage Ratio (RQ) (50 th percentile)						0.17			0.06	0.96		0.02		0.14	0.08	
Uniform Delay (d 1), s/veh						31.4			29.4	23.4		8.0		2.2	3.3	
Incremental Delay (d 2), s/veh						0.4			0.1	0.3		0.1		0.1	0.2	
Initial Queue Delay (d 3), s/veh						0.0			0.0	0.0		0.0		0.0	0.0	
Control Delay (d), s/veh						31.8			29.5	23.7		8.1		2.3	3.5	
Level of Service (LOS)						C			C	C		A		A	A	
Approach Delay, s/veh / LOS					31.8	C	24.8	C	8.1	A	2.5	A				
Intersection Delay, s/veh / LOS					11.7					B						
Multimodal Results					EB			WB			NB			SB		
Pedestrian LOS Score / LOS					1.71	B	1.96	B	2.17	B	1.62	B				
Bicycle LOS Score / LOS					0.75	A	0.99	A	0.57	A	1.74	B				

EXHIBIT 23

OPTION 3 - 2041 PEAK PM HOUR TRAFFIC – Peter (Foster)/Wilson

HCS7 Signalized Intersection Results Summary

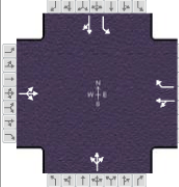
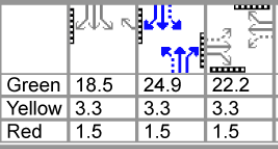
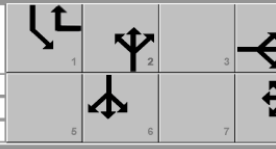
General Information						Intersection Information											
Agency						Duration, h		0.25									
Analyst				Analysis Date		2/27/2018		Area Type		Other							
Jurisdiction				Time Period		Peak PM Hour		PHF		0.92							
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00							
Intersection		Peter/Wilson		File Name		2041_PM_OPTION 3.xus											
Project Description		West Annex - OPTION 3															
Demand Information				EB			WB			NB			SB				
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R		
Demand (v), veh/h				86	66	8	24	83	743	5	76	23	652	82	74		
Signal Information																	
Cycle, s	80.0	Reference Phase	2														
Offset, s	0	Reference Point	End														
Uncoordinated	No	Simult. Gap E/W	Off														
Force Mode	Fixed	Simult. Gap N/S	Off														
Green	18.5	24.9	22.2	0.0	0.0	0.0											
Yellow	3.3	3.3	3.3	0.0	0.0	0.0											
Red	1.5	1.5	1.5	0.0	0.0	0.0											
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT						
Assigned Phase					4		8		2	1	6						
Case Number					8.0		7.0		8.3	1.0	4.0						
Phase Duration, s					27.0		27.0		29.7	23.3	53.0						
Change Period, (Y+R c), s					4.8		4.8		4.8	4.8	4.8						
Max Allow Headway (MAH), s					3.2		3.3		0.0	3.1	0.0						
Queue Clearance Time (g s), s					8.9		24.2			17.8							
Green Extension Time (g e), s					0.2		0.0		0.0	0.7	0.0						
Phase Call Probability					0.98		1.00			1.00							
Max Out Probability					0.00		1.00			0.90							
Movement Group Results				EB			WB			NB			SB				
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R		
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16		
Adjusted Flow Rate (v), veh/h					174			116	699		113		709	148			
Adjusted Saturation Flow Rate (s), veh/h/ln					1559			1785	1610		1810		1810	1773			
Queue Service Time (g s), s					3.2			0.0	22.2		0.0		15.8	2.9			
Cycle Queue Clearance Time (g c), s					6.9			3.8	22.2		3.6		15.8	2.9			
Green Ratio (g/C)					0.28			0.28	0.51		0.31		0.69	0.60			
Capacity (c), veh/h					502			550	820		723		1052	1068			
Volume-to-Capacity Ratio (X)					0.347			0.211	0.853		0.156		0.674	0.138			
Back of Queue (Q), ft/ln (50 th percentile)					63.6			40.4	287.4		38.2		115.8	25.1			
Back of Queue (Q), veh/ln (50 th percentile)					2.5			1.6	11.5		1.5		4.6	1.0			
Queue Storage Ratio (RQ) (50 th percentile)					0.15			0.10	3.03		0.09		0.68	0.15			
Uniform Delay (d 1), s/veh					23.3			22.2	17.0		18.4		6.6	6.9			
Incremental Delay (d 2), s/veh					0.2			0.1	8.2		0.5		1.2	0.3			
Initial Queue Delay (d 3), s/veh					0.0			0.0	0.0		0.0		0.0	0.0			
Control Delay (d), s/veh					23.4			22.3	25.3		18.9		7.8	7.2			
Level of Service (LOS)					C			C	C		B		A	A			
Approach Delay, s/veh / LOS				23.4	C		24.8	C		18.9	B		7.7		A		
Intersection Delay, s/veh / LOS				16.9						B							
Multimodal Results				EB			WB			NB			SB				
Pedestrian LOS Score / LOS				1.69	B		1.95	B		2.06	B		1.65	B			
Bicycle LOS Score / LOS				0.77	A		1.83	B		0.67	A		1.90	B			

EXHIBIT 24

OPTION 3 - 2041 PEAK AM HOUR TRAFFIC – Foster/Gore

HCS7 Signalized Intersection Results Summary

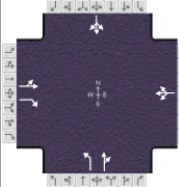
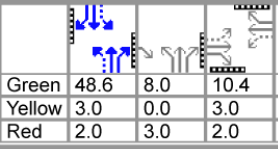
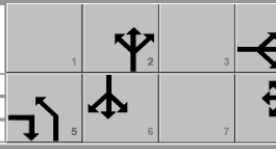
General Information					Intersection Information											
Agency					Duration, h		0.25									
Analyst					Analysis Date		2/27/2018									
Jurisdiction					Time Period		Peak AM Hour									
Urban Street		West Annex			Analysis Year		2041									
Intersection		Gore/Foster			Analysis Period		1> 7:00									
Project Description		Gore/Foster			File Name		2041_AM_OPTION 3.xus									
Project Description		West Annex - OPTION 3														
Demand Information					EB			WB			NB			SB		
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h					13	163	464	16	54	10	405	160	16	3	127	13
Signal Information																
Cycle, s	80.0	Reference Phase	2													
Offset, s	0	Reference Point	End													
Uncoordinated	No	Simult. Gap E/W	Off													
Force Mode	Fixed	Simult. Gap N/S	Off													
Green	48.6	8.0	10.4	0.0	0.0	0.0										
Yellow	3.0	0.0	3.0	0.0	0.0	0.0										
Red	2.0	3.0	2.0	0.0	0.0	0.0										
Timer Results					EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase						4		8	5	2		6				
Case Number						7.0		8.0	1.0	4.0		8.3				
Phase Duration, s						15.4		15.4	11.0	64.6		53.6				
Change Period, (Y+R c), s						5.0		5.0	5.0	5.0		5.0				
Max Allow Headway (MAH), s						3.2		3.1	3.1	0.0		0.0				
Queue Clearance Time (g s), s						9.9		4.9	2.0							
Green Extension Time (g e), s						0.5		0.1	0.4	0.0		0.0				
Phase Call Probability						1.00		0.82	1.00							
Max Out Probability						0.03		0.00	0.57							
Movement Group Results					EB			WB			NB			SB		
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement					7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h						191	178		76		440	175			155	
Adjusted Saturation Flow Rate (s), veh/h/ln						1873	1610		1779		1810	1898			1864	
Queue Service Time (g s), s						2.8	7.9		0.0		0.0	2.1			0.0	
Cycle Queue Clearance Time (g c), s						7.9	7.9		2.9		0.0	2.1			2.8	
Green Ratio (g/C)						0.13	0.21		0.13		0.72	0.74			0.61	
Capacity (c), veh/h						292	330		287		1025	1413			1294	
Volume-to-Capacity Ratio (X)						0.655	0.539		0.265		0.429	0.124			0.120	
Back of Queue (Q), ft/ln (50 th percentile)						88.1	74		32.5		67.1	14.2			23.3	
Back of Queue (Q), veh/ln (50 th percentile)						3.5	3.0		1.3		2.7	0.6			0.9	
Queue Storage Ratio (RQ) (50 th percentile)						0.21	0.30		0.08		0.71	0.03			0.14	
Uniform Delay (d 1), s/veh						33.7	28.4		31.5		6.1	2.9			5.7	
Incremental Delay (d 2), s/veh						0.9	0.5		0.2		0.1	0.2			0.2	
Initial Queue Delay (d 3), s/veh						0.0	0.0		0.0		0.0	0.0			0.0	
Control Delay (d), s/veh						34.6	28.9		31.7		6.2	3.1			5.9	
Level of Service (LOS)						C	C		C		A	A			A	
Approach Delay, s/veh / LOS					31.9	C		31.7	C		5.3	A		5.9	A	
Intersection Delay, s/veh / LOS					15.1					B						
Multimodal Results					EB			WB			NB			SB		
Pedestrian LOS Score / LOS					1.96	B		1.71	B		1.62	B		2.37	B	
Bicycle LOS Score / LOS					1.10	A		0.61	A		1.50	B		0.74	A	

EXHIBIT 25

OPTION 3 - 2041 PEAK PM HOUR TRAFFIC – Foster/Gore

HCS7 Signalized Intersection Results Summary

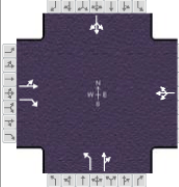
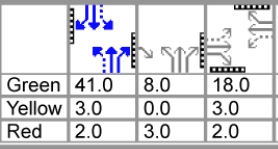
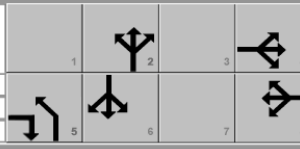
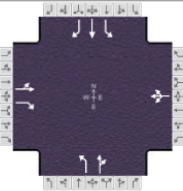
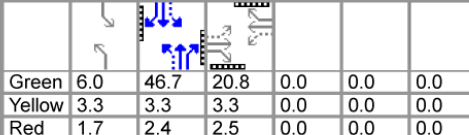
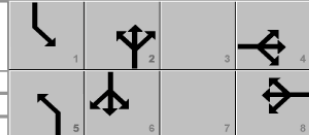
General Information						Intersection Information															
Agency						Duration, h		0.25													
Analyst						Analysis Date		2/27/2018		Area Type			Other								
Jurisdiction						Time Period		Peak PM Hour		PHF			0.92								
Urban Street		West Annex				Analysis Year		2041		Analysis Period			1> 7:00								
Intersection		Gore/Foster				File Name		2041_PM_OPTION 3.xus													
Project Description		West Annex - OPTION 2																			
Demand Information						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h						14	102	646	19	163	14	655	167	26	3	145	29				
Signal Information																					
Cycle, s		80.0	Reference Phase		2																
Offset, s		0	Reference Point		End																
Uncoordinated		No	Simult. Gap E/W		Off																
Force Mode		Fixed	Simult. Gap N/S		Off																
						Green	41.0	8.0	18.0	0.0	0.0	0.0									
						Yellow	3.0	0.0	3.0	0.0	0.0	0.0									
						Red	2.0	3.0	2.0	0.0	0.0	0.0									
Timer Results						EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase								4				8		5		2				6	
Case Number								7.0				8.0		1.0		4.0				8.3	
Phase Duration, s								23.0				23.0		11.0		57.0				46.0	
Change Period, (Y+R c), s								5.0				5.0		5.0		5.0				5.0	
Max Allow Headway (MAH), s								3.3				3.1		3.1		0.0				0.0	
Queue Clearance Time (g s), s								19.1				9.4		2.0							
Green Extension Time (g e), s								0.0				0.2		0.8		0.0				0.0	
Phase Call Probability								1.00				0.99		1.00							
Max Out Probability								1.00				0.00		0.70							
Movement Group Results						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement						7	4	14	3	8	18	5	2	12	1	6	16				
Adjusted Flow Rate (v), veh/h						126			376			202			712			193			
Adjusted Saturation Flow Rate (s), veh/h/ln						1847			1610			1849			1810			1879			
Queue Service Time (g s), s						0.0			17.1			0.0			0.0			3.2			
Cycle Queue Clearance Time (g c), s						4.4			17.1			7.4			0.0			3.2			
Green Ratio (g/C)						0.22			0.30			0.22			0.62			0.65			
Capacity (c), veh/h						466			483			466			862			1221			
Volume-to-Capacity Ratio (X)						0.271			0.779			0.434			0.826			0.158			
Back of Queue (Q), ft/ln (50 th percentile)						48.1			109.7			80.7			316.1			27.5			
Back of Queue (Q), veh/ln (50 th percentile)						1.9			4.4			3.2			12.6			1.1			
Queue Storage Ratio (RQ) (50 th percentile)						0.11			0.44			0.19			3.33			0.06			
Uniform Delay (d 1), s/veh						25.7			25.6			26.9			17.1			5.5			
Incremental Delay (d 2), s/veh						0.1			7.2			0.2			6.2			0.3			
Initial Queue Delay (d 3), s/veh						0.0			0.0			0.0			0.0			0.0			
Control Delay (d), s/veh						25.8			32.8			27.1			23.3			5.7			
Level of Service (LOS)						C			C			C			C			A			
Approach Delay, s/veh / LOS						31.1		C		27.1		C		19.5		B		9.7		A	
Intersection Delay, s/veh / LOS						22.6												C			
Multimodal Results						EB			WB			NB			SB						
Pedestrian LOS Score / LOS						1.95		B		1.70		B		1.65		B		2.37		B	
Bicycle LOS Score / LOS						1.32		A		0.82		A		1.98		B		0.81		A	

EXHIBIT 26

OPTION 3 - 2041 PEAK AM HOUR TRAFFIC – Sunset (Harris)/Wilson

HCS7 Signalized Intersection Results Summary

General Information										Intersection Information										
Agency										Duration, h		0.25								
Analyst						Analysis Date		2/27/2018		Area Type		Other								
Jurisdiction						Time Period		Peak AM Hour		PHF		0.92								
Urban Street		West Annex				Analysis Year		2041		Analysis Period		1> 7:00								
Intersection		Wilson/Sunset				File Name		2041_AM_OPTION 3.xus												
Project Description		West Annex - OPTION 3																		
Demand Information				EB			WB			NB			SB							
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R					
Demand (v), veh/h				189	11	314	8	50	11	193	454	5	7	535	147					
Signal Information																				
Cycle, s	90.0	Reference Phase	2																	
Offset, s	0	Reference Point	End																	
Uncoordinated	No	Simult. Gap E/W	Off																	
Force Mode	Fixed	Simult. Gap N/S	Off																	
				Green	6.0	46.7	20.8	0.0	0.0	0.0										
				Yellow	3.3	3.3	3.3	0.0	0.0	0.0										
				Red	1.7	2.4	2.5	0.0	0.0	0.0										
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT		
Assigned Phase						4				8		5		2		1		6		
Case Number						7.0				8.0		1.1		4.0		1.1		3.0		
Phase Duration, s						26.6				26.6		11.0		52.4		11.0		52.4		
Change Period, (Y+R c), s						5.8				5.8		5.0		5.7		5.0		5.7		
Max Allow Headway (MAH), s						3.3				3.1		3.1		0.0		3.1		0.0		
Queue Clearance Time (g s), s						19.9				4.8		5.3				2.1				
Green Extension Time (g e), s						0.9				0.1		0.3		0.0		0.0		0.0		
Phase Call Probability						1.00				0.83		1.00				1.00				
Max Out Probability						0.04				0.00		0.00				0.00				
Movement Group Results				EB			WB			NB			SB							
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R					
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16					
Adjusted Flow Rate (v), veh/h					217	330		72		210	499		8	582	51					
Adjusted Saturation Flow Rate (s), veh/h/ln					1382	1610		1829		1810	1896		1810	1900	1610					
Queue Service Time (g s), s					10.1	17.9		0.0		3.3	15.5		0.1	19.1	1.4					
Cycle Queue Clearance Time (g c), s					12.9	17.9		2.8		3.3	15.5		0.1	19.1	1.4					
Green Ratio (g/C)					0.23	0.23		0.23		0.72	0.52		0.72	0.52	0.52					
Capacity (c), veh/h					397	372		468		608	984		598	986	835					
Volume-to-Capacity Ratio (X)					0.547	0.888		0.153		0.345	0.507		0.013	0.590	0.061					
Back of Queue (Q), ft/ln (50 th percentile)					105.1	193.9		30.2		23.5	163.8		0.8	205.1	12.6					
Back of Queue (Q), veh/ln (50 th percentile)					4.2	7.8		1.2		0.9	6.6		0.0	8.2	0.5					
Queue Storage Ratio (RQ) (50 th percentile)					0.42	0.78		0.08		0.25	0.24		0.02	0.98	0.06					
Uniform Delay (d 1), s/veh					31.6	33.5		27.7		7.3	14.1		6.9	15.0	10.8					
Incremental Delay (d 2), s/veh					0.4	10.3		0.1		0.1	1.9		0.0	2.6	0.1					
Initial Queue Delay (d 3), s/veh					0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0					
Control Delay (d), s/veh					32.0	43.8		27.7		7.4	16.0		6.9	17.6	10.9					
Level of Service (LOS)					C	D		C		A	B		A	B	B					
Approach Delay, s/veh / LOS				39.1		D	27.7		C	13.5		B	16.9		B					
Intersection Delay, s/veh / LOS				22.3						C										
Multimodal Results				EB			WB			NB			SB							
Pedestrian LOS Score / LOS				1.93		B	2.26		B	1.67		B	1.91		B					
Bicycle LOS Score / LOS				1.39		A	0.61		A	1.66		B	1.54		B					

HCS7 Signalized Intersection Results Summary

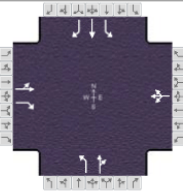
General Information						Intersection Information									
Agency						Duration, h		0.25							
Analyst				Analysis Date		2/27/2018		Area Type		Other					
Jurisdiction				Time Period		Peak PM Hour		PHF		0.92					
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00					
Intersection		Wilson/Sunset		File Name		2041_PM_OPTION 3.xus									
Project Description		West Annex - OPTION 3													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				251	37	267	8	32	30	316	803	1	13	702	191
Signal Information															
Cycle, s	90.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	No	Simult. Gap E/W	Off	Green	6.0	2.6	42.6	22.3	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	Off	Yellow	3.3	0.0	3.3	3.3	0.0	0.0					
				Red	1.7	0.0	2.4	2.5	0.0	0.0					
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					4		8	5	2	1	6				
Case Number					7.0		8.0	1.1	4.0	1.1	3.0				
Phase Duration, s					28.1		28.1	13.6	50.9	11.0	48.3				
Change Period, (Y+R c), s					5.8		5.8	5.0	5.7	5.0	5.7				
Max Allow Headway (MAH), s					3.3		3.2	3.1	0.0	3.1	0.0				
Queue Clearance Time (g s), s					21.3		4.9	8.3		2.2					
Green Extension Time (g e), s					0.9		0.1	0.4	0.0	0.0	0.0				
Phase Call Probability					1.00		0.84	1.00		1.00					
Max Out Probability					0.10		0.00	0.15		0.00					
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h					313	279		73		343	874		14	763	72
Adjusted Saturation Flow Rate (s), veh/h/ln					1410	1610		1780		1810	1900		1810	1900	1610
Queue Service Time (g s), s					16.4	14.2		0.0		6.3	38.1		0.2	31.8	2.2
Cycle Queue Clearance Time (g c), s					19.3	14.2		2.9		6.3	38.1		0.2	31.8	2.2
Green Ratio (g/C)					0.25	0.25		0.25		0.70	0.50		0.65	0.47	0.47
Capacity (c), veh/h					424	398		485		480	955		338	899	762
Volume-to-Capacity Ratio (X)					0.739	0.702		0.150		0.716	0.915		0.042	0.848	0.094
Back of Queue (Q), ft/ln (50 th percentile)					166.4	136.8		30		99.2	474.8		3.2	381.2	20.1
Back of Queue (Q), veh/ln (50 th percentile)					6.7	5.5		1.2		4.0	19.0		0.1	15.2	0.8
Queue Storage Ratio (RQ) (50 th percentile)					0.67	0.55		0.08		1.04	0.70		0.06	1.82	0.10
Uniform Delay (d 1), s/veh					32.8	30.8		26.6		15.7	20.6		15.8	20.9	13.1
Incremental Delay (d 2), s/veh					2.8	1.5		0.1		2.2	14.7		0.0	9.8	0.2
Initial Queue Delay (d 3), s/veh					0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh					35.6	32.4		26.6		17.9	35.3		15.8	30.6	13.3
Level of Service (LOS)					D	C		C		B	D		B	C	B
Approach Delay, s/veh / LOS				34.1		C	26.6		C	30.4		C	28.9		C
Intersection Delay, s/veh / LOS				30.6						C					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				1.93		B	2.30		B	1.67		B	1.91		B
Bicycle LOS Score / LOS				1.47		A	0.61		A	2.50		B	1.89		B

EXHIBIT 28

OPTION 3 - 2041 PEAK AM HOUR TRAFFIC – Dufferin (Highway 7)/Wilson

HCS7 Signalized Intersection Results Summary

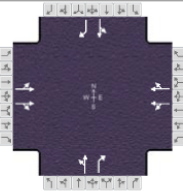
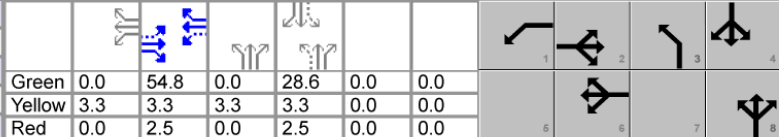
General Information						Intersection Information									
Agency						Duration, h		0.25							
Analyst		Analysis Date		4/24/2018		Area Type		Other							
Jurisdiction		Time Period		Peak AM Hour		PHF		0.92							
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00					
Intersection		Dufferin/Wilson		File Name		2041_AM_OPTION 3.xus									
Project Description		West Annex - OPTION 3													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				77	537	297	178	579	26	188	220	140	29	152	39
Signal Information															
Cycle, s	95.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	No	Simult. Gap E/W	On												
Force Mode	Fixed	Simult. Gap N/S	On												
				Green	0.0	54.8	0.0	28.6	0.0	0.0					
				Yellow	3.3	3.3	3.3	3.3	0.0	0.0					
				Red	0.0	2.5	0.0	2.5	0.0	0.0					
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					2	1	6	3	8		4				
Case Number					8.3	0.0	14.0	0.0	13.0		7.3				
Phase Duration, s					60.6	0.0	60.6	0.0	34.4		34.4				
Change Period, (Y+R c), s					5.8	3.3	5.8	3.3	5.8		5.8				
Max Allow Headway (MAH), s					0.0	0.0	0.0	0.0	3.2		3.2				
Queue Clearance Time (g s), s									26.9		9.7				
Green Extension Time (g e), s					0.0	0.0	0.0	0.0	1.7		1.8				
Phase Call Probability									1.00		1.00				
Max Out Probability									0.00		0.00				
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h				507		484	295		556		443	152		197	42
Adjusted Saturation Flow Rate (s), veh/h/ln				1297		1519	566		1687		1539	1585		1736	1610
Queue Service Time (g s), s				12.3		18.8	6.0		19.7		6.0	7.1		0.0	1.8
Cycle Queue Clearance Time (g c), s				32.1		18.8	27.9		19.7		24.9	7.1		7.7	1.8
Green Ratio (g/C)				0.58		0.58	0.58		0.58		0.30	0.30		0.30	0.30
Capacity (c), veh/h				792		877	389		973		518	477		566	484
Volume-to-Capacity Ratio (X)				0.639		0.552	0.759		0.571		0.855	0.319		0.347	0.088
Back of Queue (Q), ft/ln (50 th percentile)				216.5		158	180.2		183.1		252.5	66		84.7	16.8
Back of Queue (Q), veh/ln (50 th percentile)				8.7		6.3	7.2		7.3		10.1	2.6		3.4	0.7
Queue Storage Ratio (RQ) (50 th percentile)				0.00		0.00	0.00		0.00		0.00	0.00		0.00	0.00
Uniform Delay (d 1), s/veh				14.9		12.5	25.1		12.7		32.5	25.7		25.9	23.8
Incremental Delay (d 2), s/veh				3.9		2.5	13.0		2.4		4.3	0.1		0.1	0.0
Initial Queue Delay (d 3), s/veh				0.0		0.0	0.0		0.0		0.0	0.0		0.0	0.0
Control Delay (d), s/veh				18.9		15.0	38.2		15.1		36.7	25.8		26.0	23.9
Level of Service (LOS)				B		B	D		B		D	C		C	C
Approach Delay, s/veh / LOS				17.0		B	23.1		C		33.9	C		25.7	C
Intersection Delay, s/veh / LOS				23.5						C					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				1.88		B	1.88		B		2.11	B		2.11	B
Bicycle LOS Score / LOS				1.30		A	1.19		A		1.47	A		0.88	A

EXHIBIT 29

OPTION 3 - 2041 PEAK PM HOUR TRAFFIC – Dufferin (Highway 7)/Wilson

HCS7 Signalized Intersection Results Summary

General Information						Intersection Information													
Agency						Duration, h		0.25											
Analyst				Analysis Date		4/24/2018		Area Type		Other									
Jurisdiction				Time Period		Peak PM Hour		PHF		0.92									
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00									
Intersection		Dufferin/Wilson		File Name		2041_PM_OPTION 3.xus													
Project Description		West Annex - OPTION 3																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h				82	686	262	217	779	21	312	312	227	31	285	69				
Signal Information																			
Cycle, s	120.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	On																
Force Mode	Fixed	Simult. Gap N/S	On																
Green				0.0	64.2	0.0	44.2	0.0	0.0										
Yellow				3.3	3.3	3.3	3.3	0.0	0.0										
Red				0.0	2.5	0.0	2.5	0.0	0.0										
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase						2		1		6		3		8				4	
Case Number						8.3		0.0		14.0		0.0		13.0				7.3	
Phase Duration, s						70.0		0.0		70.0		0.0		50.0				50.0	
Change Period, (Y+R c), s						5.8		3.3		5.8		3.3		5.8				5.8	
Max Allow Headway (MAH), s						0.0		0.0		0.0		0.0		3.3				3.3	
Queue Clearance Time (g s), s														46.2				18.9	
Green Extension Time (g e), s						0.0		0.0		0.0		0.0		0.0				3.5	
Phase Call Probability														1.00				1.00	
Max Out Probability														1.00				0.01	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate (v), veh/h				542		578		355		750		678		247		343		75	
Adjusted Saturation Flow Rate (s), veh/h/ln				652		1563		384		1693		1162		1585		1788		1610	
Queue Service Time (g s), s				19.8		32.7		6.0		44.4		6.0		14.0		0.0		3.7	
Cycle Queue Clearance Time (g c), s				64.2		32.7		64.2		44.4		44.2		14.0		16.9		3.7	
Green Ratio (g/C)				0.53		0.53		0.54		0.54		0.37		0.37		0.37		0.37	
Capacity (c), veh/h				384		836		256		906		473		584		692		593	
Volume-to-Capacity Ratio (X)				1.413		0.691		1.390		0.828		1.434		0.423		0.497		0.126	
Back of Queue (Q), ft/ln (50 th percentile)				824.1		311		542.7		472.2		680.1		133.9		189.2		35.5	
Back of Queue (Q), veh/ln (50 th percentile)				33.0		12.4		21.7		18.9		27.2		5.3		7.6		1.4	
Queue Storage Ratio (RQ) (50 th percentile)				0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
Uniform Delay (d 1), s/veh				35.9		20.6		44.1		23.3		42.3		28.4		29.2		25.1	
Incremental Delay (d 2), s/veh				200.7		4.7		197.7		8.6		207.0		0.2		0.2		0.0	
Initial Queue Delay (d 3), s/veh				0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Control Delay (d), s/veh				236.6		25.2		241.8		31.9		249.3		28.5		29.4		25.1	
Level of Service (LOS)				F		C		F		C		F		C		C		C	
Approach Delay, s/veh / LOS				127.5		F		99.3		F		190.4		F		28.7		C	
Intersection Delay, s/veh / LOS				123.5						F									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.90		B		1.90		B		2.12		B		2.12		B	
Bicycle LOS Score / LOS				1.41		A		1.40		A		2.01		B		1.18		A	

MINIMUM WARRANTS FOR INSTALLATION OF TRAFFIC SIGNAL USING PROJECTED VOLUME

Location .. Sunset Boulevard and County Offices .. **of**
(Roadway) **(Intersecting Road)**

Municipality .. Town of Perth **Projected Volume** .. Year 2041

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT FOR 2 LANE HIGHWAYS		COMPLIANCE		
		2. FREE FLOW	3. RESTRICT. FLOW	SECTIONAL		4. ENTIRE %
				NUMBER	%	
1. VEHICULAR VOLUME	1. A. Vehicle volume all approaches (Average hour)	480	(720)	434	60	(50%)
	B. Vehicle volume, along minor roads, (Average hour)	120	(255) 170	127	50	
2. DELAY TO CROSS TRAFFIC	1. A. Vehicle volume, along artery (Average hour)	480	(720)	307	43	17%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads, (Average hour)	50	(75)	13	17	

Projected Average Hour - Use the sum of the AM and PM Peak volumes divided by 4

NOTES:

- Vehicle volume warrants (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction, should be 25% higher than the values given above.
- Warrant values for free flow apply when the 85 percentile speed of artery traffic equals or exceeds 70 Km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000.
- Warrant values for restricted flow apply to large urban communities when the 85 percentile speed of artery traffic does not exceed 70 Km/h.
- The lowest sectional percentage governs the entire Warrant.
- For "T" intersections the warrant values for minor road should be increased by 50 % (Warrant 1B only).
- The crossing volumes are defined as:
 - Left turns from both minor road approaches
 - The heaviest through volume from the minor road
 - 50% of the heavier left turn movement from major road when both of the following are met:
 - the left turn volume > 120 vph.
 - the left turn volume plus the opposing volume > 720 vph.
 - Pedestrians crossing the major road.

EXHIBIT 31

OPTION 3 - 2041 LEFT TURN LANE WARRANT – Sunset/Lanark County Office Access

TRAFFIC

$V_o = 225$ vph
 $V_A = 249$ vph
 $V_L = 138$ vph

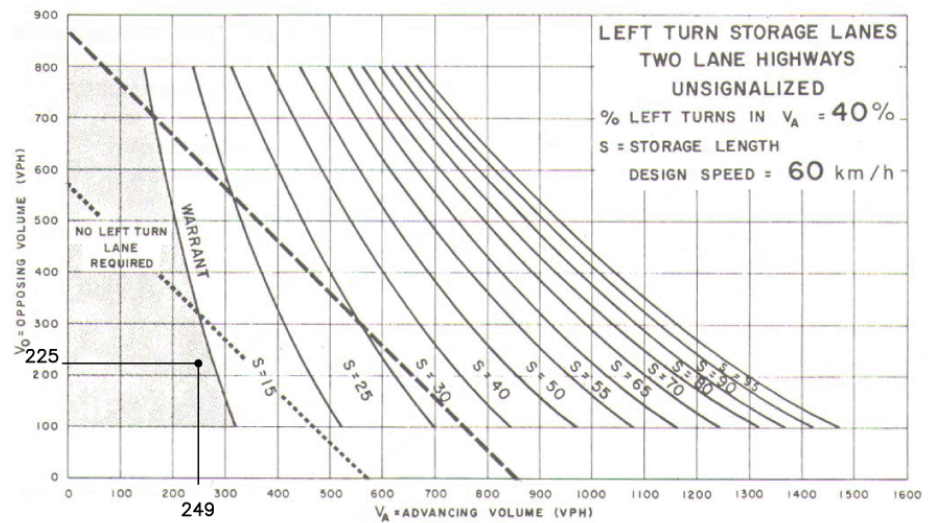
$$\frac{V_L}{V_A} = 55.4\%$$

POSTED SPEED
50 km/h

WARRANT

NO LEFT TURN
LANE REQUIRED

**WESTBOUND LEFT
PEAK AM HOUR**



--- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL
AREAS OR URBAN AREAS WITH RESTRICTED FLOW

..... TRAFFIC SIGNALS MAY BE WARRANTED IN
"FREE FLOW" URBAN AREAS

TRAFFIC

$V_o = 248$ vph
 $V_A = 504$ vph
 $V_L = 250$ vph

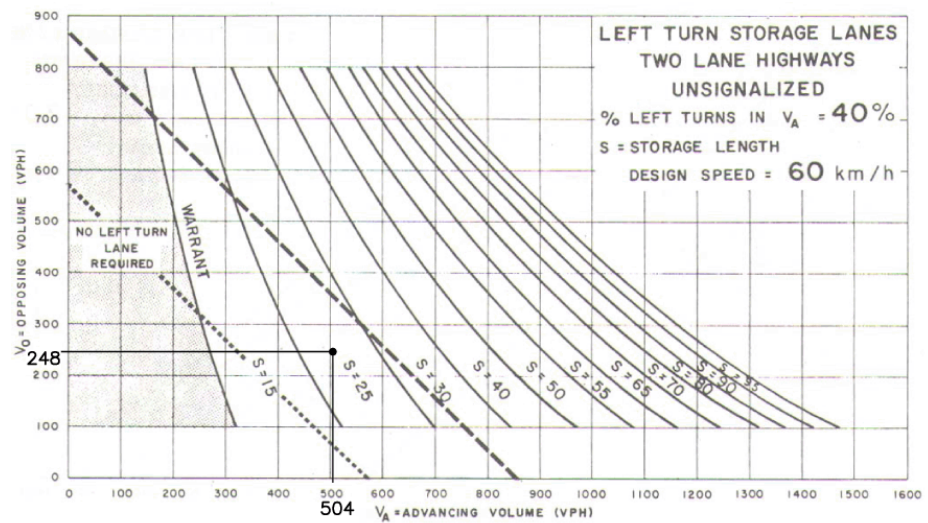
$$\frac{V_L}{V_A} = 49.6\%$$

POSTED SPEED
50 km/h

WARRANT

25m LEFT TURN
LANE REQUIRED

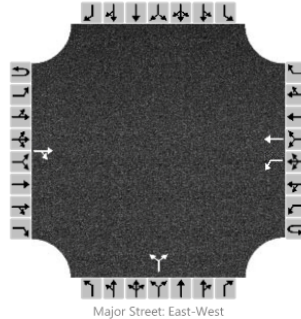
**WESTBOUND LEFT
PEAK PM HOUR**



HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst				Intersection		Sunset/County Offices	
Agency/Co.				Jurisdiction			
Date Performed		2/27/2018		East/West Street		Sunset Boulevard	
Analysis Year		2041		North/South Street		Lanark County Offices Acc	
Time Analyzed		Peak AM Hour		Peak Hour Factor		0.92	
Intersection Orientation		East-West		Analysis Time Period (hrs)		0.25	
Project Description		West Annex - OPTION 3					

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			216	9		138	111			28		263				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized		No				No				No				No		
Median Type/Storage				Undivided												

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)					150					316						
Capacity, c (veh/h)					1308					706						
v/c Ratio					0.11					0.45						
95% Queue Length, Q ₉₅ (veh)					0.4					2.3						
Control Delay (s/veh)					8.1					14.2						
Level of Service, LOS					A					B						
Approach Delay (s/veh)					4.5					14.2						
Approach LOS										B						

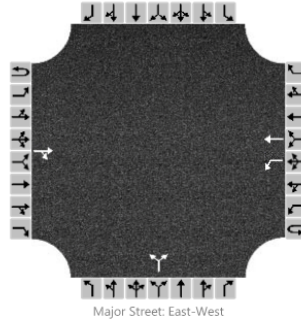
EXHIBIT 33

OPTION 3 - 2041 PEAK PM HOUR TRAFFIC – Sunset/Lanark County Office Access

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Sunset/County Offices
Agency/Co.		Jurisdiction	
Date Performed	2/27/2018	East/West Street	Sunset Boulevard
Analysis Year	2041	North/South Street	Lanark County Offices Acc
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	West Annex - OPTION 3		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			219	29		250	254			23		195				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1					7.1		6.2			
Critical Headway (sec)						4.12					6.42		6.22			
Base Follow-Up Headway (sec)						2.2					3.5		3.3			
Follow-Up Headway (sec)						2.22					3.52		3.32			

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						272					237					
Capacity, c (veh/h)						1281					578					
v/c Ratio						0.21					0.41					
95% Queue Length, Q ₉₅ (veh)						0.8					2.0					
Control Delay (s/veh)						8.6					15.5					
Level of Service, LOS						A					C					
Approach Delay (s/veh)					4.2				15.5							
Approach LOS									C							

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HCS7™ TWSC Version 7.4
2041_PM_OPTION 3.xtw

Generated: 4/26/2018 10:53:43 PM

EXHIBIT 34

OPTION 4 - 2041 PEAK AM HOUR TRAFFIC – Peter (Foster)/Wilson

HCS7 Signalized Intersection Results Summary

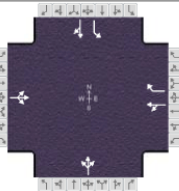
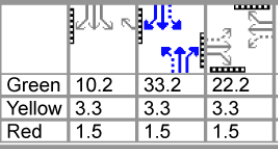
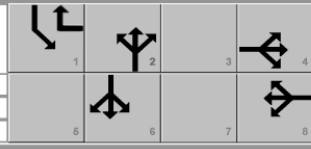
General Information						Intersection Information											
Agency						Duration, h		0.25									
Analyst				Analysis Date		2/27/2018		Area Type		Other							
Jurisdiction				Time Period		Peak AM Hour		PHF		0.92							
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00							
Intersection		Peter/Wilson		File Name		2041_AM_OPTION 4.xus											
Project Description		West Annex - OPTION 4															
Demand Information						EB			WB			NB			SB		
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h						164	264	4	7	33	437	4	30	10	389	57	82
Signal Information																	
Cycle, s	80.0	Reference Phase	2														
Offset, s	0	Reference Point	End														
Uncoordinated	No	Simult. Gap E/W	Off														
Force Mode	Fixed	Simult. Gap N/S	Off														
Green	10.2	33.2	22.2	0.0	0.0	0.0											
Yellow	3.3	3.3	3.3	0.0	0.0	0.0											
Red	1.5	1.5	1.5	0.0	0.0	0.0											
Timer Results						EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase							4		8		2	1	6				
Case Number							8.0		7.0		8.3	1.0	4.0				
Phase Duration, s							27.0		27.0		38.0	15.0	53.0				
Change Period, (Y+R c), s							4.8		4.8		4.8	4.8	4.8				
Max Allow Headway (MAH), s							3.1		3.3		0.0	3.1	0.0				
Queue Clearance Time (g s), s							24.2		11.1			9.5					
Green Extension Time (g e), s							0.0		0.5		0.0	0.7	0.0				
Phase Call Probability							1.00		1.00			1.00					
Max Out Probability							1.00		0.00			0.00					
Movement Group Results						EB			WB			NB			SB		
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement						7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h							470		43	258		48			423	129	
Adjusted Saturation Flow Rate (s), veh/h/ln							1677		1691	1610		1784			1810	1737	
Queue Service Time (g s), s							20.8		0.0	9.1		0.0			7.5	2.6	
Cycle Queue Clearance Time (g c), s							22.2		1.4	9.1		1.2			7.5	2.6	
Green Ratio (g/C)							0.28		0.28	0.41		0.41			0.69	0.60	
Capacity (c), veh/h							527		522	652		901			1073	1047	
Volume-to-Capacity Ratio (X)							0.890		0.083	0.395		0.053			0.394	0.124	
Back of Queue (Q), ft/ln (50 th percentile)							272		14.5	78.1		12.3			51.4	21.8	
Back of Queue (Q), veh/ln (50 th percentile)							10.9		0.6	3.1		0.5			2.1	0.9	
Queue Storage Ratio (RQ) (50 th percentile)							0.64		0.03	0.82		0.03			0.30	0.13	
Uniform Delay (d 1), s/veh							28.9		21.4	16.9		12.5			5.0	6.8	
Incremental Delay (d 2), s/veh							16.6		0.0	0.1		0.1			0.1	0.2	
Initial Queue Delay (d 3), s/veh							0.0		0.0	0.0		0.0			0.0	0.0	
Control Delay (d), s/veh							45.5		21.4	17.0		12.6			5.1	7.1	
Level of Service (LOS)							D		C	B		B			A	A	
Approach Delay, s/veh / LOS						45.5	D	17.6	B	12.6	B	5.6	A				
Intersection Delay, s/veh / LOS						22.2						C					
Multimodal Results						EB			WB			NB			SB		
Pedestrian LOS Score / LOS						1.69	B	1.95	B	2.19	B	1.65	B				
Bicycle LOS Score / LOS						1.26	A	0.98	A	0.57	A	1.40	A				

EXHIBIT 35

OPTION 4 - 2041 PEAK PM HOUR TRAFFIC – Peter (Foster)/Wilson

HCS7 Signalized Intersection Results Summary

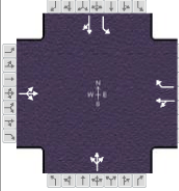
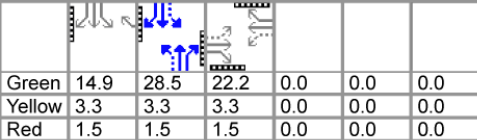
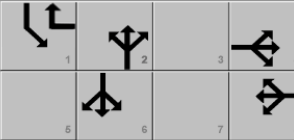
General Information					Intersection Information												
Agency					Duration, h		0.25										
Analyst					Analysis Date		2/27/2018							Area Type		Other	
Jurisdiction					Time Period		Peak PM Hour							PHF		0.92	
Urban Street		West Annex			Analysis Year		2041							Analysis Period		1> 7:00	
Intersection		Peter/Wilson			File Name		2041_PM_OPTION 4.xus										
Project Description		West Annex - OPTION 4															
Demand Information					EB			WB			NB			SB			
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), veh/h					143	171	8	24	42	784	4	76	23	547	82	32	
Signal Information																	
Cycle, s	80.0	Reference Phase	2														
Offset, s	0	Reference Point	End														
Uncoordinated	No	Simult. Gap E/W	Off														
Force Mode	Fixed	Simult. Gap N/S	Off														
Green	14.9	28.5	22.2	0.0	0.0	0.0											
Yellow	3.3	3.3	3.3	0.0	0.0	0.0											
Red	1.5	1.5	1.5	0.0	0.0	0.0											
Timer Results					EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT					
Assigned Phase						4		8		2	1	6					
Case Number						8.0		7.0		8.3	1.0	4.0					
Phase Duration, s						27.0		27.0		33.3	19.7	53.0					
Change Period, (Y+R _c), s						4.8		4.8		4.8	4.8	4.8					
Max Allow Headway (MAH), s						3.1		3.4		0.0	3.1	0.0					
Queue Clearance Time (g _s), s						17.6		24.2			14.0						
Green Extension Time (g _e), s						0.3		0.0		0.0	0.9	0.0					
Phase Call Probability						1.00		1.00			1.00						
Max Out Probability						0.32		1.00			0.13						
Movement Group Results					EB			WB			NB			SB			
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R	
Assigned Movement					7	4	14	3	8	18	5	2	12	1	6	16	
Adjusted Flow Rate (v), veh/h						350			72	743		112		595	102		
Adjusted Saturation Flow Rate (s), veh/h/ln						1640			1538	1610		1816		1810	1857		
Queue Service Time (g _s), s						13.3			0.0	22.2		0.0		12.0	1.9		
Cycle Queue Clearance Time (g _c), s						15.6			2.3	22.2		3.3		12.0	1.9		
Green Ratio (g/C)						0.28			0.28	0.46		0.36		0.69	0.60		
Capacity (c), veh/h						520			488	747		806		1033	1119		
Volume-to-Capacity Ratio (X)						0.673			0.147	0.995		0.139		0.576	0.091		
Back of Queue (Q), ft/ln (50 th percentile)						154			24.3	467.2		34.5		83.3	16.8		
Back of Queue (Q), veh/ln (50 th percentile)						6.2			1.0	18.7		1.4		3.3	0.7		
Queue Storage Ratio (RQ) (50 th percentile)						0.36			0.06	4.92		0.08		0.49	0.10		
Uniform Delay (d ₁), s/veh						26.4			21.7	21.3		16.0		6.0	6.7		
Incremental Delay (d ₂), s/veh						2.8			0.1	31.6		0.4		0.2	0.2		
Initial Queue Delay (d ₃), s/veh						0.0			0.0	0.0		0.0		0.0	0.0		
Control Delay (d), s/veh						29.2			21.8	52.9		16.4		6.2	6.8		
Level of Service (LOS)						C			C	D		B		A	A		
Approach Delay, s/veh / LOS					29.2	C	50.2	D	16.4	B	6.3	A					
Intersection Delay, s/veh / LOS					29.0					C							
Multimodal Results					EB			WB			NB			SB			
Pedestrian LOS Score / LOS					1.69	B	1.95	B	2.05	B	1.65	B					
Bicycle LOS Score / LOS					1.07	A	1.83	B	0.67	A	1.64	B					

EXHIBIT 36

OPTION 4 - 2041 PEAK AM HOUR TRAFFIC – Foster/Gore

HCS7 Signalized Intersection Results Summary

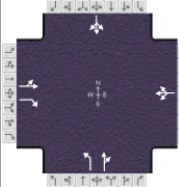
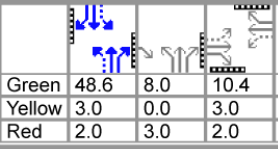
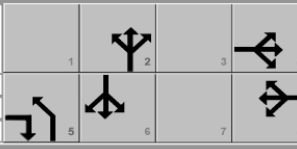
General Information					Intersection Information														
Agency				Duration, h					0.25										
Analyst			Analysis Date		2/27/2018		Area Type		Other										
Jurisdiction			Time Period		Peak AM Hour		PHF		0.92										
Urban Street		West Annex		Analysis Year		2041		Analysis Period							1> 7:00				
Intersection		Gore/Foster		File Name		2041_AM_OPTION 4.xus													
Project Description		West Annex - OPTION 4																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h				13	163	464	16	54	10	405	160	16	3	127	13				
Signal Information																			
Cycle, s	80.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	Off																
Force Mode	Fixed	Simult. Gap N/S	Off																
Green	48.6	8.0	10.4	0.0	0.0	0.0													
Yellow	3.0	0.0	3.0	0.0	0.0	0.0													
Red	2.0	3.0	2.0	0.0	0.0	0.0													
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT								
Assigned Phase					4		8	5	2		6								
Case Number					7.0		8.0	1.0	4.0		8.3								
Phase Duration, s					15.4		15.4	11.0	64.6		53.6								
Change Period, (Y+R c), s					5.0		5.0	5.0	5.0		5.0								
Max Allow Headway (MAH), s					3.2		3.1	3.1	0.0		0.0								
Queue Clearance Time (g s), s					9.9		4.9	2.0											
Green Extension Time (g e), s					0.5		0.1	0.4	0.0		0.0								
Phase Call Probability					1.00		0.82	1.00											
Max Out Probability					0.03		0.00	0.57											
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16				
Adjusted Flow Rate (v), veh/h					191	178		76		440	175		155						
Adjusted Saturation Flow Rate (s), veh/h/ln					1873	1610		1779		1810	1898		1864						
Queue Service Time (g s), s					2.8	7.9		0.0		0.0	2.1		0.0						
Cycle Queue Clearance Time (g c), s					7.9	7.9		2.9		0.0	2.1		2.8						
Green Ratio (g/C)					0.13	0.21		0.13		0.72	0.74		0.61						
Capacity (c), veh/h					292	330		287		1025	1413		1294						
Volume-to-Capacity Ratio (X)					0.655	0.539		0.265		0.429	0.124		0.120						
Back of Queue (Q), ft/ln (50 th percentile)					88.1	74		32.5		67.1	14.2		23.3						
Back of Queue (Q), veh/ln (50 th percentile)					3.5	3.0		1.3		2.7	0.6		0.9						
Queue Storage Ratio (RQ) (50 th percentile)					0.21	0.30		0.08		0.71	0.03		0.14						
Uniform Delay (d 1), s/veh					33.7	28.4		31.5		6.1	2.9		5.7						
Incremental Delay (d 2), s/veh					0.9	0.5		0.2		0.1	0.2		0.2						
Initial Queue Delay (d 3), s/veh					0.0	0.0		0.0		0.0	0.0		0.0						
Control Delay (d), s/veh					34.6	28.9		31.7		6.2	3.1		5.9						
Level of Service (LOS)					C	C		C		A	A		A						
Approach Delay, s/veh / LOS				31.9	C		31.7	C		5.3	A		5.9	A					
Intersection Delay, s/veh / LOS				15.1						B									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.96	B		1.71	B		1.62	B		2.37	B					
Bicycle LOS Score / LOS				1.10	A		0.61	A		1.50	B		0.74	A					

EXHIBIT 37

OPTION 4 - 2041 PEAK PM HOUR TRAFFIC – Foster/Gore

HCS7 Signalized Intersection Results Summary

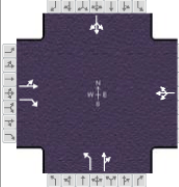
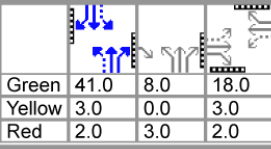
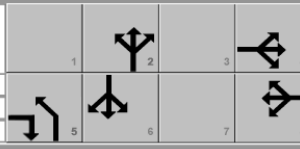
General Information					Intersection Information																					
Agency					Duration, h		0.25																			
Analyst					Analysis Date		2/27/2018																			
Jurisdiction					Time Period		Peak PM Hour																			
Urban Street		West Annex			Analysis Year		2041																			
Intersection		Gore/Foster			File Name		2041_PM_OPTION 4.xus																			
Project Description		West Annex - OPTION 4																								
Demand Information					EB			WB			NB			SB												
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R										
Demand (v), veh/h					14	102	646	19	163	14	655	167	26	3	145	29										
Signal Information																										
Cycle, s	80.0	Reference Phase	2																							
Offset, s	0	Reference Point	End																							
Uncoordinated	No	Simult. Gap E/W	Off	Green	41.0	8.0	18.0	0.0	0.0	0.0																
				Yellow	3.0	0.0	3.0	0.0	0.0	0.0																
				Red	2.0	3.0	2.0	0.0	0.0	0.0																
Force Mode	Fixed	Simult. Gap N/S	Off																							
Timer Results					EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT							
Assigned Phase							4				8		5		2				6							
Case Number							7.0				8.0		1.0		4.0				8.3							
Phase Duration, s							23.0				23.0		11.0		57.0				46.0							
Change Period, (Y+R c), s							5.0				5.0		5.0		5.0				5.0							
Max Allow Headway (MAH), s							3.3				3.1		3.1		0.0				0.0							
Queue Clearance Time (g s), s							19.1				9.4		2.0													
Green Extension Time (g e), s							0.0				0.2		0.8		0.0				0.0							
Phase Call Probability							1.00				0.99		1.00													
Max Out Probability							1.00				0.00		0.70													
Movement Group Results					EB			WB			NB			SB												
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R										
Assigned Movement					7	4	14	3	8	18	5	2	12	1	6	16										
Adjusted Flow Rate (v), veh/h						126	376		202		712	193			192											
Adjusted Saturation Flow Rate (s), veh/h/ln						1847	1610		1849		1810	1879			1841											
Queue Service Time (g s), s						0.0	17.1		0.0		0.0	3.2			0.0											
Cycle Queue Clearance Time (g c), s						4.4	17.1		7.4		0.0	3.2			4.5											
Green Ratio (g/C)						0.22	0.30		0.22		0.62	0.65			0.51											
Capacity (c), veh/h						466	483		466		862	1221			1104											
Volume-to-Capacity Ratio (X)						0.271	0.779		0.434		0.826	0.158			0.174											
Back of Queue (Q), ft/ln (50 th percentile)						48.1	109.7		80.7		316.1	27.5			42.4											
Back of Queue (Q), veh/ln (50 th percentile)						1.9	4.4		3.2		12.6	1.1			1.7											
Queue Storage Ratio (RQ) (50 th percentile)						0.11	0.44		0.19		3.33	0.06			0.25											
Uniform Delay (d 1), s/veh						25.7	25.6		26.9		17.1	5.5			9.4											
Incremental Delay (d 2), s/veh						0.1	7.2		0.2		6.2	0.3			0.3											
Initial Queue Delay (d 3), s/veh						0.0	0.0		0.0		0.0	0.0			0.0											
Control Delay (d), s/veh						25.8	32.8		27.1		23.3	5.7			9.7											
Level of Service (LOS)						C	C		C		C	A			A											
Approach Delay, s/veh / LOS					31.1		C	27.1		C	19.5		B	9.7		A										
Intersection Delay, s/veh / LOS					22.6						C															
Multimodal Results					EB			WB			NB			SB												
Pedestrian LOS Score / LOS					1.95		B	1.70		B	1.65		B	2.37		B										
Bicycle LOS Score / LOS					1.32		A	0.82		A	1.98		B	0.81		A										

EXHIBIT 38

OPTION 4 - 2041 TRAFFIC SIGNAL WARRANT – North/Wilson

MINIMUM WARRANTS FOR INSTALLATION OF TRAFFIC SIGNAL USING PROJECTED VOLUME

Location .. Wilson Street and North Street .. **of**
(Roadway)
(Intersecting Road)

Municipality .. Town of Perth **Projected Volume** .. Year 2041 ..

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT FOR 2 LANE HIGHWAYS		COMPLIANCE		
		2. FREE FLOW	3. RESTRICT. FLOW	SECTIONAL		4. ENTIRE %
				NUMBER	%	
1. VEHICULAR VOLUME	1. A. Vehicle volume all approaches (Average hour)	480	(720)	859	100	(31%)
	B. Vehicle volume, along minor roads, (Average hour)	120	(170)	53	31	
2. DELAY TO CROSS TRAFFIC	1. A. Vehicle volume, along artery (Average hour)	480	(720)	806	100	11%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads, (Average hour)	50	(75)	8	11	

Projected Average Hour - Use the sum of the AM and PM Peak volumes divided by 4

NOTES:

1. Vehicle volume warrants (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction, should be 25% higher than the values given above.
2. Warrant values for free flow apply when the 85 percentile speed of artery traffic equals or exceeds 70 Km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000.
3. Warrant values for restricted flow apply to large urban communities when the 85 percentile speed of artery traffic does not exceed 70 Km/h.
4. The lowest sectional percentage governs the entire Warrant.
5. For "T" intersections the warrant values for minor road should be increased by 50 % (Warrant 1B only).
6. The crossing volumes are defined as:
 - (a) Left turns from both minor road approaches
 - (b) The heaviest through volume from the minor road
 - (c) 50% of the heavier left turn movement from major road when both of the following are met:
 - (i) the left turn volume > 120 vph.
 - (ii) the left turn volume plus the opposing volume > 720 vph.
 - (d) Pedestrians crossing the major road.

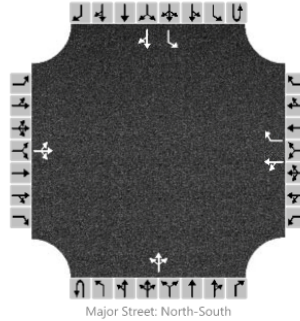
EXHIBIT 39

OPTION 4 - 2041 PEAK AM HOUR TRAFFIC – North/Wilson

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Wilson/North
Agency/Co.		Jurisdiction	
Date Performed	2/27/2018	East/West Street	North Street
Analysis Year	2041	North/South Street	Wilson Street
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	West Annex - OPTION 4		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	1	0	0	1	0	0	1	1	0
Configuration			LTR			LT		R			LTR			L		TR
Volume, V (veh/h)		5	4	11		7	3	50		82	598	17		83	519	60
Percent Heavy Vehicles (%)		2	2	2		2	2	3		2				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.12	6.52	6.22		7.12	6.52	6.23		4.12				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.52	4.02	3.32		3.52	4.02	3.33		2.22				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			22			11		54		89				90		
Capacity, c (veh/h)			123			67		462		953				916		
v/c Ratio			0.18			0.16		0.12		0.09				0.10		
95% Queue Length, Q ₉₅ (veh)			0.6			0.5		0.4		0.3				0.3		
Control Delay (s/veh)			40.3			69.2		13.8		9.2				9.4		
Level of Service, LOS			E			F		B		A				A		
Approach Delay (s/veh)	40.3				23.1				2.3				1.2			
Approach LOS	E				C											

EXHIBIT 40

OPTION 4 - 2041 PEAK PM HOUR TRAFFIC – North/Wilson

HCS7 Two-Way Stop-Control Report

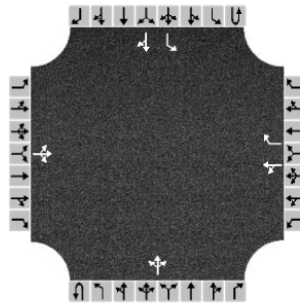
General Information

Analyst	
Agency/Co.	
Date Performed	2/27/2018
Analysis Year	2041
Time Analyzed	Peak PM Hour
Intersection Orientation	North-South
Project Description	West Annex - OPTION 4

Site Information

Intersection	Wilson/North
Jurisdiction	
East/West Street	North Street
North/South Street	Wilson Street
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	1	0	0	1	0	0	1	1	0
Configuration			LTR			LT		R			LTR			L		TR
Volume, V (veh/h)		5	3	20		5	6	93		233	723	18		71	686	134
Percent Heavy Vehicles (%)		2	2	2		2	2	3		2				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.12	6.52	6.22		7.12	6.52	6.23		4.12				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.52	4.02	3.32		3.52	4.02	3.33		2.22				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			30			12		101		253				77		
Capacity, c (veh/h)			25			12		385		760				814		
v/c Ratio			1.20			1.01		0.26		0.33				0.09		
95% Queue Length, Q ₉₅ (veh)			3.7			2.1		1.0		1.5				0.3		
Control Delay (s/veh)			473.3			686.5		17.6		12.1				9.9		
Level of Service, LOS			F			F		C		B				A		
Approach Delay (s/veh)	473.3					88.4				8.5				0.8		
Approach LOS	F					F										

EXHIBIT 41

OPTION 4 - 2041 PEAK AM HOUR TRAFFIC – Sunset (Harris)/Wilson

HCS7 Signalized Intersection Results Summary

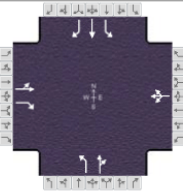
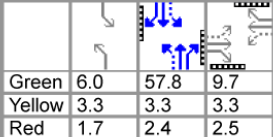
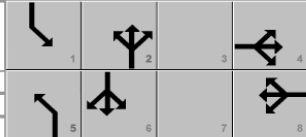
General Information						Intersection Information												
Agency						Duration, h	0.25											
Analyst					Analysis Date	2/27/2018		Area Type	Other									
Jurisdiction					Time Period	Peak AM Hour		PHF	0.92									
Urban Street	West Annex				Analysis Year	2041		Analysis Period	1> 7:00									
Intersection	Wilson/Sunset				File Name	2041_AM_OPTION 4.xus												
Project Description	West Annex - OPTION 1																	
Demand Information						EB			WB			NB			SB			
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), veh/h						101	11	82	8	50	11	159	525	5	7	591	148	
Signal Information																		
Cycle, s	90.0	Reference Phase	2															
Offset, s	0	Reference Point	End	Green	6.0			57.8	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	3.3			3.3	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	Off	Red	1.7			2.4	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Timer Results						EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT					
Assigned Phase							4		8	5	2	1	6					
Case Number							7.0		8.0	1.1	4.0	1.1	3.0					
Phase Duration, s							15.5		15.5	11.0	63.5	11.0	63.5					
Change Period, (Y+R c), s							5.8		5.8	5.0	5.7	5.0	5.7					
Max Allow Headway (MAH), s							3.2		3.1	3.1	0.0	3.1	0.0					
Queue Clearance Time (g s), s							9.6		5.2	3.5		2.1						
Green Extension Time (g e), s							0.2		0.1	0.2	0.0	0.0	0.0					
Phase Call Probability							0.99		0.83	1.00		1.00						
Max Out Probability							0.28		0.00	0.01		0.00						
Movement Group Results						EB			WB			NB			SB			
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R	
Assigned Movement						7	4	14	3	8	18	5	2	12	1	6	16	
Adjusted Flow Rate (v), veh/h							122	78		72		173	576		8	642	52	
Adjusted Saturation Flow Rate (s), veh/h/ln							1399	1610		1835		1810	1897		1810	1900	1610	
Queue Service Time (g s), s							4.4	4.1		0.0		1.5	14.1		0.1	16.5	1.1	
Cycle Queue Clearance Time (g c), s							7.6	4.1		3.2		1.5	14.1		0.1	16.5	1.1	
Green Ratio (g/C)							0.11	0.11		0.11		0.84	0.64		0.84	0.64	0.64	
Capacity (c), veh/h							227	174		243		650	1217		761	1219	1033	
Volume-to-Capacity Ratio (X)							0.535	0.449		0.295		0.266	0.473		0.010	0.527	0.050	
Back of Queue (Q), ft/ln (50 th percentile)							65.1	40.2		36.2		22.2	132.4		0.3	155.7	8.6	
Back of Queue (Q), veh/ln (50 th percentile)							2.6	1.6		1.4		0.9	5.3		0.0	6.2	0.3	
Queue Storage Ratio (RQ) (50 th percentile)							0.26	0.16		0.09		0.23	0.19		0.01	0.74	0.04	
Uniform Delay (d 1), s/veh							39.2	37.6		37.2		5.8	8.3		2.6	8.7	6.0	
Incremental Delay (d 2), s/veh							0.7	0.7		0.2		0.1	1.3		0.0	1.6	0.1	
Initial Queue Delay (d 3), s/veh							0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0	
Control Delay (d), s/veh							39.9	38.3		37.5		5.9	9.6		2.6	10.4	6.1	
Level of Service (LOS)							D	D		D		A	A		A	B	A	
Approach Delay, s/veh / LOS						39.3	D		37.5	D		8.8	A		10.0	A		
Intersection Delay, s/veh / LOS						14.0						B						
Multimodal Results						EB			WB			NB			SB			
Pedestrian LOS Score / LOS						1.94	B		2.27	B		1.65	B		1.88	B		
Bicycle LOS Score / LOS						0.82	A		0.61	A		1.72	B		1.65	B		

EXHIBIT 42

OPTION 4 - 2041 PEAK PM HOUR TRAFFIC – Sunset (Harris)/Wilson

HCS7 Signalized Intersection Results Summary

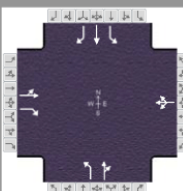
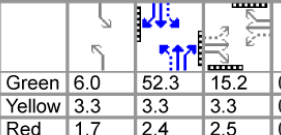
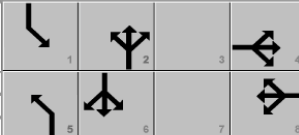
General Information										Intersection Information									
Agency								Duration, h		0.25									
Analyst				Analysis Date		2/27/2018		Area Type		Other									
Jurisdiction				Time Period		Peak PM Hour		PHF		0.92									
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00									
Intersection		Wilson/Sunset		File Name		2041_PM_OPTION 4.xus													
Project Description		West Annex - OPTION 4																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h				198	37	127	8	32	30	153	844	1	13	843	207				
Signal Information																			
Cycle, s	90.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	Off																
Force Mode	Fixed	Simult. Gap N/S	Off																
				Green	6.0	52.3	15.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
				Yellow	3.3	3.3	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
				Red	1.7	2.4	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase						4				8		5		2		1		6	
Case Number						7.0				8.0		1.1		4.0		1.1		3.0	
Phase Duration, s						21.0				21.0		11.0		58.0		11.0		58.0	
Change Period, (Y+R c), s						5.8				5.8		5.0		5.7		5.0		5.7	
Max Allow Headway (MAH), s						3.2				3.2		3.1		0.0		3.1		0.0	
Queue Clearance Time (g s), s						17.2				5.2		4.0				2.2			
Green Extension Time (g e), s						0.0				0.1		0.1		0.0		0.0		0.0	
Phase Call Probability						1.00				0.84		1.00				1.00			
Max Out Probability						1.00				0.00		1.00				0.19			
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16				
Adjusted Flow Rate (v), veh/h					255	127		73			166	918		14	916	89			
Adjusted Saturation Flow Rate (s), veh/h/ln					1423	1610		1791			1810	1900		1810	1900	1610			
Queue Service Time (g s), s					12.0	6.4		0.0			2.0	35.3		0.2	35.1	2.2			
Cycle Queue Clearance Time (g c), s					15.2	6.4		3.2			2.0	35.3		0.2	35.1	2.2			
Green Ratio (g/C)					0.17	0.17		0.17			0.78	0.58		0.78	0.58	0.58			
Capacity (c), veh/h					314	272		347			406	1104		452	1104	936			
Volume-to-Capacity Ratio (X)					0.814	0.468		0.210			0.410	0.832		0.031	0.830	0.095			
Back of Queue (Q), ft/ln (50 th percentile)					168.2	61.7		33.8			52.8	383.6		2.7	380.9	18.6			
Back of Queue (Q), veh/ln (50 th percentile)					6.7	2.5		1.4			2.1	15.3		0.1	15.2	0.7			
Queue Storage Ratio (RQ) (50 th percentile)					0.67	0.25		0.08			0.56	0.56		0.05	1.81	0.09			
Uniform Delay (d 1), s/veh					37.9	33.7		32.4			17.1	15.3		10.1	15.3	8.4			
Incremental Delay (d 2), s/veh					14.1	0.5		0.1			0.2	7.4		0.0	7.3	0.2			
Initial Queue Delay (d 3), s/veh					0.0	0.0		0.0			0.0	0.0		0.0	0.0	0.0			
Control Delay (d), s/veh					51.9	34.2		32.5			17.4	22.6		10.1	22.5	8.6			
Level of Service (LOS)					D	C		C			B	C		B	C	A			
Approach Delay, s/veh / LOS				46.0		D		32.5		C		21.8		C		21.1		C	
Intersection Delay, s/veh / LOS				25.5										C					
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.94		B		2.30		B		1.66		B		1.89		B	
Bicycle LOS Score / LOS				1.12		A		0.61		A		2.28		B		2.17		B	

EXHIBIT 43

OPTION 4 - 2041 PEAK AM HOUR TRAFFIC – Dufferin (Highway 7)/Wilson

HCS7 Signalized Intersection Results Summary

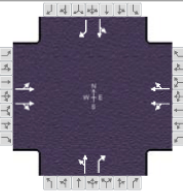
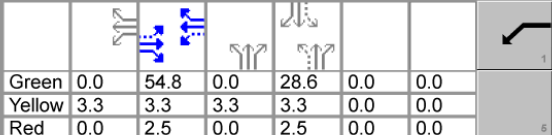
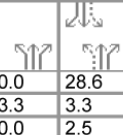
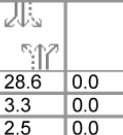
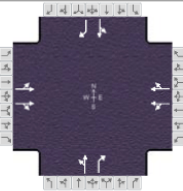
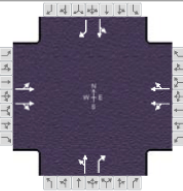
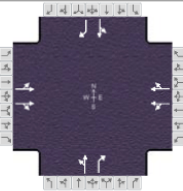
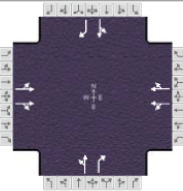
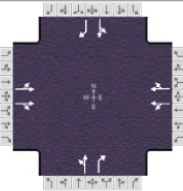
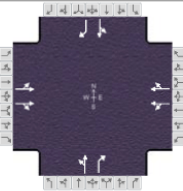
General Information						Intersection Information											
Agency						Duration, h		0.25									
Analyst				Analysis Date		4/24/2018		Area Type		Other							
Jurisdiction				Time Period		Peak AM Hour		PHF		0.92							
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00							
Intersection		Dufferin/Wilson		File Name		2041_AM_OPTION 4.xus											
Project Description		West Annex - OPTION 4															
Demand Information				EB			WB			NB			SB				
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R		
Demand (v), veh/h				77	537	297	178	579	26	188	220	140	29	152	39		
Signal Information																	
Cycle, s	95.0	Reference Phase	2														
Offset, s	0	Reference Point	End														
Uncoordinated	No	Simult. Gap E/W	On														
Force Mode	Fixed	Simult. Gap N/S	On														
Green				0.0	54.8	0.0	28.6	0.0	0.0								
Yellow				3.3	3.3	3.3	3.3	0.0	0.0								
Red				0.0	2.5	0.0	2.5	0.0	0.0								
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT						
Assigned Phase					2	1	6	3	8		4						
Case Number					8.3	0.0	14.0	0.0	13.0		7.3						
Phase Duration, s					60.6	0.0	60.6	0.0	34.4		34.4						
Change Period, (Y+R c), s					5.8	3.3	5.8	3.3	5.8		5.8						
Max Allow Headway (MAH), s					0.0	0.0	0.0	0.0	3.2		3.2						
Queue Clearance Time (g s), s									26.9		9.7						
Green Extension Time (g e), s					0.0	0.0	0.0	0.0	1.7		1.8						
Phase Call Probability									1.00		1.00						
Max Out Probability									0.00		0.00						
Movement Group Results				EB			WB			NB			SB				
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R		
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14		
Adjusted Flow Rate (v), veh/h				507		484	295		556		443	152		197	42		
Adjusted Saturation Flow Rate (s), veh/h/ln				1297		1519	566		1687		1539	1585		1736	1610		
Queue Service Time (g s), s				12.3		18.8	6.0		19.7		6.0	7.1		0.0	1.8		
Cycle Queue Clearance Time (g c), s				32.1		18.8	27.9		19.7		24.9	7.1		7.7	1.8		
Green Ratio (g/C)				0.58		0.58	0.58		0.58		0.30	0.30		0.30	0.30		
Capacity (c), veh/h				792		877	389		973		518	477		566	484		
Volume-to-Capacity Ratio (X)				0.639		0.552	0.759		0.571		0.855	0.319		0.347	0.088		
Back of Queue (Q), ft/ln (50 th percentile)				216.5		158	180.2		183.1		252.5	66		84.7	16.8		
Back of Queue (Q), veh/ln (50 th percentile)				8.7		6.3	7.2		7.3		10.1	2.6		3.4	0.7		
Queue Storage Ratio (RQ) (50 th percentile)				0.00		0.00	0.00		0.00		0.00	0.00		0.00	0.00		
Uniform Delay (d 1), s/veh				14.9		12.5	25.1		12.7		32.5	25.7		25.9	23.8		
Incremental Delay (d 2), s/veh				3.9		2.5	13.0		2.4		4.3	0.1		0.1	0.0		
Initial Queue Delay (d 3), s/veh				0.0		0.0	0.0		0.0		0.0	0.0		0.0	0.0		
Control Delay (d), s/veh				18.9		15.0	38.2		15.1		36.7	25.8		26.0	23.9		
Level of Service (LOS)				B		B	D		B		D	C		C	C		
Approach Delay, s/veh / LOS				17.0		B	23.1		C		33.9	C		25.7	C		
Intersection Delay, s/veh / LOS				23.5						C							
Multimodal Results				EB			WB			NB			SB				
Pedestrian LOS Score / LOS				1.88		B	1.88		B	2.11		B	2.11		B		
Bicycle LOS Score / LOS				1.30		A	1.19		A	1.47		A	0.88		A		

EXHIBIT 44

OPTION 4 - 2041 PEAK PM HOUR TRAFFIC – Dufferin (Highway 7)/Wilson

HCS7 Signalized Intersection Results Summary

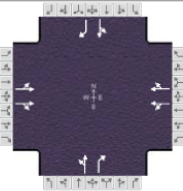
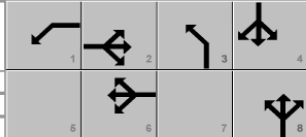
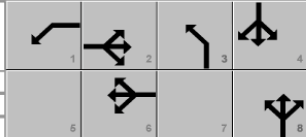
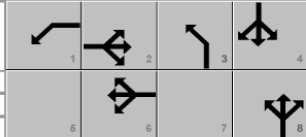
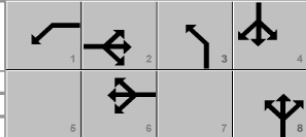
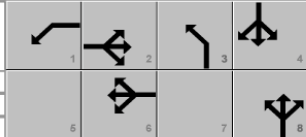
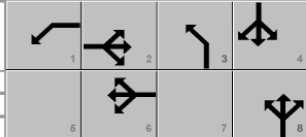
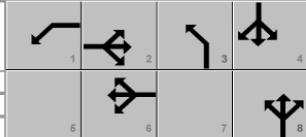
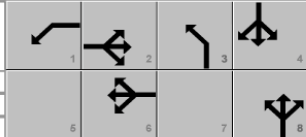
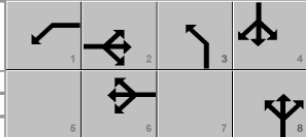
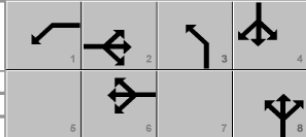
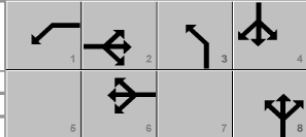
General Information										Intersection Information						
Agency										Duration, h		0.25				
Analyst				Analysis Date		4/24/2018		Area Type		Other						
Jurisdiction				Time Period		Peak PM Hour		PHF		0.92						
Urban Street		West Annex		Analysis Year		2041		Analysis Period		1> 7:00						
Intersection		Dufferin/Wilson		File Name		2041_PM_OPTION 4.xus										
Project Description		West Annex - OPTION 4														
Demand Information				EB			WB			NB			SB			
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), veh/h				82	686	262	217	779	21	312	312	227	31	285	69	
Signal Information																
Cycle, s	120.0	Reference Phase	2													
Offset, s	0	Reference Point	End													
Uncoordinated	No	Simult. Gap E/W	On													
Force Mode	Fixed	Simult. Gap N/S	On													
Green				0.0	64.2	0.0	44.2	0.0	0.0							
Yellow				3.3	3.3	3.3	3.3	0.0	0.0							
Red				0.0	2.5	0.0	2.5	0.0	0.0							
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT					
Assigned Phase					2	1	6	3	8		4					
Case Number					8.3	0.0	14.0	0.0	13.0		7.3					
Phase Duration, s					70.0	0.0	70.0	0.0	50.0		50.0					
Change Period, (Y+R c), s					5.8	3.3	5.8	3.3	5.8		5.8					
Max Allow Headway (MAH), s					0.0	0.0	0.0	0.0	3.3		3.3					
Queue Clearance Time (g s), s									46.2		18.9					
Green Extension Time (g e), s					0.0	0.0	0.0	0.0	0.0		3.5					
Phase Call Probability									1.00		1.00					
Max Out Probability									1.00		0.01					
Movement Group Results				EB			WB			NB			SB			
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R	
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14	
Adjusted Flow Rate (v), veh/h				542		578	355		750		678	247		343	75	
Adjusted Saturation Flow Rate (s), veh/h/ln				652		1563	384		1693		1162	1585		1788	1610	
Queue Service Time (g s), s				19.8		32.7	6.0		44.4		6.0	14.0		0.0	3.7	
Cycle Queue Clearance Time (g c), s				64.2		32.7	64.2		44.4		44.2	14.0		16.9	3.7	
Green Ratio (g/C)				0.53		0.53	0.54		0.54		0.37	0.37		0.37	0.37	
Capacity (c), veh/h				384		836	256		906		473	584		692	593	
Volume-to-Capacity Ratio (X)				1.413		0.691	1.390		0.828		1.434	0.423		0.497	0.126	
Back of Queue (Q), ft/ln (50 th percentile)				824.1		311	542.7		472.2		680.1	133.9		189.2	35.5	
Back of Queue (Q), veh/ln (50 th percentile)				33.0		12.4	21.7		18.9		27.2	5.3		7.6	1.4	
Queue Storage Ratio (RQ) (50 th percentile)				0.00		0.00	0.00		0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d 1), s/veh				35.9		20.6	44.1		23.3		42.3	28.4		29.2	25.1	
Incremental Delay (d 2), s/veh				200.7		4.7	197.7		8.6		207.0	0.2		0.2	0.0	
Initial Queue Delay (d 3), s/veh				0.0		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (d), s/veh				236.6		25.2	241.8		31.9		249.3	28.5		29.4	25.1	
Level of Service (LOS)				F		C	F		C		F	C		C	C	
Approach Delay, s/veh / LOS				127.5		F	99.3		F		190.4	F		28.7	C	
Intersection Delay, s/veh / LOS				123.5						F						
Multimodal Results				EB			WB			NB			SB			
Pedestrian LOS Score / LOS				1.90		B	1.90		B		2.12	B		2.12	B	
Bicycle LOS Score / LOS				1.41		A	1.40		A		2.01	B		1.18	A	

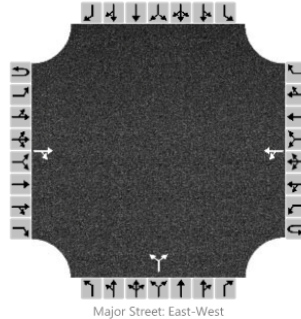
EXHIBIT 45

OPTION 4 - 2041 PEAK AM HOUR TRAFFIC – Sunset/Lanark County Office Access

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Sunset/County Offices
Agency/Co.		Jurisdiction	
Date Performed	2/27/2018	East/West Street	Sunset Boulevard
Analysis Year	2041	North/South Street	Lanark County Offices Acc
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	West Annex - OPTION 4		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			226	0		52	139			0		7				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						57					8					
Capacity, c (veh/h)						1307					775					
v/c Ratio						0.04					0.01					
95% Queue Length, Q ₉₅ (veh)						0.1					0.0					
Control Delay (s/veh)						7.9					9.7					
Level of Service, LOS						A					A					
Approach Delay (s/veh)					2.4				9.7							
Approach LOS									A							

EXHIBIT 46

OPTION 4 - 2041 PEAK PM HOUR TRAFFIC – Sunset/Lanark County Office Access

HCS7 Two-Way Stop-Control Report

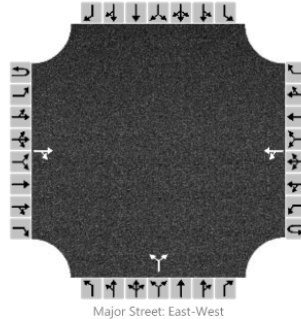
General Information

Analyst	
Agency/Co.	
Date Performed	2/27/2018
Analysis Year	2041
Time Analyzed	Peak PM Hour
Intersection Orientation	East-West
Project Description	West Annex - OPTION 4

Site Information

Intersection	Sunset/County Offices
Jurisdiction	
East/West Street	Sunset Boulevard
North/South Street	Lanark County Offices Acc
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			247	1		2	270			7		49				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized		No				No				No				No		
Median Type/Storage																

Critical and Follow-up Headways

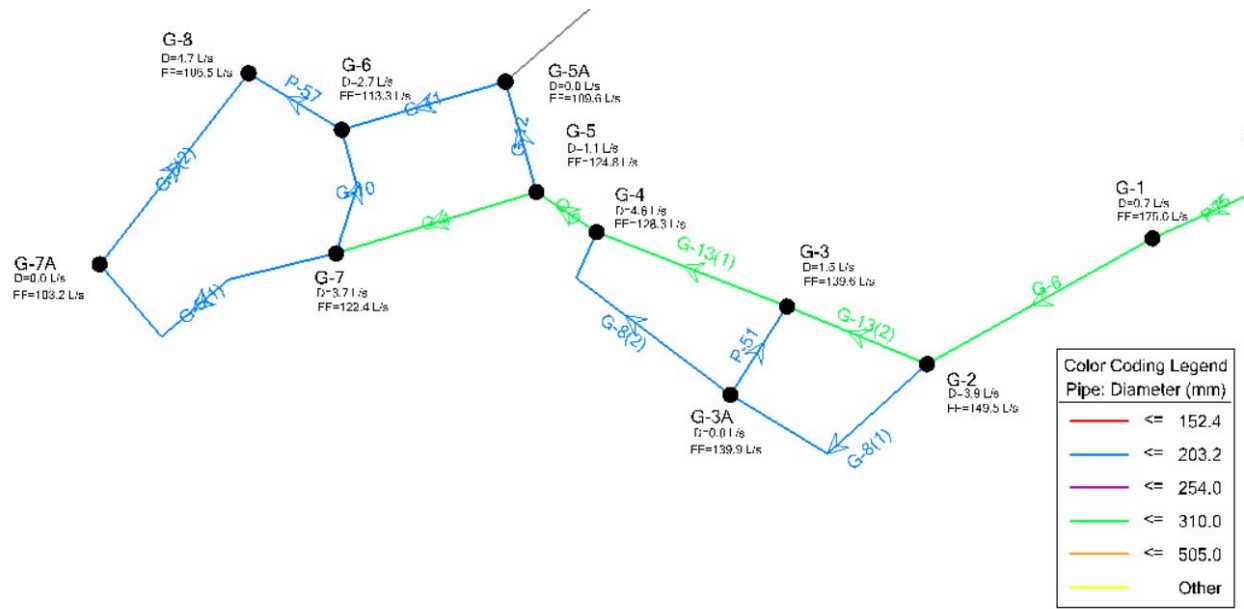
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						2					61					
Capacity, c (veh/h)						1281					701					
v/c Ratio						0.00					0.09					
95% Queue Length, Q ₉₅ (veh)						0.0					0.3					
Control Delay (s/veh)						7.8					10.6					
Level of Service, LOS						A					B					
Approach Delay (s/veh)						0.1				10.6						
Approach LOS										B						

Appendix F

Water Network Analysis

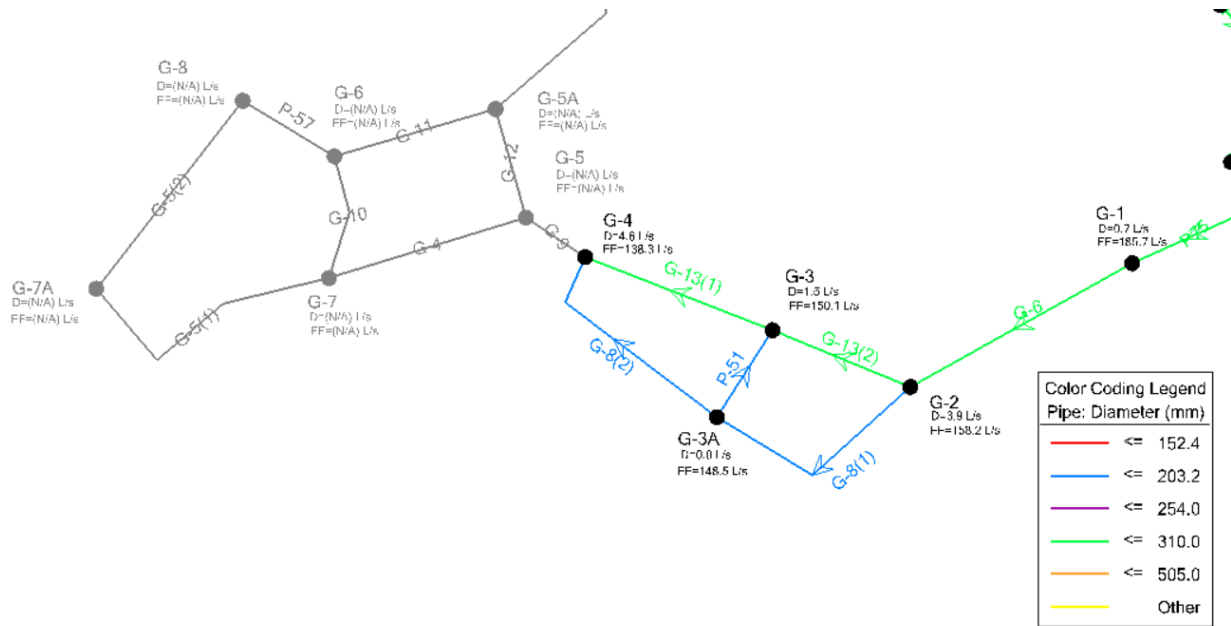


FIRE FLOW RESULTS

OPTION 1 – b) Scenario at Ultimate Build-out

Phase 1 & 2 - Western Annex (excluding North of Highway 7 development) with connection on North Street

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)	Demand (Maximum) (L/s)	Fire Flow (Available) (L/s)
G-1	134.00	0.7	176.49	60	0.7	175.0
G-2	137.50	3.9	176.36	55	3.9	149.5
G-3	135.50	1.5	176.30	58	1.5	139.6
G-3A	134.00	0.0	176.30	60	0.0	139.9
G-4	136.50	4.6	176.24	56	4.6	128.3
G-5	135.50	1.1	176.23	58	1.1	124.8
G-5A	137.00	0.0	176.22	56	0.0	109.6
G-6	136.00	2.7	176.20	57	2.7	113.3
G-7	135.00	3.7	176.21	58	3.7	122.4
G-7A	135.55	0.0	176.20	58	0.0	103.2
G-8	136.00	4.7	176.19	57	4.7	106.5

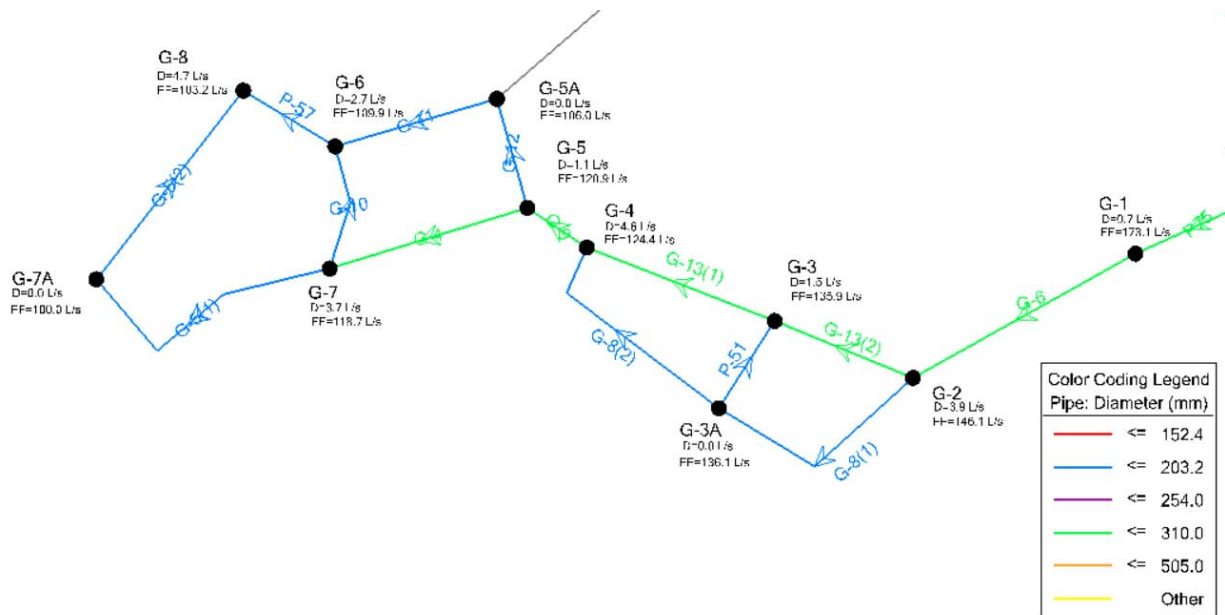


FIRE FLOW RESULTS

OPTION 1 – c) Scenario at Phase 1

Phase 1 - Western Annex (including North of Highway 7 development) with connection on North Street

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)	Demand (Maximum) (L/s)	Fire Flow (Available) (L/s)
G-1	134.00	0.7	174.94	58	0.7	185.7
G-2	137.50	3.9	174.91	53	3.9	158.2
G-3	135.50	1.5	174.91	56	1.5	150.1
G-3A	134.00	0.0	174.91	58	0.0	148.5
G-4	136.50	4.6	174.90	54	4.6	138.3

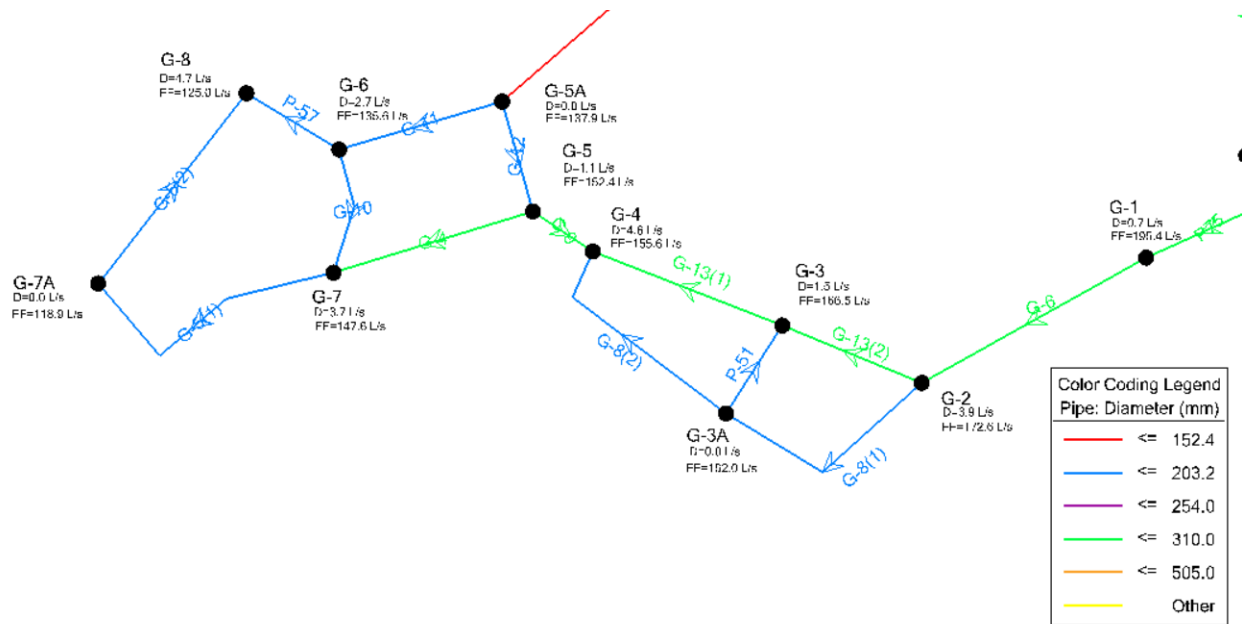


FIRE FLOW RESULTS

OPTION 1 – d) Scenario at Ultimate Build-out

Phase 1 & 2 - Western Annex (including North of Highway 7 development) with connection on North Street

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)	Demand (Maximum) (L/s)	Fire Flow (Available) (L/s)
G-1	134.00	0.7	174.23	57	0.7	173.1
G-2	137.50	3.9	174.10	52	3.9	146.1
G-3	135.50	1.5	174.04	55	1.5	135.9
G-3A	134.00	0.0	174.04	57	0.0	136.1
G-4	136.50	4.6	173.98	53	4.6	124.4
G-5	135.50	1.1	173.97	55	1.1	120.9
G-5A	137.00	0.0	173.96	52	0.0	106.0
G-6	136.00	2.7	173.94	54	2.7	109.9
G-7	135.00	3.7	173.95	55	3.7	118.7
G-7A	135.55	0.0	173.94	54	0.0	100.0
G-8	136.00	4.7	173.93	54	4.7	103.2

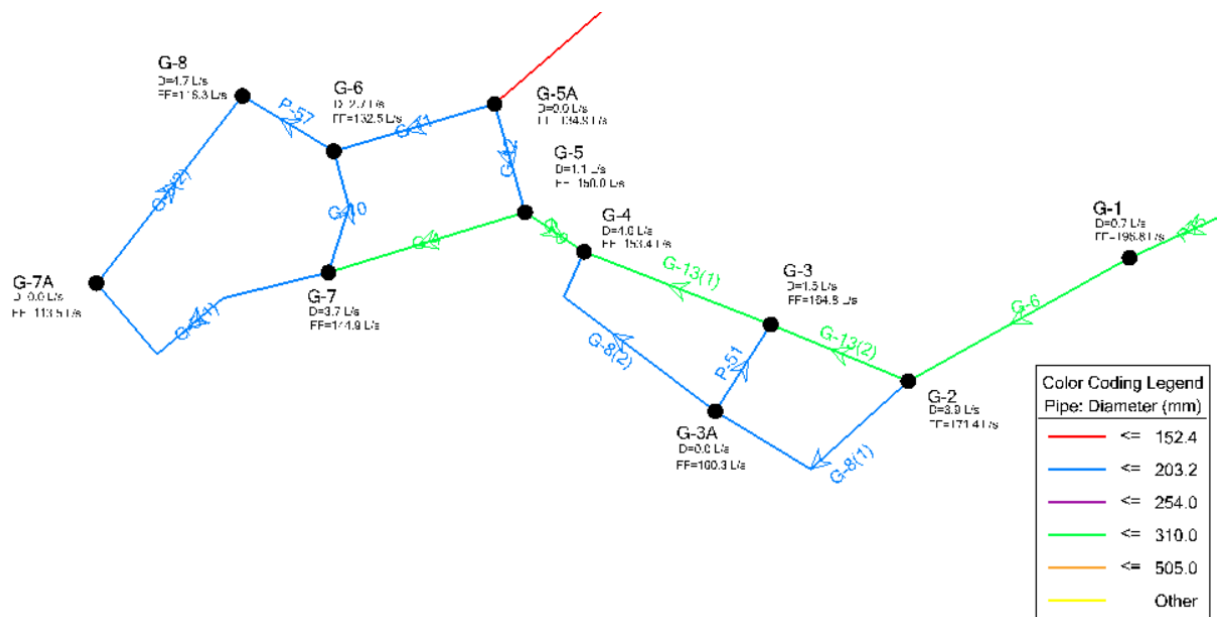


FIRE FLOW RESULTS

OPTION 2 – a) Scenario at Ultimate Build-out

Phase 1 & 2 - Western Annex (excluding North of Highway 7 development) with connection on North Street and Inverness Avenue

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)	Demand (Maximum) (L/s)	Fire Flow (Available) (L/s)
G-1	134.00	0.7	178.14	63	0.7	192.3
G-2	137.50	3.9	178.13	58	3.9	166.3
G-3	135.50	1.5	178.13	60	1.5	161.2
G-3A	134.00	0.0	178.13	63	0.0	148.1

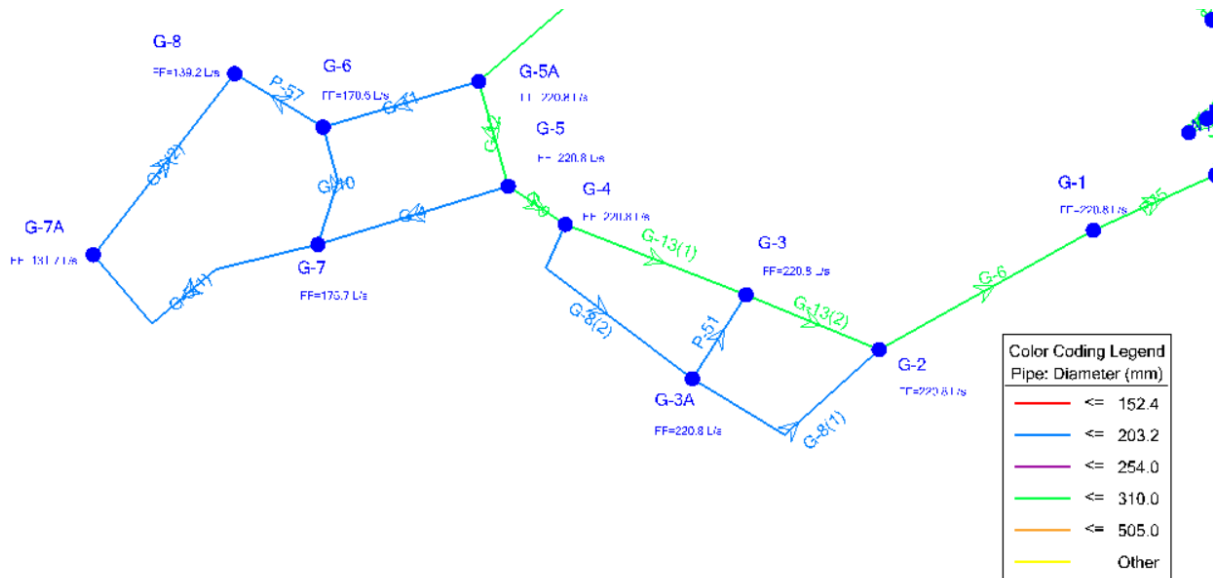


FIRE FLOW RESULTS

OPTION 2 – b) Scenario at Ultimate Build-out

Phase 1 & 2 - Western Annex (including North of Highway 7 development) with connection on North Street and Inverness Avenue

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)	Demand (Maximum) (L/s)	Fire Flow (Available) (L/s)
G-1	134.00	0.7	174.66	58	0.7	196.8
G-2	137.50	3.9	174.64	53	3.9	171.4
G-3	135.50	1.5	174.63	56	1.5	164.8
G-3A	134.00	0.0	174.63	58	0.0	160.3
G-4	136.50	4.6	174.63	54	4.6	153.4
G-5	135.50	1.1	174.63	56	1.1	150.0
G-5A	137.00	0.0	174.69	53	0.0	134.9
G-6	136.00	2.7	174.62	55	2.7	132.5
G-7	135.00	3.7	174.62	56	3.7	144.9
G-7A	135.55	0.0	174.61	55	0.0	113.5
G-8	136.00	4.7	174.61	55	4.7	116.3



FIRE FLOW RESULTS

OPTION 3

Phase 1 & 2 - Western Annex (including North of Highway 7 development) with connection on North Street and Inverness Avenue – includes the upgrade of Inverness Avenue watermain to Sunset Boulevard

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)	Demand (Maximum) (L/s)	Fire Flow (Available) (L/s)
G-1	134.00	0.7	175.63	59	0.7	220.8
G-2	137.50	3.9	175.79	54	3.9	220.8
G-3	135.50	1.5	175.91	57	1.5	220.8
G-3A	134.00	0.0	175.91	59	0.0	220.8
G-4	136.50	4.6	176.08	56	4.6	220.8
G-5	135.50	1.1	176.16	58	1.1	220.8
G-5A	137.00	0.0	176.35	56	0.0	220.8
G-6	136.00	2.7	176.17	57	2.7	170.6
G-7	135.00	3.7	176.16	58	3.7	175.7
G-7A	135.55	0.0	176.15	58	0.0	131.7
G-8	136.00	4.7	176.15	57	4.7	139.2

North of Highway 7

Water Consumption Demands

Residential Design Parameters

Base Flow	350	L/pers/d
Low Density pers/residence ratio	3.4	pers/residence
Mid Density pers/residence ratio	2.7	pers/residence
High Density pers/residence ratio	2.7	
Daily peak flow factor	2	(2.5)
Hourly peak flow factor	3	(2.2)
Hourly minimum factor	0.5	

Commercial Design Parameters:

Base Flow	2500	L/1000m ² *d
Daily peak flow factor	1.5	
Hourly peak flow factor	1.8	
Hourly minimum factor	0.5	

Node	Residential		Residential Demand (L/s)	Commercial/Institutional Total area m ²	Commercial Demand (L/s)	Average Daily (L/s)	Daily Peak (L/s)	Hourly Peak Flow (L/s)	Hourly minimum Flow (L/s)
	# Low units	# Med/High units							
N1				29,800	0.86	0.86	1.3	1.6	0.4
N2	19	42	0.72			0.72	1.4	2.2	0.4
N3	29	19	0.61			0.61	1.2	1.8	0.3
N4		60	0.66			0.66	1.3	2.0	0.3
N5	133	62	2.51			2.51	5.0	7.5	1.3
N6				50,000	1.45	1.45	2.2	2.6	0.7
N7		56	0.61			0.61	1.2	1.8	0.3
N8				79,300	2.29	2.29	3.4	4.1	1.1
N9	105	88	2.41			2.41	4.8	7.2	1.2
N10				102,300	2.96	2.96	4.4	5.3	1.5
N11				77,300	2.24	2.2	3.4	4.0	1.1
N12				35,900	1.04	1.0	1.6	1.9	0.5
N13				25,100	0.73	0.7	1.1	1.3	0.4

Notes:

Residential density and mix of unit types provided from Dillon report "Infrastructure Master Plan for Area North of Highway 7" - October 2013

Perth Annex

Tay River

Water Consumption Demands

Residential Design Parameters

Base Flow	350	L/pers/d
Low Density pers/residence ratio	3.4	pers/residence
Mid Density pers/residence ratio	2.7	pers/residence
High Density pers/residence ratio	2.7	pers/residence
Condominiums	1.8	pers/residence
Daily peak flow factor	2	(2.5)
Hourly peak flow factor	3	(2.2)
Hourly minimum factor	0.5	

Commercial Design Parameters:

Base Flow	2500	L/1000m ² *d	m ² of commercial floor area
Daily peak flow factor	1.5		
Hourly peak flow factor	1.8		
Hourly minimum factor	0.5		

Node	Residential				Total population	Residential Demand	Commercial/Institutional		Commercial Demand	Average Daily	Daily Peak	Hourly Peak Flow	Hourly minimum Flow
	# Low units	# Med/High units	#Condos	# Seniors			Total area	Floor area *					
					persons	(L/s)	m ²	m ²	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)
T1			60	120	228	0.92				0.92	1.8	2.8	0.5
T2	18				61	0.25				0.25	0.5	0.7	0.1
T3	12				41	0.17				0.17	0.3	0.5	0.1
T4	6	16			64	0.26	3,400	1,360	0.04	0.30	0.6	0.8	0.1
T5	21				71	0.29				0.29	0.6	0.9	0.1
					465					1.92	3.83	5.72	0.96

Notes:

Floor space estimated at 40% coverage for commercial developments - 30% for institutional development

Residential density and mix of unit types provided from Dillon report "Infrastructure Master Plan for Area North of Highway 7" - October 2013

* - Seniors residence assumes - 1 person per senior unit

Perth Annex

Western Annex

Water Consumption Demands

Residential Design Parameters

Base Flow	350	L/pers/d
Low Density pers/residence ratio	3.4	pers/residence
Mid Density pers/residence ratio	2.7	pers/residence
High Density pers/residence ratio	2.7	pers/residence
Condominiums	1.8	pers/residence
Daily peak flow factor	2	
Hourly peak flow factor	3	
Hourly minimum factor	0.5	

Commercial Design Parameters:

Base Flow	2500	L/1000m ² *d	m ² of commercial floor area
Daily peak flow factor	1.5		
Hourly peak flow factor	1.8		
Hourly minimum factor	0.5		

Node	Residential Single/Multi		Residential High Density Blocks		Total population	Residential Demand	Commercial/Institutional		Commercial Demand	Average Daily	Daily Peak	Hourly Peak Flow	Hourly minimum Flow
	# Low units	# Med/High units	Block area	Eq. population			Total area	Floor area *					
			m ²		persons	(L/s)	m ²	m ²	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)
G1			6,000	36	36	0.15		550	0.02	0.16	0.32	0.47	0.08
G2	32	64	6,175	37	319	1.29				1.29	2.59	3.88	0.65
G3	12	9	9,025	54	121	0.49				0.49	0.98	1.47	0.24
G4	31	34	30,548	183	380	1.54				1.54	3.08	4.62	0.77
G5	25				85	0.34	3,400	1,360	0.04	0.38	0.75	1.11	0.19
G6	9	42	12,750	77	219	0.89				0.89	1.77	2.66	0.44
G7	49	51			304	1.23				1.23	2.46	3.69	0.62
G8	67	22	16,556	99	385	1.56				1.56	3.12	4.68	0.78
Total:	225	222		486	1850					7.55	15.07	22.58	3.77
			equivalent units	270									
			Total units	717									

Notes:

Floor space estimated at 40% coverage for commercial developments - 30% for institutional development

Residential density and mix of unit types provided from Dillon report "Infrastructure Master Plan for Area North of Highway 7" - October 2013

High Density blocks population estimates 60 pers / gross ha in absence of specific information per City of Ottawa Guidelines

Number of units estimated based on average 10.5 m frontage

Appendix G

Draft Hydrologic Impact Study criteria

Appendix G

The hydrologic function of a wetland relates specifically to the hydrologic cycle in and around a wetland, as illustrated in this figure from the U.S. Geological Survey Water-Supply Paper 2425 “National Water Summary on Wetland Resources”:

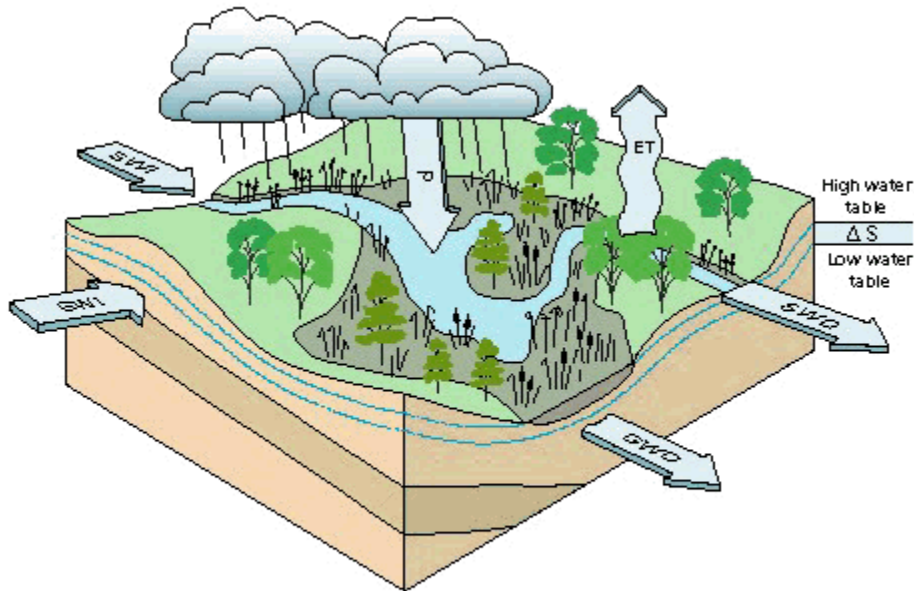


Figure 18. Components of the wetland water budget. ($P + SWI + GWI = ET + SWO + GWO + \Delta S$, where P is precipitation, SWI is surface-water inflow, SWO is surface-water outflow, GWI is ground-water inflow, GWO is ground-water outflow, ET is evapotranspiration, and ΔS is change in storage.)

The hydrologic function of a wetland would not be negatively impacted if any of these conditions can be demonstrated:

1. There is no change in the quality or quantity of water that is entering or leaving the wetland by surface or groundwater.
 - Note that in the water budget, P, ET, and ΔS are not directly affected by development in the adjacent lands, and do not have to be assessed if all of SWI, GWI, SWO and GWO can be shown to be unchanged, in both quantity and quality. Guidance may be found in the MECP Stormwater Management Planning and Design Manual, Chapter 3.2
2. There is no change in the storage of water or water chemistry within the wetland
 - If any of SWI, SWO, GWI or GWO change as a result of this development, it must be balanced against a different component of the hydrologic cycle, so it can be shown that ΔS does not change.
3. There is no significant change in the landuse of the catchment of the watershed.
 - It has been shown that any more than a limited amount of urbanization within a catchment of a wetland will produce an observable impact on the wetland species. In 'How Much Habitat is Enough', 4% imperviousness will not be expected to produce a measurable impact on the wetland species. If there is more than 4% imperviousness within a wetland, then the impacts are already being experienced, and the resilience of the system is expected to be impaired.

Appendix H

Cost Summary Sheets

Western Annex - Golf Course Lands - Construction Class D Cost Estimate

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
Part I- On-Site					
B - Road Construction					
B-1	Rock Excavation Roadway	m3	7,134	\$90.00	\$642,060.00
B-2	Clearing and Grubbing	LS	1	\$100,000.00	\$100,000.00
B-3	Granular 'A' Roadway Bed (150 mm)	t	6,383	\$22.00	\$140,427.14
B-4	Granular 'B' Roadway Bed (300 mm)	t	11,193	\$20.00	\$223,869.36
B-5	Performance Graded Superpave 12.5mm Level B (PG 58-34) - 40 mm depth	t	3,164	\$110.00	\$348,059.25
B-6	Performance Graded Superpave 19mm Level B (PG 58-34) - 50 mm depth	t	3,955	\$110.00	\$435,074.06
B-7	Pavement Markings	LS	1	\$50,000.00	\$50,000.00
B-8	Concrete Curb	m	8,610	\$60.00	\$516,600.00
B-9	Concrete Sidewalk (assume 1.8 m average width)	m2	7,380	\$100.00	\$738,000.00
B-10	Topsoil and Seed (2 m each side of road/parking lot)	m2	49,200	\$6.00	\$295,200.00
B-12	New Bridge over Tay	LS	1	\$10,000,000.00	\$10,000,000.00
Subtotal (B)					\$13,489,289.82
C - Storm Sewers					
C-1	1200 mm dia. MH per OPSD 701.010	ea	4	\$5,600.00	\$22,400.00
C-2	1500 mm dia. MH per OPSD 701.010	ea	17	\$9,300.00	\$158,100.00
C-3	1800 mm dia. MH per OPSD 701.010	ea	7	\$11,500.00	\$80,500.00
C-4	2400 mm dia. MH per OPSD 701.010	ea	10	\$20,000.00	\$200,000.00
C-5	3000 mm dia. MH per OPSD 701.010	ea	9	\$28,000.00	\$252,000.00
C-6	600 x 600 mm PCC catchbasin per OSD 705.010, incl. CB Lead	ea	75	\$4,000.00	\$300,000.00
C-7	300 mm Storm Sewer PVC Pipe - Class SDR 28	m	147	\$300.00	\$44,160.00
C-8	375 mm Storm Sewer PVC Pipe - Class SDR 28	m	250	\$350.00	\$87,500.00
C-9	450 mm Storm Sewer PVC Pipe - Class SDR 28	m	553	\$350.00	\$193,550.00
C-10	525 mm Storm Sewer PVC Pipe - Class SDR 28	m	526	\$400.00	\$210,400.00

Western Annex - Golf Course Lands - Construction Class D Cost Estimate

C-11	600 mm Storm Sewer Conc. Pipe - Class 65D	m	70	\$500.00	\$35,000.00
C-12	675 mm Storm Sewer Conc. Pipe - Class 65D	m	285	\$600.00	\$171,000.00
C-13	750 mm Storm Sewer Conc. Pipe - Class 65D	m	64	\$675.00	\$43,200.00
C-14	825 mm Storm Sewer Conc. Pipe - Class 65D	m	90	\$750.00	\$67,500.00
C-15	900 mm Storm Sewer Conc. Pipe - Class 65D	m	751	\$750.00	\$563,250.00
C-16	1050 mm Storm Sewer Conc. Pipe - Class 65D	m	170	\$850.00	\$144,500.00
C-17	1200 mm Storm Sewer Conc. Pipe - Class 65D	m	236	\$1,000.00	\$236,000.00
C-18	Headwall, D<900mm	ea	3	\$6,000.00	\$18,000.00
C-19	Headwall, D>900mm	ea	4	\$10,000.00	\$40,000.00
Subtotal (C)					\$2,867,060.00
D - Sanitary Sewers					
D-1	1200 mm dia. MH as per OPSD 701.010	ea	49	\$7,000.00	\$343,000.00
D-2	250 mm Sanitary Sewer PVC Pipe - Class SDR 28	m	4,100	\$450.00	\$1,845,000.00
D-3	Rock excavation for sanitary sewer	m3	3,500	\$150.00	\$525,000.00
D-4	Cleaning and Televising Sewers (after installation)	m	4,100	\$7.00	\$28,700.00
D-5	Force Main Sewer	m	800	\$600.00	\$480,000.00
D-6	Tay River Crossing	ea	2	\$160,000.00	\$320,000.00
D-7	Wastewater Pump Station	ea	2	\$300,000.00	\$600,000.00
D-8	Connection to Existing	ea	2	\$2,000.00	\$4,000.00
Subtotal (D)					\$4,145,700.00
E - Watermain					
E-1	Rock Excavation	m ³	8465.4	\$90.00	\$761,886.00
E-2	200 mm Diameter Watermain	m	2750	\$345.00	\$948,750.00
E-3	200mm Isolation Valves	ea	20	\$2,800.00	\$56,000.00
E-4	300 mm Diameter Watermain	m	2000	\$450.00	\$900,000.00
E-5	300mm Gate Valve	ea	13	\$2,800.00	\$36,400.00
E-6	Fire Hydrants	ea	44	\$7,500.00	\$330,000.00
E-7	Waterservice (inc. saddle and curb stop)	ea	460	\$2,000.00	\$920,000.00

Western Annex - Golf Course Lands - Construction Class D Cost Estimate

E-8	Connection to Existing	ea	1	\$7,500.00	\$7,500.00
E-9	Watermain Testing	LS	1	\$30,000.00	\$30,000.00
E-10	Adjust Valves	ea	66	\$500.00	\$33,000.00
E-11	Jack and bore - river crossing	ea	2	\$100,000.00	\$200,000.00
E-12	Excavation pits per crossing (2 per crossing)	ea	2	\$50,000.00	\$100,000.00
E-13	Steel casing	m	200	\$1,000.00	\$200,000.00
E-14	Dewatering of excavation pits	LS	1	\$100,000.00	\$100,000.00
Subtotal (E)					\$4,623,536.00
F - Active Transportation					
F-1	Pedestrian Path	m	3500	\$15.00	\$52,500.00
F-2	Bicycle Path	m	1880	\$20.00	\$37,600.00
F-3	Multi-Use Path	m	1270	\$25.00	\$31,750.00
Subtotal (F)					\$121,850.00
G - Stormwater Management Facilities					
G-1	Storm Ponds - excavation, lining, vegetation	m3	7,023	\$126.00	\$884,898.00
G-2	LID Excavation	m3	25,450	\$20.00	\$509,000.00
G-3	LID Berm	m3	12,545	\$50.00	\$627,250.00
G-4	LID filter media	m3	1,515	\$50.00	\$75,750.00
G-5	LID Rock Fill	m3	3,785	\$50.00	\$189,250.00
G-6	Berm cart-way Granular A	t	1,980	\$24.00	\$47,520.00
G-7	Hydraulic Seeding and Mulching	m2	22,500	\$5.50	\$123,750.00
Subtotal (G)					\$2,457,418.00
On-site Subtotal					\$27,704,853.82
Part II- Off-Site					

H - Sanitary Sewers					
H-1	Inverness Ave	m	350	\$600.00	\$210,000.00
H-2	George Ave	m	300	\$600.00	\$180,000.00

Western Annex - Golf Course Lands - Construction Class D Cost Estimate

H-3	Alan Ave	m	35	\$600.00	\$21,000.00
H-4	Sherbrooke St E	m	100	\$600.00	\$60,000.00
H-5	Last Duel Easement	m	120	\$600.00	\$72,000.00
Subtotal (G)					\$543,000.00
I - Lane Construction and Traffic Signals					
I-1	Rock Excavation Roadway	m3	383	\$90.00	\$34,425.00
I-2	Clearing and Grubbing	LS	1	\$2,000.00	\$2,000.00
I-3	Granular 'A' Roadway Bed (150 mm)	t	793	\$22.00	\$17,441.82
I-4	Granular 'B' Roadway Bed (300 mm)	t	1,390	\$20.00	\$27,805.80
I-5	Performance Graded Superpave 12.5mm Level B (PG 58-34) - 40 mm depth	t	46	\$110.00	\$5,093.55
I-6	Performance Graded Superpave 19mm Level B (PG 58-34) - 50 mm depth	t	58	\$110.00	\$6,366.94
I-7	Pavement Markings	LS	1	\$1,000.00	\$1,000.00
I-8	Concrete Sidewalk (assume 1.8 m average width)	m2	216	\$100.00	\$21,600.00
I-9	Topsoil and Seed (2 m each side of road/parking lot)	m2	720	\$6.00	\$4,320.00
I-10	Traffic Signal	LS	1	\$70,000.00	\$70,000.00
I-11	Improvements to Peter St, Bridge, sidewalks	LS	1	\$140,000.00	\$140,000.00
Subtotal (I)					\$330,053.11
J - Watermain Replacement on Inverness Avenue					
J-1	300 mm Diameter Watermain	m	450	\$450.00	\$202,500.00
J-2	300mm Gate valve	ea	1	\$2,800.00	\$2,800.00
J-3	Trench reinstatement	m	450	\$220.00	\$99,000.00
J-4	Adjust Valves	ea	1	\$500.00	\$500.00
J-5	Watermain Testing	LS	1	\$7,500.00	\$7,500.00
J-6	Water service reconnection to watermain	ea	16	\$500.00	\$8,000.00
J-7	Temporary water supply Inverness Avenue	ea	1	\$15,000.00	\$15,000.00
J-8	Connection into Existng	ea	2	\$7,500.00	\$15,000.00
Subtotal (J)					\$350,300.00
Off-site Subtotal					\$350,300.00

Western Annex - Golf Course Lands - Construction Class D Cost Estimate

CONSTRUCTION ESTIMATE SUB-TOTAL	\$402,800.00
DETAILED PLANNING AND ENGINEERING SERVICES (15% of Construction Estimate)	\$60,420.00
* UTILITIES (5% of Construction Estimate)	
SUB-TOTAL	\$463,220.00
CONTINGENCY (20%)	\$92,644.00
TOTAL COST (excl. HST)	\$555,864.00
H.S.T. (13%)	\$72,262.32
TOTAL COST (incl. HST)	\$628,126.32

* Natural Gas connection and meter costs are assumed to be included as part of this utilities price

Western Annex - Tayview Lands - Construction Class D Cost Estimate

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
Part I- On-Site					
B - Road Construction					
B-1	Rock Excavation Roadway	m3	2,958	\$90.00	\$266,220.00
B-2	Clearing and Grubbing	LS	1	\$50,000.00	\$50,000.00
B-3	Granular 'A' Roadway Bed (150 mm)	t	2,925	\$22.00	\$64,357.13
B-4	Granular 'B' Roadway Bed (300 mm)	t	5,130	\$20.00	\$102,598.32
B-5	Performance Graded Superpave 12.5mm Level B (PG 58-34) - 40 mm depth	t	1,312	\$110.00	\$144,317.25
B-6	Performance Graded Superpave 19mm Level B (PG 58-34) - 50 mm depth	t	1,640	\$110.00	\$180,396.56
B-7	Pavement Markings	LS	1	\$25,000.00	\$25,000.00
B-8	Concrete Curb	m	3,570	\$60.00	\$214,200.00
B-9	Concrete Sidewalk (assume 1.8 m average width)	m2	3,060	\$100.00	\$306,000.00
B-10	Topsoil and Seed (2 m each side of road/parking lot)	m2	20,400	\$6.00	\$122,400.00
Subtotal (B)					\$1,475,489.26
C - Storm Sewers					
C-1	1500 mm dia. MH per OPSD 701.010	ea	1	\$9,300.00	\$9,300.00
C-2	1800 mm dia. MH per OPSD 701.010	ea	8	\$11,500.00	\$92,000.00
C-3	2400 mm dia. MH per OPSD 701.010	ea	2	\$20,000.00	\$40,000.00
C-4	3000 mm dia. MH per OPSD 701.010	ea	5	\$28,000.00	\$140,000.00
C-5	600 x 600 mm PCC catchbasin per OSD 705.010, incl. CB Lead	ea	24	\$4,000.00	\$96,000.00
C-6	300 mm Storm Sewer PVC Pipe - Class SDR 28	m	175	\$300.00	\$52,500.00
C-7	375 mm Storm Sewer PVC Pipe - Class SDR 28	m	200	\$350.00	\$70,000.00
C-8	450 mm Storm Sewer PVC Pipe - Class SDR 28	m	60	\$350.00	\$21,000.00
C-9	600 mm Storm Sewer Conc. Pipe - Class 65D	m	200	\$500.00	\$100,000.00
C-10	675 mm Storm Sewer Conc. Pipe - Class 65D	m	240	\$600.00	\$144,000.00
C-11	825 mm Storm Sewer Conc. Pipe - Class 65D	m	100	\$750.00	\$75,000.00

Western Annex - Tayview Lands - Construction Class D Cost Estimate

C-12	1050 mm Storm Sewer Conc. Pipe - Class 65D	m	100	\$850.00	\$85,000.00
C-13	1200 mm Storm Sewer Conc. Pipe - Class 65D	m	130	\$1,000.00	\$130,000.00
C-14	Headwall, D>900mm	ea	1	\$10,000.00	\$10,000.00
C-15	Rock Excavation	m3	1,205	\$90.00	\$108,450.00
Subtotal (C)					\$1,173,250.00
D - Sanitary Sewers					
D-1	1200 mm dia. MH as per OPSD 701.010	ea	15	\$7,000.00	\$105,000.00
D-2	250 mm Sanitary Sewer PVC Pipe - Class SDR 28	m	967	\$450.00	\$435,150.00
D-3	Rock excavation for sanitary sewer	m3	500	\$150.00	\$75,000.00
D-4	Cleaning and Televising Sewers (after installation)	m	967	\$7.00	\$6,769.00
D-5	Connection to Existing	ea	1	\$2,000.00	\$2,000.00
Subtotal (D)					\$623,919.00
E - Watermain					
E-1	Rock Excavation	m ³	2347.92	\$90.00	\$211,312.80
E-2	200 mm Diameter Watermain	m	1087	\$345.00	\$375,015.00
E-3	200mm Isolation Valves	ea	7	\$2,800.00	\$19,600.00
E-4	Fire Hydrants	ea	16	\$7,500.00	\$120,000.00
E-5	Waterservice (inc. saddle and curb stop)	ea	75	\$2,000.00	\$150,000.00
E-7	Watermain Testing	LS	1	\$15,000.00	\$15,000.00
E-8	Adjust Valves	ea	14	\$500.00	\$7,000.00
Subtotal (E)					\$897,927.80
G - Stormwater Management Facility					
G-1	Earth Excavation Drainage	m3	2,400	\$20.00	\$48,000.00
G-2	Rock Excavation	m3	740	\$90.00	\$66,600.00
G-3	Clay liner	m2	4,550	\$50.00	\$227,500.00
G-4	Riprap (including geotextile)	m2	40	\$80.00	\$3,200.00
G-5	Headwall	ea	2	\$10,000.00	\$20,000.00
G-6	Granular 'B' (access road - 300mm thick)	t	149	\$24.00	\$3,576.00

Western Annex - Tayview Lands - Construction Class D Cost Estimate

G-7	Hydraulic Seeding and Mulching	m2	3,250	\$5.50	\$17,875.00
Subtotal (G)					\$386,751.00
On-site Subtotal					\$4,557,337.06
Part II- Off-Site					
H - Watermain Construction on Sunset					
H-1	200 mm Diameter Watermain	m	733	\$345.00	\$252,885.00
H-2	200mm Isolation Valves	ea	2	\$2,800.00	\$5,600.00
H-3	Connection to Existing	ea	1	\$7,500.00	\$7,500.00
H-4	Adjust Valves	ea	2	\$500.00	\$1,000.00
Subtotal (E)					\$266,985.00
i - Sanitary Construction on Sunset					
I-1	1200 mm dia. MH as per OPSD 701.010	ea	6	\$7,000.00	\$42,000.00
I-2	250 mm Sanitary Sewer PVC Pipe - Class SDR 28	m	733	\$345.00	\$252,885.00
I-3	Connection to Existing	ea	1	\$7,500.00	\$7,500.00
Subtotal (E)					\$302,385.00
Off-site Subtotal					\$569,370.00
CONSTRUCTION ESTIMATE SUB-TOTAL					\$5,126,707.06
DETAILED PLANNING AND ENGINEERING SERVICES (15% of Construction Estimate)					\$769,006.06
* UTILITIES (5% of Construction Estimate)					
SUB-TOTAL					\$5,895,713.12
CONTINGENCY (20%)					\$1,179,142.62
TOTAL COST (excl. HST)					\$7,074,855.74
H.S.T. (13%)					\$919,731.25
TOTAL COST (incl. HST)					\$7,994,586.99

* Natural Gas connection and meter costs are assumed to be included as part of this utilities price

Appendix I

Consultation

July 18, 2016

Attention: Glen McDonald, Director, Planning
Rideau Valley Conservation Authority

Prepared by: Claire Milloy, P.Geo., Groundwater Scientist
Brian Stratton, P.Eng., Manager of Engineering Services
Watershed Science and Engineering Services, Rideau Valley Conservation Authority

Project: **Western and Northern Annex of Perth**
Email from Doug Nuttall, JP2G
Received: June 26, 2016

With respect to the hydrological impact assessment required for natural features such as wetlands and streams, and in reference to JP2G's June 26, 2016, email about the related scope of work for the Western and Northern Annex lands in Perth, we offer the following preliminary advice for consideration. The advice is general in nature, since we have not been provided with any details about the proposed development. This advice is also separate from any related ecological considerations that may be required by the municipality and separate from any advice related to headwater drainage feature assessment requirements by RVCA.

As per Ontario Regulation 174/06, development is regulated within wetlands. In addition, the hydrological function of a wetland (*including areas within 120 meters of all provincially significant wetlands ...*) is regulated in other areas where development could interfere with this function. RVCA's practice is not to evaluate related setback requirements when it comes to potential hydrologic impacts in a wetland, even though setbacks may be required for other reasons (ecological, planning etc.). RVCA recommends that the study addresses the advice from Section 3.2 of the MOECC's 2003 *Stormwater Management Planning and Design Manual* with consideration to the following discussion.

In the case of specific natural features, the advice should be addressed considering the defined catchments for these natural features. The MOECC's advice accounts for changes in soil type, topography and land cover (including impervious areas). In this way, diversions, regrading, and land cover or soil type modifications, which all affect the hydrologic cycle, would be accounted for.

An important aspect of the MOECC's advice, that is very important for wetlands, is the use of monthly or daily data. Wetlands require very specific water level at specific times of the year, therefore any related assessment must be undertaken monthly and in direct reference to an actual established (measured) hydroperiod (wetland water level fluctuation pattern).

In addition, it is also always important to properly discretize an area into unique combinations of soil and land cover under pre-development and post-development scenarios. The water budget calculations are undertaken for these unique areas rather than for the total site. In this way, blended water holding capacities or water surplus values are not used.

Additional detailed advice is available from Credit Valley and Toronto Region Conservation Authorities in Chapter 6 and Appendices C and D of *Stormwater Management Criteria* (August 2012).

<http://www.creditvalleyca.ca/wp-content/uploads/2014/09/cvc-swm-criteria-appendices-Aug12-D-july14.pdf>

In addition, there is an example of how to employ the MOECC's methodology in *Hydrogeological Assessment Submissions (Conservation Authorities Guidelines for Development Applications)*.

<http://cloca.ca/devreview/HydroAssessmentGuidelines-20130610-FINAL2.pdf> Please note that in

Appendix A, there are some erroneous interpretations of Thornthwaite and Mather's calculations and other assumptions that may not be valid for all locations / circumstances, so caution is advised.

Further, if a detailed water budget assessment is required, then the USGS provides free related software

[http://wi.water.usgs.gov/Soil Water Balance/](http://wi.water.usgs.gov/Soil_Water_Balance/)

RVCA recommends detailed pre-consultation for development in advance of any site specific work.

Respectfully,



Claire A Milloy, M.Sc., P.Geo.
Groundwater Scientist
ext. 1217
claire.milloy@rvca.ca



Brian Stratton, P.Eng.
Manager Engineering Services
ext. 1141
brian.stratton@rvca.ca

and

July 18, 2016

Claire A Milloy, P.Geo., Groundwater Scientist and Brian Stratton, P.Eng., Manager, Engineering Services
Watershed Science and Engineering Services

Rideau Valley Conservation Authority

PO Box 559 | 3889 Rideau Valley Drive | Manotick, Ottawa, Ontario | K4M 1A5 | 613-692-3571 | 1-800-267-3504

Town of Perth
Infrastructure Master Plan Western Annexed Area
Notice of Study Commencement

THE STUDY

The Town of Perth has engaged Jp2g Consultants to undertake a study to determine infrastructure requirements for the development of the Western Annexed Area (see Key Map). This study is being conducted in accordance with the requirements of Phase 1 and 2 of the Municipal Class Environmental Assessment which is an approved process under the Environmental Assessment Act and has now commenced.

PUBLIC COMMENT INVITED

Public consultation is a key component of the Class EA planning and design process. The Master Plan process will include scheduled public information (consultation) centres (PIC) in the Fall 2016 to review servicing problems and opportunities and the alternative solutions being considered. In addition there will be an opportunity to review the final Infrastructure Master Plan report at the conclusion of the process. Separate notices indicating the date and time of the PIC will be published in the newspaper and Town's web site and sent to all persons requesting to be included on the study mailing / contact list.

STUDY CONTACTS

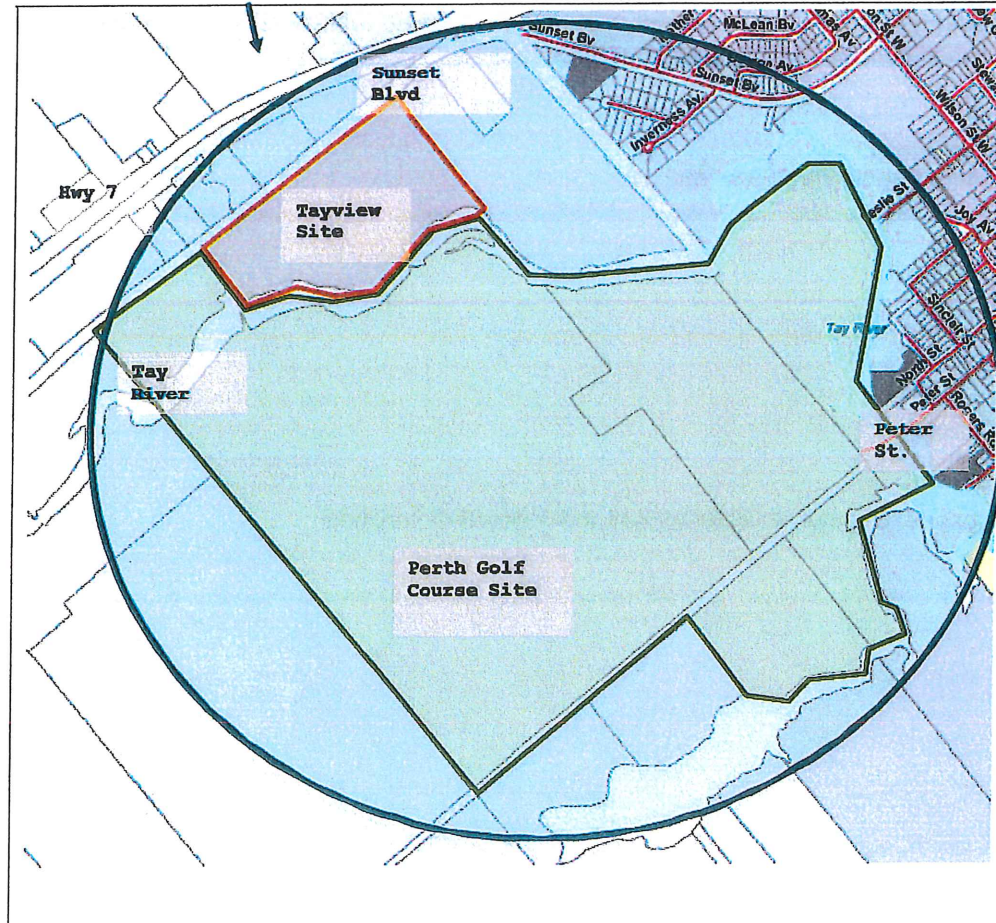
If you require additional information or wish to be added to the contact list please communicate with :

Eric Cosens, MCIP, RRP
Director Development and Protective Services
Town of Perth
80 Gore Street East
Perth, ON K7H 1H9
Ph: 613-267-3311 Ext. 2235
Email: ecosens@perth.ca

Doug Nuttall, P.Eng.
Project Manager
Jp2g Consultants Inc.
1150 Morrison Drive, Suite 410
Ottawa, ON K2H 8S9
Ph: 613-828-7800 Ext. 202
doug@jp2g.com

Information related to this study will be collected in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record.

STUDY AREA – WESTERN ANNEXED AREA





Jp2g Consultants Inc.

ENGINEERS • PLANNERS • PROJECT MANAGERS

1150 Morrison Drive, Suite 410, Ottawa, ON K2H 8S9
T 613-828-7800, F 613-828-2600, www.jp2g.com

Jp2g No. 2161774A

August 9, 2016

**Re: Town of Perth
Infrastructure Master Plan Western Annexed Area
Municipal Class Environmental Assessment**

Dear Agency:

The Town of Perth has initiated an Infrastructure Master Plan for the development of the Western Annexed Area, attached find a Notice of Study Commencement.

This project is being planned as a Schedule B activity defined by the Municipal Class Environmental Assessment document prepared by the Municipal Engineers Association of Ontario.

The Master Plan will be completed following Phases 1 and 2 of the Municipal Class EA which will involve Phase 1 - identify the problems and opportunities for developing and servicing the study area, and Phase 2 – evaluate road, water, sewage and stormwater alternative solutions to select the preferred servicing strategy.

It is expected that the potential Alternative Solutions will be available for agency and public review in the Fall 2016.

Please advise either by mail or e-mail of your comments (or intention to provide comments) and/or if you wish to receive further notice as the project proceeds through the Municipal Class EA planning and design process. My e-mail address is dougn@jp2g.com.

Yours very truly,

Jp2g Consultants Inc.
ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

Doug Nuttall, P.Eng.
Project Manager

cc Eric Cosens, Director of Development and Protective Services

Ministry of the Environment and Climate Change
Eastern Region
1259 Gardiners Road
P.O. Box 22032
Kinston, ON K7M 8S5
Attention: Vicki Mitchell
Environmental Assessment Coordinator

Phone: 613-549-4000
E-Mail: vicki.mitchell@ontario.ca

Ministry of the Environment and Climate Change
Ottawa District Office
2430 Don Reid Drive
Ottawa, ON K1H 1E1
Attention: Steve Burns
District Manager

Phone: 613-521-5437
E-Mail: steve.burns@ontario.ca

County of Lanark
99 Christie Lake Road
Perth, ON K7H 3C6
Attention: Kurt Greaves, CAO

Phone: 613-267-4200 x 1101
E-Mail: kgreaves@clanarkcounty.ca

Tay Valley Township
217 Harper Road
Perth, ON K7H 3C6
Attention: Larry Donaldson, CAO

Phone: 613-267-5353
E-Mail: ldonaldson@tayvalley.ca

Rideau Valley Conservation Authority
3889 Rideau Valley Drive
PO Box 599
Manotick, ON K4M 1A5
Attention: Glen McDonald
Director of Planning

Phone: 613-692-3571 x 1133
E-Mail: glen.mcdonald@rvca.ca

Leeds, Grenville and Lanark District Health Unit
458 Laurier Boulevard
Brockville, ON K6V 7A3
Attention: Paula Stewart
Medical Officer of Health

Phone: 613-345-5685
E-Mail: paula.stewart@healthunit.org

Ministry of Natural Resources and Forestry
Kemptville District
PO Box 2002
Kemptville, ON K0G 1J0
Attention: Lyn Garrah
District Planner

Phone: 613-258-8204
E-Mail: lyn.garrah@ontario.ca

Algonquins of Ontario
Consultation Office
31 Riverside Drive
Pembroke, ON K8A 8R6
Attention: Janet Stavinga
Executive Director

Phone: 613-735-3759
E-Mail: jstavinga@tanikiwin.com



Ministry of Tourism, Culture & Sport
435 South James Street, Suite 334
Thunder Bay, ON P7E 6S7

Attention: Paige Campbell
Archaeology Review Officer

Phone: 807-475-1632

E-Mail: paige.campbell@ontario.ca

Ministry of Municipal Affairs and Housing
Municipal Services Office – Eastern
8 Estate Lane, Rockwood House
Kinston, ON K7M 9A8

Attention: Damien Schaefer
Planner

Phone: 1-800-267-9438 ext 121

E-Mail: damien.schaefer@ontario.ca



Jp2g Consultants Inc.

ENGINEERS • PLANNERS • PROJECT MANAGERS

1150 Morrison Drive, Suite 410, Ottawa, ON K2H 8S9

T 613-828-7800, F 613-828-2600, www.jp2g.com

Jp2g No. 2161774A

August 9, 2016

Tayview Properties

Attention: Ken and Brenda Wright

E-Mail: brenda.ken.wright@bell.net

**Re: Town of Perth
Infrastructure Master Plan Western Annexed Area
Municipal Class Environmental Assessment**

Dear Ken and Brenda Wright:

The Town of Perth has initiated an Infrastructure Master Plan for the development of the Western Annexed Area, attached find a Notice of Study Commencement.

This project is being planned as a Schedule B activity defined by the Municipal Class Environmental Assessment document prepared by the Municipal Engineers Association of Ontario.

The Master Plan will be completed following Phases 1 and 2 of the Municipal Class EA which will involve Phase 1 - identify the problems and opportunities for developing and servicing the study area, and Phase 2 – evaluate road, water, sewage and stormwater alternative solutions to select the preferred servicing strategy.

In order to conduct this study we request the opportunity to obtain any information on your property, and we will require access to conduct limited fieldwork investigations and site inspections.

We would be pleased to meet and discuss the project approach and how the development of your property may be affected. My email address is dougn@jp2g.com, and we have recently established an office at 40 Sunset Boulevard, Unit 40, Perth, ON – Phone No.: 613-281-8762

Yours very truly,

Jp2g Consultants Inc.

ENGINEERS • PLANNERS • PROJECT MANAGERS

Doug Nuttall, P.Eng.
Project Manager

cc Eric Cosens, Director Development and Protective Services
Vicki Mitchell, MOECC



Jp2g Consultants Inc.

ENGINEERS • PLANNERS • PROJECT MANAGERS

1150 Morrison Drive, Suite 410, Ottawa, ON K2H 8S9

T 613-828-7800, F 613-828-2600, www.jp2g.com

Jp2g No. 2161774A

August 9, 2016

Perth Golf Club Links O'Tay
141 Peter Street
Perth, ON K7H 3E4

Phone: 613-267-3090

E-Mail: jbaxter@storm.ca

Attention: Mr. Jim Baxter

**Re: Town of Perth
Infrastructure Master Plan Western Annexed Area
Municipal Class Environmental Assessment**

Dear Mr. Jim Baxter et al:

The Town of Perth has initiated an Infrastructure Master Plan for the development of the Western Annexed Area, attached find a Notice of Study Commencement.

This project is being planned as a Schedule B activity defined by the Municipal Class Environmental Assessment document prepared by the Municipal Engineers Association of Ontario.

The Master Plan will be completed following Phases 1 and 2 of the Municipal Class EA which will involve Phase 1 - identify the problems and opportunities for developing and servicing the study area, and Phase 2 – evaluate road, water, sewage and stormwater alternative solutions to select the preferred servicing strategy.

In order to conduct this study we request the opportunity to obtain any information on your property, and we will require access to conduct limited fieldwork investigations and site inspections.

We would be pleased to meet and discuss the project approach and how the development of your property may be affected. My email address is dougn@jp2g.com, and we have recently established an office at 40 Sunset Boulevard, Unit 40, Perth, ON – Phone No.: 613-281-8762

Yours very truly,

Jp2g Consultants Inc.

ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

A handwritten signature in black ink, appearing to read 'Doug Nuttall'.

Doug Nuttall, P.Eng.
Project Manager

cc Eric Cosens, Director Development and Protective Services
Vicki Mitchell, MOECC

David Trick

E-Mail: trickdavid61@gmail.com

Mark Beveridge

E-Mail: betron@on.aibn.com

Tim Lee

E-Mail: timleebroker@gmail.com



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1150 Morrison Drive, Suite 410, Ottawa, ON K2H 8S9

T 613-828-7800, F 613-828-2600, www.jp2g.com

Jp2g No. 2161774A

August 9, 2016

**Re: Town of Perth
Infrastructure Master Plan Western Annexed Area
Municipal Class Environmental Assessment**

Dear Utility:

The Town of Perth has initiated an Infrastructure Master Plan for the development of the Western Annexed Area, attached find a Notice of Study Commencement.

This project is being planned as a Schedule B activity defined by the Municipal Class Environmental Assessment document prepared by the Municipal Engineers Association of Ontario.

The Master Plan will be completed following Phases 1 and 2 of the Municipal Class EA which will involve Phase 1 - identify the problems and opportunities for developing and servicing the study area, and Phase 2 – evaluate road, water, sewage and stormwater alternative solutions to select the preferred servicing strategy.

As part of our data collection for this study could you confirm where your utility infrastructure is located relative to the Study Area. If you are not the correct contact person please advise.

Prior to any on-site investigations which may be necessary we will be obtaining locates for confirmation. My email address is dougn@jp2g.com.

Yours very truly,

Jp2g Consultants Inc.

ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

Doug Nuttall, P.Eng.
Project Manager

cc Eric Cosens, Director Development and Protective Services

Hydro One Networks Inc.
Real Estate Services,
Land Use Planning
P.O. Box 4300
Markham, ON L3R 5Z5

Phone: 905-946-6237
E-Mail: landuseplanning@hydroone.com

Attention: Dennis De Rango
Specialized Services Team Lead

Enbridge Gas Distribution Inc.
400 Coventry Road
Ottawa, ON K1K 2C7
Attention: Denis Comtois

Phone: 613-748-6795
E-Mail: denis.comtois@enbridge.com

Bell Canada
469 Coventry Road
PO Box 8239
Ottawa, ON K1G 3J4
Attention: Brad Wilson

Phone: 613-432-9101
E-Mail: bradwilson@bell.ca

Rogers Cable Communication Inc.
475 Richmond Road
Ottawa, ON K2A 3Y8

Phone:
E-Mail: joanshirley.zacharias@rci.rogers.com

From: [David Trick](#)
To: [Kevin Mooder](#)
Cc: [MSB](#)
Subject: Re: Perth Master Infrastructure Plan Western Annexed Area Class EA
Date: Wednesday, August 10, 2016 1:47:39 PM
Attachments: [image001.png](#)

Any and all information that you require should be on file with McIntosh Perry as they were the consultants for us. James Baxter is no longer involved with the Perth Golf Course.

Please direct any further correspondence to myself.

Regards,
David Trick

On Tue, Aug 9, 2016 at 11:30 AM, Kevin Mooder <kmooder@jp2g.com> wrote:

> Eric Cosens provided us with a list of contact persons regarding this
> project, see attached. I apologize in advance if there is an error or
> omission in this list
>
> Mr Nuttall is on holidays August 15-26, so in the meantime if you have any
> questions please do not hesitate to contact me.
>
>
>
> *Kevin Mooder, MCIP, RPP*
>
> T: 613-828-7800 x209
>
> 1150 Morrison Drive, Suite 410, Ottawa, Ontario, K2H 8S9
>
> [image: cid:image001.png@01D008AD.1ECF4950]
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>
> *Keep it Clean - Go Green*
>
>
>

From: [Inforequest, Kemptville \(MNRF\)](#)
To: bryanak@jp2g.com
Cc: [Inforequest, Kemptville \(MNRF\)](#)
Subject: MNR Kemptville District Information Request (2016_BAT-3631) Response
Date: Thursday, August 11, 2016 3:59:31 PM
Attachments: [ESA Infosheet-InfoRequest.pdf](#)
[NHIC-LIO Infosheet-InfoRequest.pdf](#)
[2016 BAT-3631 Response.pdf](#)
Importance: High

Hello,

Bryana Kenny
JP2G Consultants Inc.

Please find attached a response to your information request for project 'Perth Master Plan Class EA'.

In regard to your questions about the need to carry out new surveys – positive survey results are generally valid until there is sufficient survey effort to conclude that a previously occupied habitat has been permanently abandoned. The length of time negative survey results are considered valid is variable and dependent on considerations such as the species site fidelity, local habitat availability and site conditions. Generally, results have been considered valid for planning purposes for 1-2 years, after which species presence/absence and habitat use/mapping must be re-assessed. I recommend that new surveys be carried out as part of the updated EIS, including targeted surveys for gray ratsnake which is known to occur in the vicinity of the project site.

If you have any questions or concerns, please contact Mary Dillon at mary.dillon@ontario.ca.

Sincerely,

Information Request Services
Kemptville District
Ministry of Natural Resources

From: [Jamie Delaney](#)
To: kmooder@jp2g.com
Subject: EGD 12637906 - Perth Infrastructure Master Plan Western Annexed Area Class EA - GENERAL LOCATE
Date: Thursday, August 25, 2016 9:46:11 AM
Attachments: [12637906.zip](#)
[BOOKLETS.zip](#)

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Attached is the information you had requested.

The information provided is for GENERAL LOCATION ONLY. You must re-submit detailed drawings for sign-off by Enbridge Gas Distribution.

Should you require anything further please let me know.

Kind Regards,

Jamie Delaney

Distribution Planning & Records

ENBRIDGE GAS DISTRIBUTION

TEL: 416-495-6321, 866-326-2924 | FAX: 416-753-6941
500 Consumers Road North York, Ontario M2J 1P8

enbridgegas.com

Integrity. Safety. Respect.

Enbridge Gas Distribution cannot provide information regarding the depth of cover over our gas infrastructure.

We suggest that a field locate be performed through Ontario One Call (1800-400-2255).

If further details are still required, it is suggested that test holes be performed by an outside party in order to determine the actual Enbridge Infrastructure depth.

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From: Denis Comtois
Sent: Tuesday, August 09, 2016 3:04 PM
To: Mark-Ups
Cc: Shona Thirsk
Subject: EGD 12637906 - Perth Infrastructure Master Plan Western Annexed Area Class EA
Attachments: Utilities Letter.pdf; Notice of Study-July 19, 2016.pdf

Categories: Jamie

Please see attachments and respond to Consultant.
Thank you.

Denis Comtois
Leak Surveyor

613-513-3616 cell
613-748-6795 direct
Enbridge Gas Distribution Inc,
400 Coventry Road, Ottawa ON K1K 2C7

From: Kevin Mooder [mailto:kmooder@jp2g.com]
Sent: Tuesday, August 09, 2016 12:14 PM
To: landuseplanning@hydroone.com; Denis Comtois; brad.wilson@bell.ca;
joanshirley.zacharias@rci.rogers.com
Cc: ecosens@perth.ca; 'Doug Nuttall'
Subject: Perth Infrastructure Master Plan Western Annexed Area Class EA

Attached find a notice of study commencement and request for information
Mr Nuttall is on holidays August 15-26, so in the meantime if you require any clarification please do
not
hesitate to contact me.

Kevin Mooder, MCIP, RPP

T: 613-828-7800 x209

1150 Morrison Drive, Suite 410, Ottawa, Ontario, K2H 8S9

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Keep it Clean - Go Green

From: [Garrah, Lyn \(MNRF\)](#)
To: [Kevin Mooder](#); dougn@jp2g.com
Cc: ecosens@perth.ca
Subject: RE: Perth Infrastructure Master Plan Western Annexed Area Class EA
Date: Friday, August 26, 2016 4:34:01 PM
Attachments: [image001.png](#)

Hello,

The MNRF received the notice of study commencement. We sent an information letter for this file on August 11, 2016. The information from that letter should be helpful in scoping and assessing the presence and impact on natural heritage features and species at risk in the study area. Please send me further notice as the project proceeds through the Municipal Class EA process, and send any reports relating to MNRF's mandate for our review and comment.

Thank you sincerely.

Lyn

Lyn Garrah, M.E.S.
District Planner

Ministry of Natural Resources and Forestry
Kemptville District
10 Campus Drive, PO Box 2002, Kemptville, ON K0G 1J0
613-258-8414

From: Kevin Mooder [mailto:kmooder@jp2g.com]
Sent: August 9, 2016 11:30 AM
To: Mitchell, Vicki (MOECC); Burns, Steve (MOECC); Kurt Greaves; ldonaldson@tayvalley.ca; 'Glen McDonald'; paula.stewart@healthunit.org; Garrah, Lyn (MNRF); Janet Stavinga (Algonquins Of Ontario); Campbell, Paige (MTCS); Schaefer, Damien (MAH)
Cc: ecosens@perth.ca; 'Doug Nuttall'
Subject: Perth Infrastructure Master Plan Western Annexed Area Class EA

Mr Nuttall is on holidays the week of August 15 to 26, in the meantime if you have any questions please do not hesitate to contact me.

Kevin Mooder, MCIP, RPP
T: 613-828-7800 x209
1150 Morrison Drive, Suite 410, Ottawa, Ontario, K2H 8S9
[cid:image001.png@01D008AD.1ECF4950](#)

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Doug Nuttall

From: Doug Nuttall
Sent: September 3, 2016 11:48 AM
To: brenda.ken.wright
Subject: RE: Perth Infrastructure Master Plan Wester Annexed Area Class EA

Thank you both for coming in and discussing this project with me on Friday, September 2, 2016.

I am including a summary of the topics we discussed and action items that we agreed to:

The Environmental Assessment process is intended to find the most effective method of servicing (transportation, water, sanitary, storm) the western annex as a whole, including the Tayview property and the Golf Course property.

The intent is to develop as little new information as possible, and rather rely on existing information to make the required assessments.

Additional information is currently being collected by the Town of Perth on existing traffic counts, and while this was originally expected to be available in July, it is currently expected in October.

JP2G, together with our sub-consultants, will develop projected future traffic counts, pedestrian and cycling routes, service capacities for Sanitary and Water, etc., and from that develop a decision matrix for servicing options.

We will be arranging for geotechnical investigations at the most logical crossing location(s) to develop an approximate cost of construction of a potential new river crossing(s).

In the event that a crossing is to be considered adjacent to or through your property, I will contact you directly to obtain access through your property for the geotechnical investigation equipment – likely a truck mounted drill rig.

It is not expected at this time that we will need access to your property for other purposes. If this changes, I will contact you to discuss what information we would require, and what access we would require to collect that information.

The results of our traffic studies will be useful to you as part of your subdivision planning and approval process.

The results of our compilation efforts of the existing data may be useful to you, if only to identify existing data gaps that would need to be filled through the subdivision process.

The original completion date for the EA was intended to be in December, 2016. As some of the critical data has not been made available as expected, the completion date will be later than originally expected. At this time, it is expected that completion will be in January, 2017.

Action Items:

JP2G will prepare these notes of our meeting.

JP2G will maintain communication with Brenda and Ken Wright throughout the EA process.

JP2G will contact Brenda and Ken Wright to specifically arrange access for the geotechnical investigation.

JP2G will contact Brenda and Ken Wright if any other reasons to access their property develop throughout the EA process.

Douglas Nuttall, P.Eng.
Senior Civil Engineer

T: 613-828-7800 x202
C: 613-281-8762
40 Sunset Drive, Suite 40, Perth, Ontario, K7H 2Y4



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By email only

September 9, 2016

Jp2g Consultants Inc.

Attention: Doug Nuttall, P. Eng., Project Manager
dougn@jp2g.com

Dear Mr. Nuttall:

Re: Town of Perth Infrastructure Master Plan Western Annexed Area

Thank you for providing the Notice of Study Commencement on August 9, 2016. The Notice indicates that the project is following the Master Planning process in the Municipal Class EA, and will address phases 1 and 2 of the Municipal Class EA process.

Please keep me on your mailing list for notices. In addition, it is helpful to provide scanned copies of the notices as they appear in newspapers, and confirm the dates of publication and names of the newspapers.

Master Plan Process

The Master Plan process is discussed in section A.2.7 and Appendix 4 of the Class EA. Appendix 4 of the Class EA sets out different approaches that could be followed, and includes sample notices. It is preferable to determine the Master Plan approach at an early stage of the process, so that the public and commenting agencies are aware of future commenting opportunities, appeal mechanisms, and additional work needed for individual projects in the plan.

For example, the proponent will need to decide whether the final notice of study completion for the Master Plan will also serve as a final notice of completion for some or all of the schedule B projects identified in the Master Plan. In this case, the notice should list the specific schedule B projects and include a statement informing the public that they have a right to request a Part II Order for the specified projects (approach # 2).

Alternatively, if the proponent has determined that additional EA work and public consultation is needed before the schedule B and C projects are deemed to be completed, and the Master Plan simply provides the framework for future decisions, then the Master Plan is not subject to Part II Order requests, and the notice would not include a statement about the Part II Order mechanism (approach # 1, sample notice # 3).

Approach # 4 involves integrating the Master Plan with a planning approval such as an Official Plan or a comprehensive Official Plan Amendment. With this approach, the Master Plan must meet the requirements set out in Section A.2.9 of the Municipal Class EA.

The proponent should be aware that copies of notices must be provided to the Director of this ministry's Environmental Approvals Branch, with a brief summary of how the Master Plan followed the Class EA requirements. This information is required to be sent to EAB for tracking purposes, to monitor the effectiveness of the Master Plan approach at MEA.Notices.EAAB@ontario.ca.

The Master Plan document should clearly define the projects which will be carried out under the Master Plan, the appropriate schedule for each project, future documentation or studies that will be needed, and future public consultation opportunities for each project or class of projects. The Master Plan should also explain the appeal mechanisms for the projects in the plan (for example, opportunities to request a Part II Order at a later date, appeal to OMB if integration with a Planning Act approval is proposed). We recommend that the Master Plan include a chart which summarizes the above information.

As the Master Plan is intended to satisfy Phases 1 and 2 of the Municipal Class EA process, the Master Plan should evaluate alternatives and identify impacts to the environment. The description and evaluation of alternatives should be completed in sufficient detail to allow any reviewer to understand the advantages and disadvantages of each alternative and the rationale for selecting the preferred alternative. The Master Plan may also identify technical studies that will be carried out in future as the individual projects within the Master Plan are further developed.

The Ministry of the Environment and Climate Change Areas of Interest

This ministry's interest in infrastructure projects includes impacts to surface water from stormwater discharge, impacts to groundwater and surface water quality and quantity due to construction (for example, water crossings, dewatering, control of erosion and sedimentation, spill control), noise and air quality impacts to nearby residents or planned subdivisions, potential for encountering contaminated soil or contaminated sediment, and appropriate removal and disposal of waste material. These issues should be addressed during the EA process.

This ministry's interest in road projects includes impacts to surface water from stormwater discharge, impacts to groundwater and surface water quality and quantity due to construction (for example, water crossings, dewatering, control of erosion and sedimentation, spill control), noise and air quality impacts to nearby residents or planned subdivisions, potential for encountering contaminated soil or contaminated sediment, and appropriate removal and disposal of waste material. These issues should be addressed during the EA process.

The following comments are standard Ministry of the Environment and Climate Change (the “ministry”) comments for road projects. They may not all apply to the proposed project.

Noise and Vibration

The Project File should include commitments to comply with municipal noise bylaws, implement general noise control measures, investigate noise complaints, and comply with ministry sound level criteria for construction equipment.

Where there is a potential for permanent noise increases from this project, a noise study should be completed as part of the Class EA process to assess impacts on residences, proposed residential development, or other sensitive land uses. This noise assessment should be available to the public during the Class EA process and should be included in the Project File.

If blasting is required, pre-blast surveys are recommended, and the proponent should establish protocols for notifying residents and addressing blasting complaints. Noise, dust and flyrock should be controlled.

Water

Where there is a potential to impact creeks, rivers and lakes, appropriate mitigation measures should be considered prior to construction:

- machinery should not operate directly in a watercourse;
- refuelling of all vehicles and equipment should be done away from watercourses;
- adequate erosion and sedimentation controls must be incorporated into the planning and construction for the project;
- the time between excavation and restoration must be kept to a minimum,
- disturbed shoreline should be stabilized as soon as possible;
- removal of vegetation from the right-of-way should be kept to a minimum;
- materials removed and stockpiled such as excavated soil and backfill material must be contained in a manner to ensure sediment does not enter a waterway;
- contingency plans should be developed to respond to spills from equipment or release of sediment into a waterway;
- spill containment materials should be available on site and workers should be trained on spill containment and other contingency measures; and,
- construction work should be monitored to ensure mitigation measures are working and to ensure contingency plans are implemented when necessary (for example, in-stream turbidity and suspended solids).

If construction involves taking, dewatering, storage or diversion of water in excess of 50,000 litres per day, the activity may be required to be registered on the Environmental Activity and Sector Registry (EASR) or may require a Permit To Take Water. The process to be used depends on the source of the water, the quantity of water taken, and the type of construction activity. EASR requirements for water takings for road

construction and construction dewatering are prescribed in Ontario Regulation 63/16 under the Environmental Protection Act. The Permit To Take Water requirements are prescribed in Section 34, Ontario Water Resources Act.

Guidance on nearshore construction and dredging may be obtained from the following ministry guidelines:

- *B-6 Guidelines for Evaluating Construction Activities Impacting on Water Resources,*
- *Evaluating Construction Activities Impacting on Water Resources, Part III A, Part III B, and Part III C (dredging handbook) and accompanying Appendix A Provincial Sediment Quality Guidelines,*
- *Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario: An Integrated Approach.*

Stormwater management should be in accordance with the *Stormwater Management Planning and Design Manual*. Stormwater ponds require an approval under section 53 of the Ontario Water Resources Act.

The ministry has concerns with the use of a cured-in-place process (CIPP) for culverts. Styrene released into the environment can result in harm to fish.

Waste

Waste, including contaminated soil, must be managed in accordance with MOECC standards. The Environmental Protection Act (EPA) and Regulation 347 require waste to be classified and disposed of appropriately. When determining the waste category, the proponent must ensure compliance with Schedule 4 of Regulation 347.

Where the removal and movement of soils is required for the project, we recommend that you refer to the MOECC document *Management of Excess Soil – A Guide for Best Management Practices* and Ontario Regulation 153/04 and the accompanying *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* for guidance on assessment, management, restoration and soil quality criteria.

The Waste Disposal Site Inventory, dated June 1991, may be helpful in identifying the locations of open and closed waste disposal sites in Ontario.

Spills should be reported to the Spills Action Centre at 1-800-268-6060.

Consultation with First Nation and Métis Communities

Your proposed project may have the potential to affect Aboriginal communities who hold or claim Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982.

The Crown has a duty to consult First Nation and Métis communities when it knows about established or credibly asserted Aboriginal or treaty rights, and contemplates decisions or actions that may adversely affect them.

Although the Crown remains responsible for ensuring the adequacy of consultation with potentially affected Aboriginal communities, it may delegate procedural aspects of the consultation process to project proponents.

The environmental assessment process requires proponents to consult with interested persons and government agencies, including those potentially affected by the proposed project. This includes a responsibility to conduct adequate consultation with First Nation and Métis communities.

The ministry relies on consultation conducted by proponents when it assesses the Crown's obligations and directs proponents during the regulatory process.

Where the Crown's duty to consult is triggered in relation to your proposed project, the ministry is delegating the procedural aspects of rights-based consultation to you through this letter.

Steps that you may need to take in relation to Aboriginal consultation for your proposed project are outlined in the attached "Aboriginal Consultation Information" document. Please complete the checklist contained there, and keep related notes as part of your consultation record. Doing so will help you assess your project's potential adverse effects on Aboriginal or treaty rights.

You must contact the Director, Environmental Approvals Branch if you have reason to believe that your proposed project may **adversely affect an Aboriginal or treaty right, consultation has reached an impasse**, or if a Part II Order request is anticipated. The ministry will then assess the extent of any Crown duty to consult in the circumstances, and will consider whether additional steps should be taken and what role you will be asked to play in them.

Should you or any members of your project team have any questions regarding the material above, please contact me at (613) 540-6852.

Yours truly,



Vicki Mitchell
Environmental Assessment Coordinator
Eastern Region
VM/dv

ec: Eric Cosens, Director Development and Protective Services, Town of Perth
ecosens@perth.ca

ABORIGINAL CONSULTATION INFORMATION

Consultation with Interested Persons under the Ontario Environmental Assessment Act

Proponents subject to the Ontario *Environmental Assessment Act* are required to consult with interested persons, which may include First Nations and Métis communities. In some cases, special efforts may be required to ensure that Aboriginal communities are made aware of the project and are afforded opportunities to provide comments. Direction about how to consult with interested persons/communities is provided in the Code of Practice: Consultation in Ontario's Environmental Assessment Process available on the Ministry's website:

<https://www.ontario.ca/environment-and-energy/consultation-ontarios-environmental-assessment-process>

As an early part of the consultation process, proponents are required to contact the Ontario Ministry of Aboriginal Affairs' Consultation Unit and visit Aboriginal Affairs and Northern Development Canada's Aboriginal and Treaty Rights Information System (ATRIS) to help identify which First Nation and Métis communities may be interested in or potentially impacted by their proposed projects.

ATRIS can be accessed through the Aboriginal Affairs and Northern Development Canada website:

http://sidait-atris.aadnc-aandc.gc.ca/atris_online/

For more information in regard Aboriginal consultation as part of the Environmental Assessment process, refer to the Ministry's website:

www.ontario.ca/government/environment-assessments-consulting-aboriginal-communities

You are advised to provide notification directly to all of the First Nation and Métis communities who may be interested in the project. You should contact First Nation communities through their Chief and Band Council, and Metis communities through their elected leadership.

Rights-based consultation with First Nation and Métis Communities

Proponents should note that, in addition to requiring interest-based consultation as described above, certain projects may have the potential to adversely affect the ability of First Nation or Métis communities to exercise their established or credibly asserted Aboriginal or treaty rights. In such cases, Ontario may have a duty to consult those Aboriginal communities.

Activities which may restrict or reduce access to unoccupied Crown lands, or which could result in a potential adverse impact to land or water resources in which harvesting rights are exercised, may have the potential to impact Aboriginal or treaty rights. For assistance in determining whether your proposed project could affect these rights, please refer to the attached "Preliminary Assessment Checklist: First Nation and Métis Community Interest."

If there is likely to be an adverse impact to Aboriginal or treaty rights, accommodation may be required to avoid or minimize the adverse impacts. Accommodation is an outcome of consultation and includes any mechanism used to avoid or minimize adverse impacts to Aboriginal or treaty rights and traditional uses. Solutions could include mitigation such as

adjustments in the timing or geographic location of the proposed activity. Accommodation may in certain circumstances involve the provision of financial compensation, but does not necessarily require it.

For more information about the duty to consult, please see the Ministry's website at:

www.ontario.ca/government/duty-consult-aboriginal-peoples-ontario

The proponent must contact the Director, Environmental Approvals Branch if a project may adversely affect an Aboriginal or treaty right, consultation has reached an impasse, or if a Part II Order or an elevation request is anticipated; the Ministry will then determine whether the Crown has a duty to consult.

The Director of the Environmental Approvals Branch can be notified either by email with the subject line "Potential Duty to Consult" to EAASIBGen@ontario.ca or by mail or fax at the address provided below:

Email:	EAASIBGen@ontario.ca Subject: Potential Duty to Consult
Fax:	416-314-8452
Address:	Environmental Approvals Branch 135 St. Clair Avenue West, 1 st Floor Toronto, ON, M4V 1P5

Delegation of Procedural Aspects of Consultation

Proponents have an important and direct role in the consultation process, including a responsibility to conduct adequate consultation with First Nation and Métis communities as part of the environmental assessment process. This is laid out in existing environmental assessment codes of practice and guides that can be accessed from the Ministry's environmental assessment website at

www.ontario.ca/environmentalassessments

The Ministry relies on consultation conducted by proponents when it assesses the Crown's obligations and directs proponents during the regulatory process. Where the Crown's duty to consult is triggered, various additional procedural steps may also be asked of proponents as part of their delegated duty to consult responsibilities. In some situations, the Crown may also become involved in consultation activities.

Ontario will have an oversight role as the consultation process unfolds but will be relying on the steps undertaken and information you obtain to ensure adequate consultation has taken place. To ensure that First Nation and Métis communities have the ability to assess a project's potential to adversely affect their Aboriginal or treaty rights, Ontario requires proponents to undertake certain procedural aspects of consultation.

The proponent's responsibilities for procedural aspects of consultation include:

- Providing notice to the elected leadership of the First Nation and/or Métis communities (e.g., First Nation Chief) as early as possible regarding the project;

- Providing First Nation and/or Métis communities with information about the proposed project including anticipated impacts, information on timelines and your environmental assessment process;
- Following up with First Nation and/or Métis communities to ensure they received project information and that they are aware of the opportunity to express comments and concerns about the project. If you are unable to make the appropriate contacts (e.g. are unable to contact the Chief) please contact the Environmental Assessment and Planning Coordinator at the Ministry's appropriate regional office for further direction.
- Providing First Nation and/or Métis communities with opportunities to meet with appropriate proponent representatives to discuss the project;
- Gathering information about how the project may adversely impact the relevant Aboriginal and/or Treaty rights (for example, hunting, fishing) or sites of cultural significance (for example, burial grounds, archaeological sites);
- Considering the comments and concerns provided by First Nation and/or Métis communities and providing responses;
- Where appropriate, discussing potential mitigation strategies with First Nation and/or Métis communities;
- Bearing the reasonable costs associated with these procedural aspects of consultation, which may include providing support to help build communities' capacity to participate in consultation about the proposed project.
- Maintaining a Consultation Record to show evidence that you, the proponent, completed all the steps itemized above or at a minimum made meaningful attempts to do so.
- Upon request, providing copies of the Consultation Record to the Ministry. The Consultation Record should:
 - summarize the nature of any comments and questions received from First Nation and/or Métis communities
 - describe your response to those comments and how their concerns were considered
 - include a communications log indicating the dates and times of all communications; and
 - document activities in relation to consultation.

Successful consultation depends, in part, on early engagement by proponents with First Nation and Métis communities. Information shared with communities must be clear, accurate and complete, and in plain language where possible. The consultation process must maintain sufficient flexibility to respond to new information, and we trust you will make all reasonable efforts to build positive relationships with all First Nation and Métis communities contacted. If you need more specific guidance on Aboriginal consultation steps in relation to your proposed project, or if you feel consultation has reached an impasse, please contact the Environmental Assessment and Planning Coordinator at the Ministry's appropriate regional office.

Preliminary Assessment Checklist: First Nation and Métis Community Interests and Rights

In addition to other interests, some main concerns of First Nation and Métis communities may pertain to established or asserted rights to hunt, gather, trap, and fish – these activities generally occur on Crown land or water bodies. As such, projects related to Crown land or water bodies, or changes to how lands and water are accessed, may be of concern to Aboriginal communities.

Please answer the following questions and keep related notes as part of your consultation record. “Yes” responses will indicate a potential adverse impact on Aboriginal or treaty rights.

Where you have identified that your project may trigger rights-based consultation through the following questions, you should arrange for a meeting between you and the Environmental Assessment and Planning Coordinator at the Ministry's appropriate regional office to provide an early opportunity to confirm whether Ontario's duty to consult is triggered and to discuss roles and responsibilities in that event.

	YES	NO
1. Are you aware of concerns from First Nation and Métis communities about your project or a similar project in the area? The types of concerns can range from interested inquiries to environmental complaints, and even to land use concerns. You should consider whether the interest represents on-going, acute and/or widespread concern.		
2. Is your project occurring on Crown land, or is it close to a water body? Might it change access to either?		
3. Is the project located in an open or forested area where hunting or trapping could take place?		
4. Does the project involve the clearing of forested land?		
5. Is the project located away from developed, urban areas?		
6. Is your project close to, or adjacent to, an existing reserve? Projects in areas near reserves may be of interest to the First Nation and Métis communities living there.		
7. Will the project affect First Nations and/or Métis ability to access areas of significance to them?		
8. Is the area subject to a land claim? Information about land claims filed in Ontario is available from the Ministry of Aboriginal Affairs; information about land claims filed with the federal government is available from Aboriginal Affairs and Northern Development Canada.		
9. Does the project have the potential to impact any archaeological sites?		

Ministry of Tourism,
Culture and Sport

Heritage Program Unit
Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel: 416 314 7145
Fax: 416 212 1802

Ministère du Tourisme,
de la Culture et du Sport

Unité des programmes patrimoine
Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto ON M7A 0A7
Tél: 416 314 7145
Télééc: 416 212 1802



September 26, 2016 (EMAIL ONLY)

Doug Nuttall, P.Eng.
Jp2g Consultants Inc.
1150 Morrison Drive, Suite 410
Ottawa, ON K2H 8S9
E: dogn@jp2g.com

RE: MTCS file #: 0005630
Proponent: Town of Perth
**Subject: Notice of Commencement, Municipal Class Environmental Assessment
Infrastructure Master Plan Western Annexed Area**
Location: Town of Perth, County of Lanark, Ontario

Dear Doug Nuttall:

Thank you for providing the Ministry of Tourism, Culture and Sport (MTCS) with the Notice of Commencement for your project. MTCS's interest in this Master Plan project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- Archaeological resources, including land-based and marine;
- Built heritage resources, including bridges and monuments; and,
- Cultural heritage landscapes.

Under the Municipal Class Environmental Assessment (EA) process, the proponent is required to determine a project's potential impact on cultural heritage resources. A Master Plan project at minimum will address Phases 1 and 2 of the Municipal Class EA process. Developing and reviewing inventories of known and potential cultural heritage resources within the study area can identify specific resources that may play a significant role in guiding the evaluation of alternatives for subsequent project-driven EAs.

While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation. Aboriginal communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Aboriginal communities includes a discussion about known or potential cultural heritage resources that are of value to these communities. Municipal Heritage Committees, historical societies and other local heritage organizations may also have knowledge that contributes to the identification of cultural heritage resources.

Archaeological Resources

Your Master Plan project may impact archaeological resources and you should screen the project with the MTCS [Criteria for Evaluating Archaeological Potential](#) and [Criteria for Evaluating Marine Archaeological Potential](#) to determine if an archaeological assessment is needed. MTCS archaeological sites data are available at archaeology@ontario.ca. If your Master Plan project area exhibits archaeological potential, then an archaeological assessment (AA) should be undertaken by an archaeologist licenced under the OHA, who is responsible for submitting the report directly to MTCS for review.

Built Heritage and Cultural Heritage Landscapes

The MTCS [Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes](#) should be completed to help determine whether your Master Plan project may impact cultural heritage resources. The Clerks for the Town of Perth and County of Lanark can provide information on property registered or designated under the *Ontario Heritage Act*. Municipal Heritage Planners can also provide information that will assist you in completing the checklist.

If potential or known heritage resources exist, MTCS recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, should be completed to assess potential project impacts. Our Ministry's [Info Sheet #5: Heritage Impact Assessments and Conservation Plans](#) outlines the scope of HIAs. Please send the HIA to MTCS for review, and make it available to local organizations or individuals who have expressed interest in review.

Environmental Assessment Reporting

All technical heritage studies and their recommendations are to be addressed and incorporated into Master Plan projects. Please advise MTCS whether any technical heritage studies will be completed for your Master Plan project, and provide them to MTCS before issuing a Notice of Completion. If your screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the Master Plan report or file.

Thank-you for consulting MTCS on this project: please continue to do so through the Master Plan process, and contact me for any questions or clarification.

Sincerely,

Joseph Muller, RPP/MCIP
Heritage Planner
Joseph.Muller@Ontario.ca

Copied to: Eric Cosens, Director Development and Protective Services, Town of Perth

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their Master Plan report or file is accurate. MTCS makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the Master Plan process, and in no way shall MTCS be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Please notify MTCS if archaeological resources are impacted by Master Plan project work. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the Ontario Heritage Act and the Standards and Guidelines for Consultant Archaeologists.

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

From: [Doug Nuttall](#)
To: [Kevin Mooder](#)
Subject: Fwd: Inquiry/ concern re Master Plan process
Date: Tuesday, September 27, 2016 8:05:42 PM
Attachments: [image001.png](#)

Sent from my iPhone

Begin forwarded message:

From: Eric Cosens <ecosens@perth.ca>
Date: September 27, 2016 at 7:40:58 PM EDT
To: Doug Nuttall <dougn@jp2g.com>
Cc: Julianna Zhuo <jzhuo@perth.ca>
Subject: Inquiry/ concern re Master Plan process

Hello Doug: I have been contacted by a resident who has an interest in the environment generally and in the Blanding's Turtle in particular. Jim Ronson has submitted a Parks Canada info sheet on the Turtle and expressed the opinion that the entire Golf Course site may be unsuitable for development given the presence of the Turtle in the adjacent reach of the Tay River and associated wetlands. He has advised that he understands the turtle can nest up to a half mile upland from its normal habitat. He wants to know what consideration will be given to the turtle during the Master Plan process. He did not say specifically but I anticipate from our discussion that any suggestion that a bridge could be inserted within the Turtle's habitat would be, in his perspective, totally unacceptable. His phone number is 613-264-1937. His address for future notification is 105 Peter Street K7H 1S4.

I would appreciate it if you could contact him to discuss how endangered species will be considered through the Master Plan process. Please let me know the outcome of any discussions you may have.

Thanks.

Eric Cosens
Director of Development and Protective Services

Corporation of the Town of Perth
80 Gore Street East
Perth, Ontario
K7H 1H9

Tel: [\(613 \) 267-3311 ext. 2235](tel:(613)267-3311)
Fax: [\(613 \) 267-5635](tel:(613)267-5635)
Email: ecosens@perth.ca
Web: www.perth.ca

Also please visit Perth Tourism on Facebook

Description: facebook-icon



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THE CORPORATION OF THE TOWN OF PERTH

Western Annexed Area of Perth Infrastructure Master Plan Notice of Public Consultation Centre

The lands annexed to the Town in 2009 along the western boundary included the Perth Golf Course landholdings and the Tayview property (Sales Barn site) which are proposed to accommodate future residential growth. The Infrastructure Master Plan identifies development constraints and opportunities and provides a functional design solution for transportation, water distribution, wastewater collection and storm drainage to service future Plan of Subdivision development applications under the Planning Act.

This Infrastructure Master Plan is being planned as a Schedule B project under the Municipal Class Environmental Assessment. Before selection of the preferred solutions the Town of Perth wishes to obtain public input on the transportation and servicing alternatives, and the preliminary identification of a preferred master plan solution.

Monday March 25, 2019
Open House 3:30 pm to 4:30 pm
Presentation 5:00 pm
Municipal Building: 80 Gore Street East

Following the public consultation centre, further comments are invited for incorporation into the planning and design of this project and will be received until April 3, 2019. Subject to comments received because of this Notice, the Town plans to finalize the Infrastructure Master Plan and place on the public record for a minimum 30-day review period.

If you require additional information or wish to be added to the mailing list, please contact:

Forbes Symon, MCIP RRP
Director Development and Protective Services
Town of Perth
80 Gore Street East
Perth, ON K7H 1H9
Ph: 613-267-3311 Ext. 2235
Email: fsymon@perth.ca

Doug Nuttall, P.Eng.
Project Manager
Jp2g Consultants Inc.
40 Sunset Blvd. Unit 40
Perth, ON K7H 1H9
Ph: 613-828-7800 Ext. 202
dougn@jp2g.com

This Notice issued March 6, 2019



March 22, 2019
19-TOP-EA

3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
T 613-692-3571 | 1-800-267-3504
F 613-692-0831 | www.rvca.ca

Town of Perth
80 Gore Street East
Perth, ON
K7H 1H9

Attention: Forbes Symon

Subject: **Infrastructure Master Plan – Wester Annex in the Town of Perth
dated 31 January, 2019**

Lands in Part Lot 25 and 26, Concession 2, geographic Township of
Bathurst, now the Town of Perth (Roll Numbers 09219110350950000000
and 09219110350930000000)

Dear Mr. Symon,

The Rideau Valley Conservation Authority (RVCA) has reviewed the subject document, in fulfillment of our regulatory requirements and memorandum of agreement with the County of Lanark, within the context of:

- Section 1.6.6 Sewage, Water and Stormwater, 2.1 Natural Heritage, 2.2 Water and 3.1 Natural Hazards of the Provincial Policy Statement under Section 3 of the Planning Act;
- The Rideau Valley Conservation Authority Development Policies ("Development, Interference with Wetlands and Alteration to Shorelines and Watercourses" regulation 174/06 under Section 28 of the Conservation Authorities Act);
- The Mississippi-Rideau Source Water Protection Plan;
- The Tay Subwatershed Report
- The Tay River – Perth Catchment Report;
- The Tay River – Grants Creek Catchment Report;
- The Blueberry Creek Flood Risk Mapping Report;
- The Tay River Flood Plain Mapping Report – Glen Tay to Lower Rideau;

In addition to these documents, the reviewing planner has referred to the Stormwater Management Planning and Design Manual as an appropriate template for reviewing a project of this scope and nature.

The Document

The document is titled "*Infrastructure Master Plan – Western Annex in the Town of Perth*". It is dated 31 January, 2019 and was received by our office on 27 February, 2019.

The RVCA understands that this document has been commissioned by the Town of Perth in support of a related Official Plan Amendment (OPA-16).

The Area

The Infrastructure Master Plan (IMP) considers future development, infrastructure and servicing to an area of the Town of Perth known as the "western annex". It is also known as the "golf course lands", for those lands south of the Tay River, and "Sale Barn" for those lands north of the Tay River.

Discussion

Stormwater Management Planning and Design Manual

This manual advocates the combination of environmental and municipal land use planning as there are inter-relationships between the two fields of planning. For the submitted IMP, where there are complementary planning documents, it is important that they be considered holistically. Therefore, it is appropriate to consider watershed studies and catchment reports concurrently with the Town's Official Plan. The Manual advocates for understanding existing environmental conditions when undertaking large scale planning. Although not always required, typical components that need to be identified include:

- Surface water resources, including an evaluation of the water budget, baseflows, and peak flows as well as flood line assessment;
- Hydrogeology, including definition of geologic conditions; groundwater flow patterns and recharge/discharge areas; location, capacity, and quality of aquifers; and quantification of existing well usage;
- Surface water quality, including characterization of water quality constituents for dry and wet weather conditions;
- Fluvial geomorphology, including classification of streams with respect to their stability and sensitivity to land use change;
- Terrestrial resources, including characterization of resources such as wetlands, woodlands, landforms and specially designated natural areas; and
- Aquatic resources, including fish and macroinvertebrate (aquatic insect) inventories.

When all of this information is collected, it can establish the existing environmental conditions, identify their linkages, establish goals, evaluate alternatives and select the preferred approach for development.

Provincial Policy Statement

These PPS excerpts were first provided on the RVCA comment letter for the Town of Perth's Official Plan Amendment 16. They are repeated here as they are relevant to the IMP document we are reviewing.

Planning authorities are required to provide infrastructure in a coordinated, efficient and cost-effective manner that considers impacts from climate change while accommodating projected needs (Section 1.6). Authorities must ensure that infrastructure systems are provided in a manner that can be sustained, are feasible, financially viable and complies with all regulatory requirements. In addition, these systems need to ensure that human health and the natural environment are protected (Section 1.6.6.1[b]).

When planning for stormwater management, authorities shall minimize, or where possible, prevent increases in contaminant loads (Section 1.6.6.7). Authorities are also required to consider significant resources identified in Section 2.0 of the PPS when planning for corridors and rights-of-way for significant transportation, and infrastructure facilities (Section 1.6.8.5).

Planning authorities are required to protect natural features for the long-term (Section 2.1.1) and also maintain, restore or improve the diversity and connectivity of natural features in an area and the long-term ecological and biodiversity of natural heritage systems (Section 2.1.2). Development and site alteration are permitted on adjacent lands to natural heritage features, but only when demonstrated that there will be no negative impacts on these features or their ecological functions (Section 2.1.8).

Water quality and quantity shall be protected, improved or restored by minimizing potential negative impacts, including cross-jurisdictional and cross-watershed impacts, identifying water resource systems. This includes ground and surface water features, and natural heritage features including shorelines. Linkages between all these features are required to be maintained and this may require necessary restrictions on development and site alteration to protect all municipal drinking water supplies, designated vulnerable areas, sensitive surface and ground water features and their hydrologic functions. Protection of water quality and quantity can be further achieved through the use of stormwater management practices that minimize stormwater volumes and contaminant loads and maintain or increase the extent of pervious surfaces and vegetative cover (Section 2.2.1).

The PPS recognizes that Ontario's long-term economic prosperity, environmental health and social well-being depend on reducing the potential for public cost or risk to Ontario's residents from natural or human made hazards.

To ensure that these parameters are respected, development shall be directed away from natural or human-made hazards where there is an unacceptable risk to public health or safety or of property damage, and not create new or aggravate existing hazards (Section 3.0).

Natural hazards refers to hazardous lands adjacent to river systems which are impacted by flooding hazards, and development shall generally be directed to areas outside of these hazards and areas adjacent to them (Section 3.1.1). Section 3.0 of the PPS further states that development and site alteration shall not be permitted within areas that would be rendered inaccessible to people and vehicles during times of flooding hazards, unless it has been demonstrated that the site has safe access appropriate for the nature of the development and the natural hazard (Section 3.1.2). In the consideration of these hazards, planning authorities are required to consider the potential impacts of climate change that may increase the risk associated with natural hazards (Section 3.1.3).

Ontario Regulation 174/06

The reviewing planner would like to highlight several areas within the preferred solution identified as part of the IMP where Ontario Regulation 174/06 (Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses) would apply.

A review of our records indicates the presence of the Grant's Creek Provincially Significant Wetland, located within the subject area, to the southwest of the proposed lot layout for the golf course lands. Many of the lots indicated in the preferred layout would be within the adjacent lands of this wetland. Therefore permits from our office would be required based on the potential for interference.

A review of our records also indicates the 1:100 year floodplain located on both the golf course lands and Sale Barn properties. As proposed in the IMP, it appears that the golf course lands would need to proceed through a balanced cut in fill if the preferred solution is to be realized. Our regulatory policies indicate that public infrastructure, including stormwater management facilities, and various utilities shall not generally be permitted within the 1:100 year regulatory floodplain except where the development has been approved through a satisfactory Environmental Assessment process clearly demonstrating that there is no viable alternative and / or if it has been demonstrated to the satisfaction of the Conservation Authority that the control of flooding, erosion, pollution or the conservation of land will not be affected.

Watercourses, including headwater drainage features (HDFs), the Tay River and Blueberry Creek are also located within the subject study area. Development is required to be setback a minimum of 30 metres from the normal high water mark of a watercourse or beyond the floodplain, whichever is greater, in accordance with our regulatory policies.

Any future development located within or adjacent provincially significant wetlands or the regulatory floodplain, and any alterations to watercourses, including changes in flow, requires the prior written permission of the RVCA in accordance with Regulation 174/06.

Catchment Reports

The RVCA produces catchment reports which provide information on the health of a catchment area based on many parameters assessed by the Provincial Water Quality Objective (PWQO) guidelines. These objectives assess watershed health based on a variety of factors, including, but not limited to, nutrient levels (such as nitrogen and phosphorus), presence or absence of *E. coli*, riparian vegetation and fish surveys. It is important to consider the information in the catchment reports in a holistic manner.

An appendix with all fish species encountered in the two catchment reports has been provided to this comment letter. This should be forwarded to any consultants completing future work on this project and can assist with forming part of the existing conditions.

Tay Subwatershed Report

The Tay Subwatershed indicates that efforts should be made to support reforestation and protect what remains in all catchments, but with a focus on the Perth and Grant's Creek catchments where forest cover is less than 30%. In the long term, sustained water supplies and effective flood damage reduction will depend, in large part, on maintaining the remaining wetland features throughout the watershed and restoring them in those area that are more prone to the impacts of a changing climate (i.e. poorer water quality conditions, stressed water supplies, increased flooding and erosion and reduced biodiversity). The report advocates for a 30 metre naturally vegetated buffer on either side of a watercourse to be maintained over 75% of its length for the protection of water quality and instream shoreline habitat. The Perth and Grants Creek catchments do not currently meet the 75% guideline, therefore, restoration efforts should be undertaken. Perth and Grants Creek catchments are also identified as locations for focused reforestation. If the RVCA can assist with reforestation efforts and protection, we would be pleased to help.

Tay River – Grants Creek Catchment Report

The Grants Creek catchment report identifies water quality as being "very good" at the upstream end of the catchment to "fair" just upstream of the Grants Creek wetland at Grant's Creek Station 1. At this station, our records indicate that total phosphorus and nitrogen are consistently above PWQO guidelines. Total phosphorus concentrations meet the guideline only 33% of the time and nitrogen only 26% of the time. The report also identifies high concentrations of aluminum before Grant's Creek enters the Grant's Creek Wetland. The average concentration is 0.110 mg/L which is below the guideline 67% of the time.

Reasons for elevated metals/nutrients may be from runoff due to meltwater and rainfall which transports pollutants from farms, yards, roads and parking lots. Identification is difficult, and efforts should continue to be made to improve overall stream health and lessen downstream impacts on the Tay River.

Tay River – Town of Perth Catchment Report

The most recent report for the Town of Perth catchment indicates that the water quality index is “fair” and “good” within the catchment based on occasional exceedances of nitrogen when compared to PWQO guidelines. Bacteriological contamination does occur in this part of the Tay River, though this is not a persistent problem. Metal pollution is also occasionally an issue in this part of the Tay River. Some invasive species, such as European frogbit, yellow iris and flowering rush have been encountered along this section of the Tay River.

The future Sale Barn and Golf Course Lands are listed as a site for potential riparian restoration in this catchment report. The report indicates that there is limited stream shading from shoreline vegetation. It recommends that the riparian corridor within 30 metres from the normal high water mark of the Tay River be maintained in a natural vegetative state. This provides a buffer that can protect banks against erosion, improve habitat for fish by shading and cooling the water and provide protection for birds and other wildlife that feed and rear their young near the water. These buffers also provide natural filtration to overland storm water before it enters the waterbody.

Mississippi Rideau Source Water Protection Plan

Several Intake Protection Zones have been identified based on the Mississippi-Rideau Source Water Protection Plan. Our review did not currently identify any prohibitions based on the preferred solution in the IMP, but risk management plans may be required for some activities and infrastructure within source protection areas. The entirety of the Sale Barn property and portions of the Golf Course Lands are located within an Intake Protection Zone 2 (IPZ-2). Within the IPZ-2, the reviewing planner understands that the proposed uses are predominantly residential in nature. Risk management plans and potential consultation with the Ministry of Environment, Conservation and Parks may be required for stormwater management facilities and some of the sanitary facilities (pump stations and forcemains).

There is also an Intake Protection Zone 1 (IPZ-1) located at the Town's primary water intake along the Tay River, approximately 500 metres downstream of the proposed bridge crossing over the Tay River.

In addition, most of The Town of Perth has been identified as a highly vulnerable aquifer. These are aquifers that are vulnerable to surface contaminants due to thin or absent soils overlying bedrock that may be fractured.

Where these conditions exist, it may be possible for contaminants to enter drinking ground water supplies. For this reason, care should be taken to avoid land uses and practices that may inadvertently lead to undesirable effects on groundwater.

Unevaluated Wetlands

Several unevaluated wetlands have been identified through our desktop review of the subject area. Specifically, it appears that unevaluated wetlands exist on the south shore of the Sale Barn property and north shore of the Golf Course Lands.

Unevaluated wetlands are currently required to be regulated under the Conservation Authorities Act. Given the numerous benefits of all wetlands, the Conservation Authority strongly encourages their preservation. These benefits include: attenuation of flood water; serving as a groundwater recharge/discharge area and providing a more stable source of water during low water conditions; filtering our drinking water; and providing habitat to many species of plants and animals (often including fish). The RVCA is in the process of reviewing the implementation of our policies and procedures to comply with the updated Conservation Authorities Act. For further information on these changes please see the following link: <http://conservationontario.ca/policy-priorities/conservation-authorities-act/>.

Discussion

IMP Review

The IMP considers the planning context and development trends within the Perth area. Sections of the plan consider natural heritage features, including terrestrial and aquatic environments within the Inventory of Existing Environment (Section 3). Following the establishment of the parameters within the IMP, a problem statement is created and states, among other things:

- The lands within the Western Annexed Area are intended to be developed based on full municipal water and sanitary sewage service in an efficient and sustainable manner, and stormwater services to protect the water quality and natural heritage features of the Tay River and Grant's Creek.
- The lands within the Western Annexed Area are subject to the Tay River and Grant's Creek regulatory flood plain.
- The study area is subject to development restrictions as adjacent lands to Natural Heritage Feature and Provincially Significant Wetlands.
- The water supply intake for the Town of Perth Water Treatment Plant is to be protected.
- The servicing for the Western Annex area is limited by the surrounding infrastructure and the costs associated with upgrading pinch points.
- Terrestrial habitats will be affected by developing the Western Annex, and this may include habitat for endangered species.

- Aquatic habitat will be disturbed by bridges and/or other services crossing the Tay.

Following this problem statement, the document shows a preferred layout for development of the golf course lands. The preferred layout is the culmination of various options that are considered. The preferred layout presented includes general location of blocks and indicates their dwelling type. The preferred infrastructure network is included. It depicts the location of the road network, including a future bridge which would connect the golf course lands to the current County of Lanark building / Lanark Lodge property. It depicts the location of multi-use pathway and pedestrian facilities. It also depicts the location of the sanitary and storm pipe networks.

RVCA consolidated comments

Based on our review of the document, our office has the following comments for consideration by the Town as part of the IMP:

General Comments

- The future bridge crossing goes onto lands in the Township of Tay Valley. This will require significant engineering, hydraulic analysis of the floodplain, consideration of the ecological impact of the bridge and a permit will be required when construction is contemplated.
- The IMP appears to show land being serviced into what is currently designated "natural heritage feature" by the Town of Perth's Official Plan. The related Official Plan Amendment (OPA-16) makes no change to this designation.
- The RVCA agrees with the recommendation in Section 3.1.4 of the IMP that a new SAR survey should be carried out on site. We would suggest that it be a component of an appropriate EIS, described elsewhere in this letter.
- Section 5.4.1 of the IMP states that:

"the development in the Golf Course Lands and Tayview Development are proposed to be urbanized, draining by conventional storm sewers, treated within stormwater management facilities located in the existing low areas, and draining to the Tay River, Grants Creek Wetland or Grant's Creek."

The reviewing planner would like to point out that the "existing low areas" are all located within the regulatory floodplain. As stated in the O.Reg Section 174/06 of this report:

public infrastructure and various utilities shall not generally be permitted within the 1:100 year regulatory floodplain except where the development has been approved through a satisfactory Environmental Assessment process clearly demonstrating that there is no viable alternative and / or if it has been demonstrated to the satisfaction of the Conservation Authority that the control of flooding, erosion, pollution or the conservation of land will not be affected.

- The reviewing planner understands that Option 3 has been selected as the preferred stormwater conveyance and treatment option as part of the IMP. The reviewing planner appreciates that this option proposes pre-development stormwater flows which will equal post-development flows, but it is not clear if 80% TSS will be achieved. The option indicates that the ponds will achieve 60% TSS, and that the linear retention facility will complete the remaining treatment. However, the IMP does not specify that 80% will be achieved by the overall system. Please clarify that the overall stormwater management system will be able to meet this target.
- Significant regrading and vegetation removal is proposed for all options considered by the IMP. Section 5.4.2 states that it is expected that all disturbed material would remain on-site, providing grade-raise to areas outside the floodplain. This section also states that regrading the rock areas will require removal of much of the forest within the urbanized area. What is not clear is what effect this grading will have on the floodplain, whether it would be altered or not. In addition, vegetation maintenance is strongly encouraged through the Tay River Subwatershed report, especially within this location, and by the Town's Vision Statement in its Official Plan. Our office would recommend that the Town consider completing a tree preservation plan such that every opportunity to preserve existing vegetation is explored.
- The transportation assessment does not respect the existing floodplain and there is no mention of the three identified floodplain crossings to implement the IMP. The IMP should address these matters in section 5.6.1.
- The LID proposed as part of the preferred design in Section 6.1.4 would be constructed adjacent the wetland with a berm between the LID and Grant's Creek PSW, which would have specifically designed porosity and overflow locations to provide adequate flow attenuation. The berm would be used as part of the overall active transportation system network. Our office offers the following comments on this proposed system:
 - This has not been assessed by any related hydrological assessment or water budget which would provide an indication of any impact to Grant's Creek PSW as a result of this feature.

- The proposed LID facility and berm trail appear to be located very close to the PSW and no indication is given for the setback. Should we offer a minimum?
- The 2012 EIS that has been prepared in support of this application is still being reviewed by our office. Related to our review, we will be looking to see if the LID and related infrastructure proposed in the IMP were assessed and whether it was indicated that these features will have no negative impacts on the PSW.
- Further appraisal of the three options presented for the Active Transportation Route shown on Figures 5.6, 5.7 and 5.8 should occur. As currently shown, the proposed bike route/pedestrian/multi-use pathway system could cause many unintended impacts to the natural hazards and natural heritage feature in and adjacent to the Grants Creek floodplain and PSW. It may also negatively affect the habitat and functions of the various vegetation communities listed in the IMP, which it is proposed to pass through. As an example of this is Vegetation Community 9, described in Appendix C of the IMP. It, along with Vegetation Community 1, contains an impressive array of biological diversity, as evidenced by the species observed listing for these communities found in the same appendix of the report. It is also noted that Vegetation Community 9 contains interior forest habitat, which is a special type of habitat that may harbor unique flora and fauna. In the Town of Perth, interior forest habitat is found in a few locations only and, as such, should be considered to be significant habitat within the western annex lands.

This is important given that it is a major factor (as are the other points raised in this review) to be considered, in order to address one of the key policy provisions (1.2.17) stated in the Town of Perth Official Plan (as noted on p.10 of the IMP):

“the Town’s vision embraces the concept of sustainable development through land use and infrastructure development decisions and operational practices that integrate human needs with the natural and built environment. Land use approvals and infrastructure redevelopment decisions will include sustainable design measures for transportation, infrastructure, waste management, energy systems, and will strive for the efficient use of natural resources and preservation of historic, cultural and natural heritage features. This vision intends to be adaptive to innovative design and human activities that support sustainability.”

- Section 6.1.5 of the IMP depicts a sanitary pipe traversing the Tay River 500 metres upstream of the Town's intake for its potable drinking water supply. It is not clear if this will be a forcemain. Although a review of the Mississippi Source Water Plan did not indicate the location of this sanitary pipe as prohibited, our office would like to raise the location of the pipe as a matter for the Town to consider at this stage of planning.
- Figure 6.5 shows two pump stations, which will be constructed with wet wells. Through discussions with the consultant, it is our understanding that bypasses and overflows are planned to be redirected to SWM facilities and ultimately discharge into Grant's Creek PSW. Source Protection staff within our office are currently inquiring with the MOECP regarding this to verify what type of risk management plan, if any, is required for these discharges. The northernmost pump station is located within the floodplain and also within the IPZ-2. Regarding its location in the floodplain, our policies with respect to infrastructure would apply. The southern pump station appears to be located outside the floodplain, but also appears to be located within 30 metres of the normal highwater mark of the Tay River and should meet the required 30 metre setback identified in our regulation.
- A further question for consideration is the depth of the proposed pump station excavations. This may have an effect on groundwater, which should be understood. To assist in this understanding, related background information should include groundwater elevations and a water budget analysis.
- As the subject property is a greenfield development, all proposed lots, infrastructure and facilities should achieve a minimum 30 metre setback from the Tay River, Blueberry Creek and headwater features.

Natural heritage / Water comments

- Our office would like to acknowledge receipt of the 2012 EIS. A review of our records did not indicate whether we had previously been provided a copy.
- Our office would be pleased to work with the Town to conduct a series of field visits by RVCA staff (watershed biologist, ecologist and Tay Watershed planner) to assess the natural heritage features on the western annex lands with respect to the findings in the 2012 EIS and subsequent 2016 field survey. Amongst other things, this activity will help to confirm the boundary of the Grants Creek PSW, as well as other wetland features on the western annex lands.

- The majority of the development appears to be focused towards the table lands, and the RVCA appreciates these efforts.
- Some of the fish species referenced in the existing conditions section do not account for the full range of species our office has encountered during 2015 – 2017 and our historical records. For assistance, we have included this information as Schedule 'A' to this comment letter to assist with completing a fulsome existing conditions section to the IMP.
- Headwater drainage features have been identified through our desktop mapping. We note that at least one feature has been identified by the 2012 EIS. In addition, there may be additional features not mapped, but located on the property. Our office would be willing to participate in a walk of the property to explore all features within this area in the spring. Ultimately, these features will need to be assessed by a qualified professional who would make recommendations on their status and whether they should be maintained or if mitigation/relocation is possible. Our office does note that one of the stormwater management facilities is proposed to locate on an existing watercourse identified through our mapping. Our office has not been provided enough information to demonstrate that the control of flooding, erosion, pollution and conservation of lands will be acceptable to our office associated with the relocation of this feature and replacement with a stormwater pond. We offer the following additional information about headwater features:
 - Applications to alter HDFs will need to be assessed in accordance with the document titled *"Evaluation, Classification and Management of Headwater Drainage Features Guideline. Toronto and Region Conservation Authority and Credit Valley Conservation, TRCA Approval July 2013 (Finalized January 2014)"*.
 - The applicant should pre-consult with RVCA to ensure that the scope and timing of the evaluation is appropriate for the scale/type of the proposal, availability of information for the feature and the sensitivity of the feature.
 - The evaluation of an HDF shall include collecting information that may be available in a watershed or subwatershed plan, catchment reports, an environmental management plan, fisheries management plan etc.
 - In order for the RVCA to issue future permits under the *Conservation Authorities Act* the guideline provides a consistent methodology to evaluate, classify and provide a management action for all HDF's. The results from the management classifications for HDF will inform what future permits are necessary and how best to manage them based on their function.

- Detailed information pertaining to future in water work and alterations to the watercourse will be required for review by RVCA. Types of work requiring review includes:
 - channel piping/realignments
 - storm water/discharge outlets to existing watercourses
 - flow diversions
 - bridge construction
 - Other alterations not yet identified

Hydrologic considerations

- Our office had provided comment during the 2016 initiation of this project and this correspondence was included in Section 7.2 of the IMP. Based on our comments in 2016, the IMP does not address the matters raised in this letter.
- Additional existing information should be provided in the form of a water budget analysis. The urban effects of development has the potential to interfere with the natural transfers of water between storage components of the hydrologic cycle. Submission of a water balance is used to describe the hydrological cycle and provide an accounting of water transfers across the development area over time. Any difference between inflows to the system and outflows from the system during a specified time period will need to be balanced by the proposed urbanization of the area which will have an effect on storage of the hydrologic system. This is especially important with the adjacent Grant's Creek PSW to ensure that it remains hydrated. The water balance would form the basis of permits for interference to the wetland.

Analysis

There are several outstanding matters that do not appear to be addressed through the submission of the IMP.

The problem statement from the IMP acknowledges that the subject lands are subject to the regulatory floodplain and natural heritage features, but the IMP does not appear to fully respect natural hazards and natural heritage features with the current development layout.

It does appear that the IMP is mostly consistent with Section 3.1.1 of the PPS. This section states that development shall generally be directed to areas outside of *"hazardous lands adjacent to river, stream and small inland lake systems which are impacted by flooding hazards..."* Much of the development area appears to be located on higher ground, and generally located outside hazardous lands as defined in the PPS. However, the proposed infrastructure layout depicts transportation and related infrastructure within the 1:100 year regulatory floodplain. In the opinion of the reviewing planner this is not consistent with Section 3.1.2 of the PPS which states:

"development and site alteration shall not be permitted within: ...areas that would be rendered inaccessible to people and vehicles during times of flooding hazards...unless it has been demonstrated that the site has safe access appropriate for the nature of the development and the natural hazard."

The IMP shows access roads traversing the floodplain in three separate locations. While these may be proven to be suitable with additional information and hydraulic analysis of the change of the floodplain as a result of the development, safe access has not yet been demonstrated. There are also still some areas depicted on the preferred plan that show future lots within the 1:100 year floodplain. Creation of new lots within the floodplain is not supported by our policies.

The IMP appears to be missing several key considerations that would normally be seen as part of an infrastructure master planning exercise. There is some information on existing conditions in terms of vegetation communities, underlying soils, some information on grades and species at risk. Yet the document does not appear to provide an assessment of groundwater conditions, water balance or headwater drainage features. This information is crucial to demonstrate that the overall development is consistent with section sections 2.1 and 2.2 of the PPS. Specifically, the natural heritage features of Section 2.1 are related to the water described in Section 2.2. The PPS requires planning authorities to protect, improve or restore the quality and quantity of water by: *"identifying water resource systems consisting of ground water features, hydrologic functions, natural heritage features and areas, and surface water features including shoreline areas, which are necessary for the ecological and hydrological integrity of the watershed."* In the absence of additional groundwater, hydrologic and headwater drainage feature information, it is not clear how these features have been identified, nor how the IMP proposes to protect, improve or restore the quality and quantity of water. Without this evaluation, it is not clear if the headwater features on site would be classified as sensitive surface water features, or not, and whether they are able to be relocated as identified in the preferred solution.

The proposed stormwater management solution appears to propose all stormwater management facilities within the existing regulatory floodplain. In relation to Section 1.6.6.7 of the PPS, information has not been provided to demonstrate how location within the floodplain will not increase risks to human health and safety and property damage. In addition, several sanitary pump stations are proposed, one of which appears to be located within the regulatory floodplain and IPZ-2. The other pump station appears to be located outside the regulated area but is proposed within 30 metres of a watercourse. These facilities also need to satisfy our regulatory policies with respect to infrastructure in the floodplain.

Significant grading is proposed within the study area, and it is not known what effect this may have on the existing regulatory floodplain and whether this may exacerbate flooding up or downstream for existing properties.

This should be considered with hydraulic modelling to account for any changes that may occur, and to demonstrate if those changes are acceptable.

The golf course lands, in particular, should also consider the impacts of climate change that may increase the risk associated with natural hazards as required by Section 3.1.3 of the PPS

Recommendations

Based on the comments above, the following additional information should be completed as part of the IMP report:

- Completion of an appropriate EIS;
- Completion of a Headwater Drainage Feature Assessment;
- Completion of a water budget analysis;
- Relocation of SWM facilities outside the floodplain or engineering analysis to demonstrate that locating these facilities partially or entirely within the floodplain will not have adverse impact with respect to flooding, erosion and pollution control and the conservation of land;
- Completion of site visits with RVCA staff;
- The IMP should ensure that all proposed development is able to achieve a 30 metre setback from all watercourses.

If there is no desire at this time to undertake the additional analysis required to more fully substantiate the assumptions, conclusions and guidance provided in the IMP, we recommend that the following statements be included in the report:

1. That the preferred land use plan is conceptual and that it may change based on the outcome of the more detailed analysis required to determine the appropriate location of infrastructure (roads, watercourse crossings, watermains, sanitary sewers, stormwater management facilities) and the lot layout, relative to the natural hazard and natural heritage features within the study area;
2. That prior to consideration of development applications submitted under the *Planning Act*, the detailed analysis as described in paragraph 1, above, will be conducted to the satisfaction of the RVCA and the Town of Perth;
3. That prior to commencement of subsequent studies that will inform the final development concept plan and infrastructure servicing plan, the Town of Perth, RVCA and other government agencies as appropriate, shall engage in pre-consultation to identify outstanding issues and scope of work.

Conclusions

Although we recommend additional information be considered as part of the IMP, the RVCA is of the opinion that the development of the western annex lands provide a unique opportunity for the Town of Perth to plan a greenfield development which has the potential to be a model of sustainable small town development planning, in keeping with the Town's vision statement for future planning and development activity. It is our opinion that the natural environment could be marketed as a selling feature of the community, if maintained and enhanced as directed through the Town's vision statement.

Our organization, including relevant professionals, would be pleased to make themselves available to participate in ongoing discussions regarding development within this area, and we would welcome the opportunity to walk the property with Town officials during the spring.

Please advise us on the status of this planning exercise following the public information session. Please circulate our office on all future public information in relation to this file.

Thank you for the opportunity to comment and please do not hesitate to contact the undersigned at (613) 267-5353 x 131 should you have any questions.

Yours truly,



Phil Moshier
Planner

Appendix A – Fish Species

Fish Species	Scientific Name	Fish Code	Historical	2015	2016	2017
banded killifish	<i>Fundulus diaphanus</i>	BaKil	X	X		X
black crappie	<i>Pomoxis nigromaculatus</i>	BlCra				X
blackchin shiner	<i>Notropis heterodon</i>	BcShi	X			X
blacknose dace	<i>Rhinichthys atratulus</i>	BnDac			X	
blacknose shiner	<i>Notropis heterolepis</i>	BnShi		X		
bluegill	<i>Lepomis macrochirus</i>	Blueg				X
bluntnose minnow	<i>Pimephales notatus</i>	BnMin	X	X	X	X
brassy minnow	<i>Hybognathus hankinsoni</i>	BrMin				X
brook stickleback	<i>Culaea inconstans</i>	BrSti	X		X	
brown bullhead	<i>Ameiurus nebulosus</i>	BrBul	X	X	X	X
bullhead catfish hybrids	<i>Ictaluridae family</i>	Hy650	X			
burbot	<i>Lota lota</i>	Burbo		X		X
carps and minnows	<i>Cyprinidae</i>	CA_MI	X		X	
Central stoneroller	<i>Campostoma anomalum</i>	CeSto	X		X	
central mudminnow	<i>Umbra limi</i>	CeMud	X	X	X	X
common carp	<i>Cyprinus carpio</i>	CoCar		X		
common shiner	<i>Luxilus cornutus</i>	CoShi	X	X	X	X
creek chub	<i>Semotilus atromaculatus</i>	CrChu	X	X		X
etheostoma sp.	<i>etheostoma sp.</i>	EthSp	X	X	X	X
fallfish	<i>Semotilus corporalis</i>	Fallf	X	X		X
fathead minnow	<i>Pimephales promelas</i>	FhMin				X
golden shiner	<i>Notemigonus crysoleucas</i>	GoShi				X
greater redhorse	<i>Moxostoma valenciennesi</i>	GrRed		X		
hornyhead chub	<i>Nocomis biguttatus</i>	HhChu		X	X	X

Iowa darter	<i>Etheostoma exile</i>	IoDar	X			
largemouth bass	<i>Micropterus salmoides</i>	LmBas		X		X
logperch	<i>Percina caprodes</i>	Logpe	X	X		X
longnose dace	<i>Rhinichthys cataractae</i>	LnDac				X
northern pike	<i>Esox lucius</i>	NoPik	X	X		X
northern redbelly dace	<i>Chrosomus eos</i>	NRDac			X	
pumpkinseed	<i>Lepomis gibbosus</i>	Pumpk	X	X	X	X
rock bass	<i>Ambloplites rupestris</i>	RoBas	X	X	X	X
shorthead redhorse	<i>Moxostoma macrolepidotum</i>	ShRed		X		
smallmouth bass	<i>Micropterus dolomieu</i>	SmBas	X	X		X
spotfin shiner	<i>Cyprinella spiloptera</i>	SpShi	X			
spottail shiner	<i>Notropis hudsonius</i>	StShi	X			
sunfish family	<i>Lepomis sp.</i>	LepSp	X			
stonecat	<i>Noturus flavus</i>	Stone				X
tadpole madtom	<i>Noturus gyrinus</i>	TaMad		X		
walleye	<i>Sander vitreus</i>	Walle	X			
white sucker	<i>Catostomus commersonii</i>	WhSuc	X	X		X
yellow bullhead	<i>Ameiurus natalis</i>	YeBul	X	X	X	X
yellow perch	<i>Perca flavescens</i>	YePer		X		X

Green = observed in Grants Creek Catchment

Not highlighted = observed in Tay River – Town of Perth Catchment

Yellow = observed in both Grants Creek and Tay River – Town of Perth Catchments

From: [Phil Mosher](#)
To: [Doug Nuttall](#)
Cc: ["gmachan@perth.ca"; "Forbes Symon"](#)
Subject: Golf Course Lands - Floodplain
Date: Friday, April 26, 2019 9:36:57 AM
Attachments: [image007.jpg](#)
[image008.jpg](#)
[image009.jpg](#)

Good morning gentlemen,

I am writing in follow-up to our meeting last Thursday. I had the following points that needed clarification/answers

1. Can RVCA provide the HEC-RAS information to the Town at no cost?
2. Can RVCA indicate their interpretation of SWM facilities in the floodplain in light of our policies?

I have provided answers here:

1. Regarding Point #1 above, yes, our office will be able to provide this. I believe Alex from Jp2g has reached out to Evelyn regarding this information. Evelyn is in the course of preparing this data, but our office is still waiting for information from Doug regarding the scope of work based on our meeting.

2. Regarding Point #2 above, our policy states:

1.2(3) "Notwithstanding Section 1.2(1), public infrastructure (e.g. roads, sewers, flood and erosion control works) and various utilities (e.g. pipelines) shall generally not be permitted within the 1:100 year regulatory floodplain except where the development has been approved through a satisfactory Environmental Assessment process clearly demonstrating that there is no viable alternative and / or if it has been demonstrated to the satisfaction of the Conservation Authority that the control of flooding, erosion, pollution, or the conservation of land will not be affected."
(emphasis added)

- So, SWM facilities can be permitted in the floodplain where there is a satisfactory (to RVCA) EA process which clearly demonstrates that there is no viable alternative or the control of flooding, erosion, pollution, or the conservation of land will not be affected. So far, the EA process has been initiated. Because the SWM facilities are being proposed in the floodplain it appears the Town is taking the position of satisfying the second criteria (control of flooding, erosion, pollution, or the conservation of land will not be affected). To date, our office has not received information demonstrating that SWM facilities in the floodplain have met these criteria specified in our policy. This information will need to be provided as part of the EA process and to the satisfaction of our office in order for us to accept this position from the Town.
- I would be remiss if I did not point out that the other compliance alternative is locating the SWM facilities outside the floodplain.

As a final comment, determination of SWM facilities and floodplain represents a component of our review of the IMP. Based on our March 22, 2019 comment letter there are other components that should be considered by the Town as part of the IMP.

Please let me know if there are any questions regarding this information.

Phil Mosher

Planner

phil.mosher@rvca.ca, ext. 1181 (Manotick) 613-267-5353 x 131 (Tay Valley)

email footer





THE CORPORATION OF THE TOWN OF PERTH

Western Annexed Area of Perth Infrastructure Master Plan Notice of Completion

The lands annexed to the Town in 2009 along the western boundary included the Perth Golf Course landholdings and the Tayview property (Sales Barn site) which are proposed to accommodate future residential growth. The Infrastructure Master Plan identifies development constraints and opportunities and provides a functional design solution for transportation, water distribution, wastewater collection and storm drainage to service future Plan of Subdivision development applications under the Planning Act.

This Infrastructure Master Plan is being planned as a Schedule B project under the Municipal Class Environmental Assessment. The report has identified the preferred solutions for transportation and servicing the residential subdivisions.

The Infrastructure Master Plan is available for review at www.perth.ca and at the Municipal Office at 80 Gore Street East, Perth, Ontario, Monday to Friday, 8:30 am to 4:30 pm.

Interested persons shall provide written comments to the Municipality on the proposal within 30 calendar days from the date of this Notice. Comments should be directed to the Director Development and Protective Services.

A person or party may request that the projects identified in The Master Plan require a higher level of assessment under the Environmental Assessment Act, referred to as a Part II Order. The Master Plan itself is not subject to Part II of the Act. Copies of the Request Form must be sent to:

Minister of the Environment Conservation and Parks
77 Wellesley Street West
11th Floor, Ferguson Block
Toronto, ON M7A 2T5

-and-

Director Environmental Assessment and Permissions Branch
135 St. Clair Avenue West
1st Floor
Toronto, ON M4V 1P5

-and-

Director of Development and Protective Services
Town of Perth
80 Gore Street East
Perth, ON K7H 1H9

If there is no "request received by September 9, 2019", the landowners may proceed with the planning and design of the subdivisions as presented.

Please note that ALL personal information included in a Part II Order submission – such as name, address, telephone number and property location – is collected, maintained and disclosed by the Ministry of the Environment Conservation and Parks for the purpose of transparency and consultation. The information is collected under the authority of the Environmental Assessment Act or is collected and maintained for the purpose of creating a record that is available to the general public as described in s.37 of the Freedom of Information and Protection of Privacy Act. Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remain confidential. For more information, please contact the ministry's Freedom of Information and Privacy Coordinator at 416-327-1434.

This Notice issued August 8, 2019



Jp2g Consultants Inc.

ENGINEERS • PLANNERS • PROJECT MANAGERS

1150 Morrison Drive, Suite 410, Ottawa, ON K2H 8S9
T 613-828-7800, F 613-828-2600, www.jp2g.com

Jp2g No. 2161774A

August 7, 2019

**Re: Town of Perth
Infrastructure Master Plan Western Annexed Area
Municipal Class Environmental Assessment**

Dear :

The Town of Perth has completed an Infrastructure Master Plan for the development of the Western Annexed Area, attached find a Notice of Study Completion.

This project has been planned as a Schedule B activity defined by the Municipal Class Environmental Assessment document prepared by the Municipal Engineers Association of Ontario.

The Infrastructure Master Plan followed Phases 1 and 2 of the Municipal Class EA process which involved Phase 1 - identify the problems and opportunities for developing and servicing the study area, and Phase 2 – evaluate road, water, sewage and stormwater alternative solutions to select the preferred servicing strategy. The Master Infrastructure Plan is available on the Town's website.

Please advise by e-mail acknowledging receipt of this letter and whether you wish to provide any comments or have any questions my e-mail address is dougn@jp2g.com.

Yours very truly,

Jp2g Consultants Inc.

ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

Doug Nuttall, P.Eng.
Project Manager

cc Forbes Symon, Director of Development and Protective Services

Ministry of the Environment Conservation and Parks
Eastern Region
1259 Gardiners Road
P.O. Box 22032
Kinston, ON K7M 8S5
Attention: Vicki Mitchell
Environmental Assessment Coordinator

Phone: 613-549-4000
E-Mail: vicki.mitchell@ontario.ca

Ministry of the Environment Conservation and parks
Ottawa District Office
2430 Don Reid Drive
Ottawa, ON K1H 1E1
Attention: Tracy Hart
District Manager

Phone: 613-521-5437
E-Mail: tracy.hart@ontario.ca

County of Lanark
99 Christie Lake Road
Perth, ON K7H 3C6
Attention: Kurt Greaves, CAO

Phone: 613-267-4200 x 1101
E-Mail: kgreaves@lanarkcounty.ca

Tay Valley Township
217 Harper Road
Perth, ON K7H 3C6
Attention: Amanda Mabo, Clerk

Phone: 613-267-5353
E-Mail: clerk@tayvalleytwp.ca

Rideau Valley Conservation Authority
3889 Rideau Valley Drive
PO Box 599
Manotick, ON K4M 1A5
Attention: Phil Mosher
Planner

Phone: 613-692-3571
E-Mail: phil.mosher@rvca.ca

Leeds, Grenville and Lanark District Health Unit
458 Laurier Boulevard
Brockville, ON K6V 7A3
Attention: Paula Stewart
Medical Officer of Health

Phone: 613-345-5685
E-Mail: paula.stewart@healthunit.org

Ministry of Natural Resources and Forestry
Kemptville District
PO Box 2002
Kemptville, ON K0G 1J0
Attention: Mary Dillon
District Planner

Phone: 613-258-8414
E-Mail: mary.dillon@ontario.ca

Algonquins of Ontario
Consultation Office
31 Riverside Drive
Pembroke, ON K8A 8R6
Attention: Janet Stavinga
Executive Director

Phone: 613-735-3759
E-Mail: jstavinga@tanakiwin.com
algonquins@tanakiwin.com



Ministry of Tourism, Culture & Sport
435 South James Street, Suite 334
Thunder Bay, ON P7E 6S7
Attention: Paige Campbell
Archaeology Review Officer

Phone: 807-475-1632
E-Mail: paige.campbell@ontario.ca

Ministry of Municipal Affairs and Housing
Municipal Services Office – Eastern
8 Estate Lane, Rockwood House
Kinston, ON K7M 9A8
Attention: Damien Schaefer
Planner

Phone: 1-800-267-9438 ext 121
E-Mail: damien.schaefer@ontario.ca

Ken and Brenda Wright
17 Glascott Street
Perth ON K7H 2V6

Email: brenda.ken.wright66@gmail.com

Jim Ronson
105 Peter Street
Perth ON K7H 1S4

Phone: 613-264-1937

Tim Lee Broker
Century 21
203-23 Beckwith Street N
Smiths Falls, ON K7A 2B2

Email : tim.lee@century21.ca

David Trick
Perth Golf Course
141 Peter Street
Perth, ON K7H 3E4

Email : trickdavid61@gmail.com



THE CORPORATION OF THE TOWN OF PERTH

Western Annexed Area of Perth Infrastructure Master Plan Notice of Completion

The lands annexed to the Town in 2009 along the western boundary included the Perth Golf Course landholdings and the Tayview property (Sales Barn site) which are proposed to accommodate future residential growth. The Infrastructure Master Plan identifies development constraints and opportunities and provides a functional design solution for transportation, water distribution, wastewater collection and storm drainage to service future Plan of Subdivision development applications under the Planning Act.

This Infrastructure Master Plan is being planned as a Schedule B project under the Municipal Class Environmental Assessment. The report has identified the preferred solutions for transportation and servicing the residential subdivisions.

The Infrastructure Master Plan is available for review at www.perth.ca and at the Municipal Office at 80 Gore Street East, Perth, Ontario, Monday to Friday, 8:30 am to 4:30 pm.

Interested persons shall provide written comments to the Municipality on the proposal within 30 calendar days from the date of this Notice. Comments should be directed to the Director Development and Protective Services.

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77 Wellesley Street West
11th Floor, Ferguson Block
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135 St. Clair Avenue West
1st Floor
Toronto, ON M4V 1P5

-and-

Director of Development and Protective Services
Town of Perth
80 Gore Street East
Perth, ON K7H 1H9

- If there is no “request received by September 9, 2019”, the landowners may proceed with the planning and design of the subdivisions as presented.

- Please note that ALL personal information included in a Part II Order submission – such as name, address, telephone number and property location – is collected, maintained and disclosed by the Ministry of the Environment Conservation and Parks for the purpose of transparency and consultation. The information is collected under the authority of the Environmental Assessment Act or is collected and maintained for the purpose of creating a record that is available to the general public as described in s.37 of the Freedom of Information and Protection of Privacy Act. Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remain confidential. For more information, please contact the ministry’s Freedom of Information and Privacy Coordinator at 416-327-1434.

- This Notice issued August 8, 2019



September 4, 2019

Lauren Walton
Clerk
Town of Perth
Town Hall
80 Gore Street East
Perth, Ontario, K7H 1H9

Dear Ms. Walton

RE: Infrastructure Master Plan Western Annex in the Town of Perth

The Town of Perth has filed a notice of completion of the above noted Infrastructure Master Plan.

The intent of the Plan is to assess the requirements for municipal infrastructure required to service the Golf Course and Tayview property sites and the projected residential development comprising some 170 housing units. The development is intended to help enable the Town to achieve a population growth target of 8,085 by 2038.

The Master Plan provides an assessment of existing conditions, the identification of a problem statement, options for addressing the problems identified and preferred solutions.

The Friends of the Tay Watershed is interested in the sustainability of the ecological functions associated with the Tay River and the potential impacts on those functions of projected development. The following are the comments provided by the Friends of the Tay Watershed (FoTW) in response to the Infrastructure Master Plan.

1. FoTW supports OPA 16 requirements (Section 8.8.3 d.) that the impact on the Natural Heritage Features "must be considered prior to any change in this designation". The commitment to the conservation of natural heritage features and areas will ensure that the integrity of the area's ecology is maintained before, during and after the development process.
2. Section 3.1.1: FoTW concurs with the need to mitigate and adapt to the effects of climate change and that a detailed analysis should be undertaken as part of future design studies. Further to this objective Section 6.1.7 should specify a target, preferable 40%, for the vegetative canopy cover as an additional measure as the extent of canopy cover is considered essential to provide for a required level of carbon sequestration and a level that will also help to sustain pre-development stormwater volumes.
3. The Problem Statement (Section 4) identifies the scope of issues of interest to FoTW in Bullets 3, 5, 11, 15 and 16. However, bullet # 3 should more appropriately refer to "stormwater services" as stormwater management services or stormwater management

facilities. Bullet 5 should more correctly refer to both natural heritage features and areas and adjacent lands, not just adjacent lands. Bullet 11 should more correctly refer to the "habitat of endangered and threatened species" in order to be consistent with the Provincial Policy Statement and the Official Plan. Bullet 16 refers only to climate change adaptation. The design for any development must consider climate change mitigation first and foremost. Such wording would also be consistent with Section 6.1.7.

4. Section 5.4, 5.4.2, 6.1.4, 6.1.6: Stormwater Management. The Master Plan sets out three options for stormwater management, all of which establish the maintenance of pre-development flows as the objective. All three options will require significant regrading including removal of much of the forest in the urbanized area. "This will increase the runoff coefficients of the open space." Section 6.1.4 is not clear as to whether any of the three options is a preferred option; rather, the preference appears to be a combination of the three options with deference to the LID berm as an important feature. Section 6.1.4 also indicates that a hydrologic model and water balance study would be required notwithstanding that there is no regulatory requirement for the hydrologic impact study.

Phase 2 (p.74) of the development works within the flood plain talks to raising the land by filling part of the flood plain. The proposal intends to maintain the ecological function over a program of replanting coincident with the regrading of the lands, installation of SWM ponds and the LID linear corridor. Despite the proposal, the plan states: "While it is possible to clear, raise, and replant the area to allow it to return to a forest, due to the surrounding disturbance associated with residential development, it is not clear that this would be the most effective manner to attempt to maintain the ecological function. Rather, it is proposed that the Town of Perth and the RVCA are to negotiate the most appropriate method ensuring the requirement for Conservation of Land is maintained."

The clearing of forested land for urban development will have an impact on the ecological functions of the existing forest ecosystem as will any alteration to the flood plain. The intent to replant with native species to compensate for the loss of the forested area reflects conventional practice; however, the renaturalization through replanting means that the ecological functions may not be restored for an extended time period, perhaps 25 – 50 years. The preferred alternative does not appear to require replanting of the developed properties within the subdivision and even replanting of surrounding lands is questioned as to whether the approach "would be the most effective manner." A more integrated approach should be required starting with and including an EIS-based forest management plan that identifies what/which trees and vegetative communities should be conserved in the design and layout of lots, streets and infrastructure. The lot fabric should be designed to integrate with the natural environment not the reverse. SWM planning should be integrated with the forest management plan since effective SWM should start with the retention of run-off on lots to minimize off-site discharge into sewers, swales etc. Development should be integrated into the existing topographic features to the greatest extent possible and with the intent to minimize the need for regrading. The forest management plan, coincident with the Master Plan's proposal for climate change mitigation, should establish a minimum forest canopy retention target, preferably 40% as part of the Plan and the target should be science-based to also address carbon sequestration. Building design should incorporate on-site soakaway pits, measures for minimizing impervious surfaces, recycling rain-water etc.

A construction plan should also be a requirement to ensure effective implementation of the forest management plan during the installation of services and the building of homes/lot development. Such a plan will ensure that trees and other vegetation are not damaged by heavy equipment during construction.

The Master Plan provides an opportunity to implement state-of-the-art SWM best practices that are ecologically-driven rather than development driven. The Town's intent to partner with the RVCA on developing the best approach to the design and development of land for conservation of natural features and the environment is commendable, but not fully evident in the proposed Master Plan.

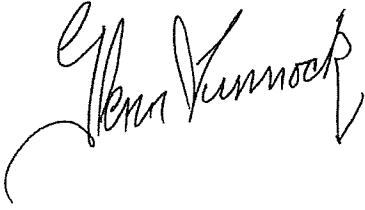
5. Section 6.1.7 – Climate Change. Suggestions are made for mitigating climate change; however, the proposal makes the application of mitigation measures optional rather than regulatory. A more detailed climate change plan as suggested above could be a landmark feature of the Master Plan. As an example, the conventional approach to flood plain management is to use the 1:100 year flood design. Extreme climate events in today's context appear to have exceeded this parameter as witnessed on Christie Lake where the 1:100 flood was exceeded. Extreme climactic events raise the question as to whether this could occur within the Perth community as well. The question of how such an extreme event would be addressed through development guidelines is not addressed in the Master Plan?

In summary, the Master Plan acknowledges the importance of the correlation with infrastructure planning/installation and sustaining the natural environment; however, the Master Plan is weak with respect to best practices for on-site SWM and the relationship to the conservation of forest/vegetative cover. The lotting fabric of the subdivisions proposed should be deferred until there is a more fulsome assessment of the natural heritage features and areas accompanied by the preparation of a forest management plan and climate change plan. The lotting pattern and infrastructure should be integrated with these environmentally-driven plans along with the results of the hydrologic impact study.

The ownership of the lands outside of any proposed lots is unknown. The FoTW's position is that where these lands are located within a floodplain, they should be retained within the public domain for open space uses and such uses could include recreational trails where the trail is appropriately integrated to ensure the integrity of the existing natural environment.

Perth is a community known for its forward thinking. Friends of the Tay Watershed believe that the Town is committed to conserving the integrity of the Tay watershed through sustainable and science-based development decisions and aspires to having an Infrastructure Master Plan that reflects that belief.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Glenn Tunnock". The signature is fluid and cursive, with a large initial "G" and a stylized "T".

Glenn Tunnock, MPA, MCIP, RPP
President

Ministry of Natural Resources & Forestry

Ministère des Richesses naturelles et des Forêts

Kemptville District

District de Kemptville

10-1 Campus Drive
Kemptville ON K0G 1J0
Tel.: 613 258-8204
Fax: 613 258-3920

10-1 promenade Campus
Kemptville ON K0G 1J0
Tel.: 613 258-8204
Fax: 613 258-3920

September 5, 2019

Via Email

Doug Nuttall
Project Manager
Jp2g Consultants Inc.
dougn@jp2g.com

Subject: Review of the Infrastructure Master Plan Western Annex in the Town of Perth

Dear Mr. Nuttall:

The Ministry received the Notice of Study Completion for the above-noted Schedule 'B' Municipal Class Environmental Assessment project on August 8, 2019. We reviewed the Infrastructure Master Plan (plan) prepared by Jp2g Consultants Inc. and dated August 2019. We understand the project is to identify development constraints and opportunities and to provide a functional design solution for infrastructure and servicing for future residential development in the "western annex" area of the Town of Perth. Lisa McShane and I completed a review of the report. The following comments are based on this review and our understanding of the proposed project and its location.

Fisheries

1. The Tay River provides habitat for a variety of spring and fall spawning species. There is walleye spawning habitat in a reach of the Tay River adjacent to the project site. These habitats are considered critical fish habitat and should be protected from adverse effects. A new bridge across the Tay River as an extension of North Street is not a preferred access option given the walleye spawning area.
2. No in-water work should be carried out between October 15th and June 30th in any given year, to protect spring and fall spawning species.
3. We recommend the establishment and/or retention of a minimum 30 m of natural vegetated cover from the high-water mark to protect fish habitat and water quality. Appropriate measures to avoid harm to fish and fish habitat (including measures to maintain or improve water quality) should be implemented if any infrastructure or

facilities are constructed adjacent to fish habitat. Generally, development should be directed to areas outside of the floodplain.

Wetland

4. There is unevaluated wetland within and adjacent to the Tayview property which should be evaluated prior to development approvals to ensure adequate protection and setbacks. There is other unevaluated wetland along the shores of the Tay River (e.g., where the new bridge crossing is proposed) which should be evaluated for the same reasons before any development is approved.
5. The Grant Creek Wetland Provincially Significant Wetland (PSW) is located at the southern limits of the project site. It appears from the mapping in the report that no development (e.g., multi-use pathway, bike route, pedestrian pathway etc.) is proposed within the PSW. Can you please confirm? Development and site alteration should not occur in the adjacent lands either, unless it has been demonstrated that there will be no negative impacts on the feature or its ecological functions. Has this been demonstrated?
6. We recommend the establishment and/or retention of a minimum 30 m of natural vegetated cover adjacent to PSW. At the detail design stage, wetland boundaries should be staked by a qualified professional to protect the feature and ensure adequate setbacks are maintained.

Species at Risk

7. The Ministry of Environment, Conservation and Parks (MECP) assumed responsibility for the Endangered Species Act (ESA), including species at risk (SAR), earlier this year. Please contact MECP directly regarding the ESA or SAR at SAROntario@ontario.ca.

Wildland Fire

8. Development should be directed away from areas that are unsafe for development due to the presence of hazardous forest types for wildland fire. The risks associated with wildland fire in the project area are anticipated to be low, based on the Ministry's generalized wildland fire hazard data which provides a coarse scale assessment of areas with the greatest potential for risks associated with wildland fire. Site-specific information obtained as part of the existing environmental conditions investigation for this project should provide more confidence regarding the wildland fire hazardous forest types and risk level.

Authorizations

9. Work in and adjacent to the Tay River or Grant Creek may require authorization under the Lakes and Rivers Improvement Act and/or the Public Lands Act. Please contact Tarique Kamal (tarique.kamal@ontario.ca) for further information.

Closure

We appreciate the opportunity to provide input. If there are any questions or concerns regarding these comments, please give me a call and we will resolve them with you.

Sincerely,



Mary Dillon
District Planner
613-258-8470

c: Lisa McShane, Management Biologist

From: [Forbes Symon](#)
To: [Doug Nuttall](#)
Subject: FW: Western Annexed Area of Perth Infrastructure Master Plan
Date: Friday, September 6, 2019 3:02:29 PM

Another one.

-----Original Message-----

From: Bob Strachan [<mailto:bobsperth@gmail.com>]
Sent: Friday, September 6, 2019 2:05 PM
To: Forbes Symon <dpdir@perth.ca>
Cc: John Fenik <jfenik@perth.ca>
Subject: Western Annexed Area of Perth Infrastructure Master Plan

Dear Forbes

Thank you for taking the time to listen to my suggestion regarding the above noted Infrastructure Master Plan however, since I have not received any follow up, I feel obligated to put my concerns in writing before the advertised deadline for comments on September 9, 2019.

As I mentioned, I feel that the consultant has not considered a viable and much less costly alternative for servicing Stage 2 of the development.

The consultant indicates that the preferred servicing route for this stage would be to enlarge the infrastructure on Inverness Ave. out to Sunset Blvd. This would require ripping up the entire street - asphalt, curb and gutter, approximately 20 household services for water and sewer as well as the storm sewer system - and reinstating all the above after enlarging the sewer and water to accommodate the new development. Also to get access to Inverness Ave from the new development there is only a very narrow easement between two houses that currently carries the services to the County Admin. Bldg.

The consultants have not shown as an alternative the logical route for this new infrastructure to follow the 66 ft unused road allowance (Town of Perth) parallel to the County Administration Building driveway that is centered on the "Bathurst" side of the double road allowance formerly between Bathurst Twp and the Town of Perth.

When the County Admin Bldg. was constructed the driveway was intentionally centered on the Bathurst side to allow for future servicing opportunities on the Perth side. At that time the road allowance went right from Highway 7 through to the Scotch Line however a portion has since been closed by the Town behind the former Brown Shoe property.

This would permit the services to be tied into new services at the intersection of Sunset Blvd. New water and sewer services will be required along Sunset past County Admin Bldg, PCCC and Lanark Lodge to the Sales Barn Site. I feel that this alternative would be much preferable to the costly project of upgrading services on Inverness Ave. I realize that this part of the project is years away but I feel that this document will be used by potential developers during due diligence stages of the purchase of the development properties and they should be aware of this less costly alternative.

I therefore request that an addendum be prepared to compare the viability of my suggested route with the Inverness option and include this comparison in the report for future consideration when we both aren't around to respond to questions!!

Please acknowledge receipt of this correspondence — I certainly do not feel this request should include a "bump up" to the EA but that the addendum should be carried out to ensure a complete report.

Thanks for your co operation

Robert B Strachan P.Eng.

♂Sent from Bob's iPad ♂



3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
T 613-692-3571 | 1-800-267-3504
F 613-692-0831 | www.rvca.ca

September 6, 2019
19-TOP-EA

Town of Perth
80 Gore Street East
Perth, ON
K7H 1H9

Attention: Forbes Symon

Subject: **Western Annex In the Town of Perth – Infrastructure Master Plan; Notice of Completion**

Dear Mr. Symon,

Thank you for circulating our office on the Notice of Completion for the Western Annex in the Town of Perth Infrastructure Master Plan. Please read this letter in conjunction with our previous comments provided March 22, 2019.

Our office has reviewed the submitted notice of completion and updated document and would like to indicate that we appreciate many of our comments, made on March 22, 2019, being addressed through the document. For instance, we appreciate that the subject document now indicates the following:

- The future bridge will be addressed as a separate process under the Municipal Class EA;
- It has been clarified that any proposed stormwater treatment system would achieve long-term efficiency of better than 80% TSS removal;
- Tree preservation plans will be required for future development proposals;
- Water Budget and groundwater analysis will be required for future development proposals;
- It has been clarified that any proposed LID facility and berm trail will be located the more distant of the regulatory floodplain or setback 30 metres from the boundary of the Provincially Significant Wetland;
- An HIS will be required for all development within 120 metres of the Provincially Significant Wetland;

Proudly working in partnership
with our 18 watershed municipalities

Athens, Augusta, Beckwith, Central Frontenac, Clarence-Rockland,
Drummond/North Elmsley, Elizabethtown-Kitley, Merrickville-Wolford, Montague,
North Dundas, North Grenville, Ottawa, Perth, Rideau Lakes, Smiths Falls, South Frontenac, Tay Valley, Westport

- Headwater Drainage Feature Assessment will be required for future subdivision applications;
- That a 30 metre setback from watercourses will be able to be achieved through future subdivision applications;

While we appreciate these matters being addressed, based on our review of the notice of completion, it is the opinion of the reviewing planner that additional clarification is still required. We had recommended that there be several additional statements within the document of the infrastructure master plan. Notably these included the following:

1. That the preferred land use plan is conceptual and that it may change based on the outcome of the more detailed analysis required to determine the appropriate location of infrastructure (roads, watercourse crossings, watermains, sanitary sewers, stormwater management facilities) and the lot layout, relative to the natural hazard and natural heritage features within the study area;
2. That prior to consideration of development applications submitted under the *Planning Act*, the detailed analysis as described in paragraph 1, above, will be conducted to the satisfaction of the RVCA and the Town of Perth;
3. That prior to commencement of subsequent studies that will inform the final development concept plan and infrastructure servicing plan, the Town of Perth, RVCA and other government agencies as appropriate, shall engage in pre-consultation to identify outstanding issues and scope of work.

While the notice of completion includes portions of these statements in Table 7.3 of the document, these statements do not appear to be reproduced in a fulsome manner within the document. Notably, the IMP should be explicit that the proposed land use plan is conceptual. This is most important because of the continued depiction of infrastructure and parcels being located within the floodplain without any additional analysis. Staff from our office had participated in ongoing discussions with the Town in order to define the level of information required in relation to floodplain crossings and stormwater management facilities within the floodplain. Within our correspondence, included as part of appendix I and dated April 26, 2019, it was stated that:

"...SWM facilities can be permitted in the floodplain where there is a satisfactory (to RVCA) EA process which clearly demonstrates that there is no viable alternative or the control of flooding, erosion, pollution, or the conservation of land will not be affected. So far, the EA process has been initiated. Because the SWM facilities are being proposed in the floodplain it appears the Town is taking the position of satisfying the second criteria (control of flooding, erosion, pollution, or the conservation of land will not be affected). To date, our office has not received information demonstrating that SWM facilities in the floodplain have met these criteria specified in our policy. This information will need to be provided as part of the EA process and to the satisfaction of our office in order for us to accept this position from the Town."

This matter has been referred to in Section 6.1.6 of the IMP and concludes, regarding Phase 1, that:

"...the existing hydraulic modelling of the Tay River already considers this connection closed, so closing this connection would not negatively affect flooding, erosion, or

pollution. Conservation Land is described by RVCA as the ecological function of the affected land."

Although this statement is made in the IMP, water resources engineering staff within our office advise that this statement has not yet been proven or demonstrated. Please refer to our enclosed technical review memorandum dated August 29, 2019.

Regarding Phase 2, the IMP again concludes:

"Closing this connection would have no negative impact of flooding, erosion, or pollution – the flood plain modelling by RVCA already assumes this connection has been closed off, and no flow between Tay River and Grant's Creek is accounted for, so this development will not change the regulatory flood levels...."

And, regarding the final, western floodplain connection, the IMP concludes:

"As the SWM feature is constructed above the flood elevation of Grant's Creek wetland, all of the land draining to it must also be above the flood elevation, necessitating the filling of approximately 0.5 ha of land."

Again, water resources engineering staff within our office advise that this statement has not yet been proven or demonstrated.

All of these statements make assumptions regarding the floodplain within this vicinity, but our office has not received any information to substantiate these conclusions. Without additional supplemental information, such as hydraulic calculations, it is not possible for our office to agree with these statements at this time. We do not know if they are correct, and we do not know if there will be any negative effects or increased flooding to adjacent landowners downstream of the subject development as a result of the preferred solution.

In our view, planning infrastructure within the floodplain, without any substantiating information, does not appropriately address Section 3.1 of the PPS with respect to development within the floodplain. Specifically, the PPS states the following:

"3.1.2 Development and site alteration shall not be permitted within:

- c) areas that would be rendered inaccessible to people and vehicles during times of flooding hazards...unless it has been demonstrated that the site has safe access appropriate for the nature of the development and the natural hazard; and*
- d) a floodway regardless of whether the area of inundation contains high points of land not subject to flooding."*

To be clear, RVCA is not opposed to the development, but we are of the opinion that the questions of public health and safety must be addressed in a manner that is appropriate to the EA document.

We recommend the following changes to **Section 6.1.6** of the document to address our concerns above:

- Under the heading **Phase 1**, delete the following text:

Paragraph 1, Sentence 1 - *"Within Phase 1, it is proposed to construct a road and a SWM facility within the existing flood plain."*

Paragraph 1, Sentence 4 - *"The existing hydraulic modelling of the Tay River already considers this connection closed, so closing this connection would not negatively affect flooding, erosion, or pollution."*

- Under the heading **Phase 2**, delete the following text:

Paragraph 1, Sentence 5 - *"Closing this connection would have no negative impact of flooding, erosion, or pollution – the flood plain modelling by RVCA already assumes this connection has been closed off, and no flow between the Tay River and Grant's Creek is accounted for, so this development will not change the regulatory flood levels;"*

Paragraph 2, Sentence 2 - *"As the SWM feature is constructed above the flood elevation of Grant's Creek wetland, all of the land draining to it must also be above the flood elevation, necessitating the filling of approximately 0.5 ha of land."*

By deleting these sentences, something to the effect of the following should be inserted into Section 6.1.6:

"While this Plan proposes to locate infrastructure within the regulatory floodplain, it is acknowledged that the preferred land use plan for Phases 1 and 2 is conceptual and that it may change based on the outcome of the more detailed analysis required to determine the appropriate location of infrastructure (roads, watercourse crossings, watermains, sanitary sewers, stormwater management facilities) and the lot layout, relative to the natural hazard and natural heritage features within the study area."

Finally, within Section 8, Project Summary, and ahead of Table 8-1, we recommend that the following be included:

"While this Plan proposes to locate infrastructure within the regulatory floodplain, it is acknowledged that the preferred land use plan for Phases 1 and 2 is conceptual and that it may change based on the outcome of the more detailed analysis required to determine the appropriate location of infrastructure (roads, watercourse crossings, watermains, sanitary sewers, stormwater management facilities) and the lot layout, relative to the natural hazard and natural heritage features within the study area. It is further acknowledged that prior to plans of subdivision being submitted to the approval authority, detailed analysis will be undertaken which demonstrates that development will not affect the control of flooding, erosion, pollution or the conservation of land. This shall be to the satisfaction of the RVCA and the Town of Perth."

Future proponents will pre-consult with the RVCA to ensure appropriate scoping of any future studies to address floodplain and hydraulic analysis."

Throughout the EA document reference is made to additional studies and reports that will be required prior to development. For clarity of the document, we recommend that Table 8-1 include the following additional items that have already been identified throughout the report:

- Tree preservation plans will be required for future development proposals;
- Water Budget and groundwater analysis will be required for future development proposals;
- An HIS will be required for all development within 120 metres of the Provincially Significant Wetland;
- Headwater Drainage Feature Assessment will be required for future subdivision applications;

Should the recommended reports and studies identified in Table 8-1 be undertaken in an isolated fashion, only applicable to a particular phase of development, it is possible that this may result in additional costs to future applicants. These reports and studies should be completed in a coordinated effort and should assess the entire area that is subject to development. To ensure a coordinated fashion, our office recommends that a further statement above Table 8-1 be included which says:

"The required studies and reports identified below shall be completed in a coordinated manner and assess the entirety of the lands that are the subject of this Plan. Future proponents will pre-consult with the RVCA to ensure appropriate scoping of any of these future studies."

There are a few additional points of clarification that we would like to raise:

- Section 2.1.4 appears to incorrectly state that the effect of the Town of Perth's OPA-16 was to re-designate lands previously identified as "special study area" to "future residential".
- Section 3.1.2 - **Water Environment and Aquatic Flora/Fauna** - appears to indicate that our office identified concerns with the North Street bridge extension. To clarify, our comments from March 22, 2019 regarding the new bridge were directed towards the proposed new bridge that would be extended onto the County of Lanark administrative property.
- Figure 3-1 – **Water Environmental Features** – does not show the location of the watercourse we had identified through our March 22, 2019 correspondence.
- Throughout the document references are made to Section 3.1.4, however there does not appear to be such a section within the document.
- Within Table 7.3 – **RVCA Consultation** – **item 3.4** indicates that figures 6.1, 6.2, 6.3, 6.4 and 6.5 have been revised. However, it does not appear that these revisions have fully addressed our regulatory policy requirement of locating future lots outside the regulatory floodplain.
- Regarding **Appendix G**, staff within our office advises that this attachment should also refer to the MOECP stormwater management manual for guidance about water budgets.

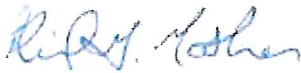
Staff note that any hydrological assessment should also consider function of the wetland beyond exclusively water budget considerations.

Conclusions

As always, please continue to keep us informed of the EA as it is finalized.

Thank you for the opportunity to comment and please do not hesitate to contact the undersigned at (613) 267-5353 x 131 should you have any questions. Please advise us on any decision respecting this application or any changes in the status of the application.

Yours truly,



Phil Mosher
Planner, RVCA

cc – Doug Nuttall, Jp2g

encl. Technical Review Comments regarding floodplain crossings



Watershed Science and Engineering Services - Technical Review Memorandum

August 29, 2019

To: Phil Moser, Planner, Planning Advisory Services, RVCA
From: Ferdous Ahmed, Senior Water Resources Engineer, RVCA
RE: Perth Western Annex – Infrastructure Master Plan, Town of Perth
Work within Floodplain – Review

As requested, I have reviewed Section 6.1.6 (Work Within a Floodplain) of the following report:

- Report entitled "Infrastructure Master Plan – Western Annex in the Town of Perth," prepared by Jp2g Consultants Inc., dated August 2019

My comments are as follows:

1. It has been proposed that three overland flood routes will be closed by building roads. It is claimed that this closing will not adversely affect flooding; however, no analysis has been offered to support this claim. In our opinion, this may cause piling up of flood water up to the water level prevalent in the Tay River, thus increasing the flood risk and inundating more areas. Moreover, it would also slightly increase the flood risk along the Tay River, at least up to Rogers Street. We need appropriate technical analysis to demonstrate that the proposed closing of the flood routes will not adversely impact the control of flooding.
2. It is also proposed that stormwater ponds will be located within the identified floodplain. The 2003 MOE Guideline in Section 4.2 states that "End-of-pipe SWMPs should normally be located outside of the floodplain (above the 100 year elevation). If the facility is multi-purpose in nature (e.g., providing quantity control in addition to quality and erosion control) it must be located above the highest design flood level." The stormwater design should conform to the MOE Guidelines.

I trust this is satisfactory for your present purpose. Please call if you have any questions.
Respectfully,

RVCA Watershed Sciences and Engineering Services

A handwritten signature in black ink, appearing to read "F. Ahmed", is placed above the printed name.

Ferdous Ahmed, Ph.D., P.Eng.
Senior Water Resources Engineer

**Ministry of Tourism,
Culture and Sport**

Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel: 416.314.7133

**Ministère du Tourisme,
de la Culture et du Sport**

Direction des programmes et des services
401, rue Bay, Bureau 1700
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September 17, 2019

EMAIL ONLY

Doug Nutall, P.Eng.
Project Manager
Jp2g Consultants Inc.
1150 Morrison Drive, Suite 410
Ottawa, ON K2H 8S9
doughn@jp2g.com

MTCS File	:	0005630
Proponent	:	Town of Perth
Subject	:	Notice of Study Completion
Project	:	Infrastructure Master Plan
Location	:	Western Annexed Area, Town of Perth, County of Lanark

Dear Mr. Nutall:

Thank you for providing the Ministry of Tourism, Culture and Sport (MTCS) with the Notice of Study Completion and Infrastructure Master Plan prepared by Jp2g Consultants Inc. (August 2019), for the above-referenced project. MTCS's interest in this Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- Archaeological resources, including land and marine;
- Built heritage resources, including bridges and monuments; and,
- Cultural heritage landscapes.

Project Summary

In 2009 the Town of Perth annexed two parcels along the western limits known locally as the Perth Golf Course and the Tayview property, formerly in Tay Valley Township. The annexation process was initiated by private landowners interested in new development on their properties to be serviced with piped municipal sewage and water services from the Town. In September 2014, a revised Official Plan for Perth was adopted. The revised Official Plan added these additional lands to the Land Use Schedule and proposed policies to guide development based on conceptual plans prepared by landowners.

Jp2h Consultants Inc., was retained by the Town of Perth to complete an Infrastructure Master Plan for the Western Annexed Area of Perth. The plan will develop a framework for transportation, water supply, sanitary sewer and stormwater servicing for the study area and provide the Town with an understanding of both the short- and long-term opportunities and constraints associated with development of this unique area.

Review of the Infrastructure Master Plan

MTCS has reviewed the Infrastructure Master Plan and has the following comments and observations:

- On September 26, 2016, MTCS provided advice on this project as follows:
 - If the Master Plan project area exhibits archaeological potential, then an archaeological assessment (AA) should be undertaken by a licensed archaeologist.

- If there are potential or known cultural heritage resources (built heritage or cultural heritage landscape), MTCS recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant should be completed to assess potential project impacts.
 - All technical heritage studies and their recommendations are to be addressed and incorporated into Master Plan projects.
- The completed screening checklists in Appendix D ([Criteria for Evaluating Archaeological Potential](#) and [Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes](#)) indicates that the study area does have archaeological potential as well as potential for built heritage resources and/or cultural heritage landscapes.
- MTCS does note that in Section 3.2 (Cultural Heritage- page 23) that the plan states that any applications under the *Planning Act* will require both an Archaeological Assessment and a Cultural Heritage Evaluation. MTCS also notes that Table 8-1 (Documentation for Plan of Subdivision and Approvals- page 93) includes archaeological assessment but it does not include cultural heritage evaluation. MTCS would like further clarification in terms of timing and coordination between the Environmental Assessment and *Planning Act* processes. MTCS is still of the opinion that technical cultural heritage studies be undertaken by a qualified person in order to inform the Master Plan EA process. The same studies would likely be accepted for *Planning Act* purposes in order to avoid duplication and additional costs.
- Under Section 4 (Problem Statement- page 34), it is noted that, "The Perth Golf Course is the oldest in Canada and the first 9 holes should be protected from development". However, it is noted that in Appendix D in the Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes checklist that the property contains a parcel of land that is the subject of a municipal, provincial or federal commemorative plaque. MTCS recommends that these sections are reviewed and aligned as appropriate. At this time, it is not clear if the golf course is a potential cultural heritage resource or whether there are any other cultural resources in the study area. MTCS strongly recommends that a cultural heritage evaluation be undertaken for the study area. An Existing Conditions and Preliminary Impact Assessment report would be appropriate for the size of the study area.
- Under Section 5.6 (Assessment Alternatives- page 64), it states that, "The Cultural and Socio-Economic criteria will be addressed on the comparative evaluation of an alternative to minimize impact on the sensitive features identified in Section 3.2 and 3.3 of this report". Please clarify how cultural heritage resources were assessed and informed the evaluation of alternatives if no technical cultural heritage studies have been undertaken.

Thank you for consulting MTCS on this project. If you have any questions or require clarification, do not hesitate to contact me.

Sincerely,



Kimberly Livingstone
Heritage Planner (A)
Heritage Planning Unit
kimberly.livingstone@ontario.ca

Copied to: Forbes Symon, Director of Development and Protective Service, Town of Perth, dpdir@perth.ca
Jon Orpana, Environmental Coordinator / Planner, MECP, jon.orpana@ontario.ca

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. MTCS makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MTCS be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Please notify MTCS if archaeological resources are impacted by EA project work. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the *Ontario Heritage Act* and the *Standards and Guidelines for Consultant Archaeologists*.

If human remains are encountered, all activities must cease immediately and the local police or coroner as well as the Registrar, Burials of the Ministry of Government and Consumer Services (<https://www.ontario.ca/feedback/contact-us?id=26922&nid=72703>) must be contacted. In situations where human remains are associated with archaeological resources, MTCS should also be notified to ensure that the site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

**Jp2g Consultants Inc.**

ENGINEERS • PLANNERS • PROJECT MANAGERS

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Jp2g No. 2161774B

October 4, 2019

Via e-mail

Rideau Valley Conservation Authority
3889 Rideau Valley Drive
P.O. Box 599, Manotick ON K4M 1A5
Tel.: 613 692-3571
Fax: 613 692-0831
phil.mosher@rvca.ca

Attention Phil Moser, Planner

Re: Infrastructure Master Plan for Western Annexed Area, Town of Perth

Thank you for your letter dated September 6, 2019. There are several comments in your letter, some of which are being addressed through ongoing conversations. Those that we are currently satisfied with will be addressed as described below:

Throughout the EA document reference is made to additional studies and reports that will be required prior to development. For clarity of the document, we recommend that Table 8-1 include the following additional items that have already been identified throughout the report:

- Tree preservation plans will be required for future development proposals;
- Water Budget and groundwater analysis will be required for future development proposals;
- An HIS will be required for all development within 120 metres of the Provincially Significant Wetland;
- Headwater Drainage Feature Assessment will be required for future subdivision applications;

Table 8-1 has been revised accordingly.

Should the recommended reports and studies identified in Table 8-1 be undertaken in an isolated fashion, only applicable to a particular phase of development, it is possible that this may result in additional costs to future applicants. These reports and studies should be completed in a coordinated effort and should assess the entire area that is subject to development. To ensure a coordinated fashion, our office recommends that a further statement above Table 8-1 be included which says:

"The required studies and reports identified below shall be completed in a coordinated manner and assess the entirety of the lands that are the subject of this Plan. Future proponents will pre-consult with the RVCA to ensure appropriate scoping of any of these future studies."

The noted text has been added to the report.

Section 2.1.4 appears to incorrectly state that the effect of the Town of Perth's OPA-16 was to re-designate lands previously identified as "special study area" to "future residential".

The text has been revised to reflect the wording of OPA-16.



Section 3.1.2 - **Water Environment and Aquatic Flora/Fauna** - appears to indicate that our office identified concerns with the North Street bridge extension. To clarify, our comments from March 22, 2019 regarding the new bridge were directed towards the proposed new bridge that would be extended onto the County of Lanark administrative property.

The text has been revised to clarify this.

Figure 3-1 – **Water Environmental Features** – does not show the location of the watercourse we had identified through our March 22, 2019 correspondence.

The figures in the report have been revised to clarify this.

Throughout the document references are made to Section 3.1.4, however there does not appear to be such a section within the document.

The section has been restored and expanded on.

Within Table 7.3 – **RVCA Consultation** – item 3.4 indicates that figures 6.1, 6.2, 6.3, 6.4 and 6.5 have been revised. However, it does not appear that these revisions have fully addressed our regulatory policy requirement of locating future lots outside the regulatory floodplain.

The figures in the report have been revised to clarify this.

Regarding **Appendix G**, staff within our office advises that this attachment should also refer to the MOECP stormwater management manual for guidance about water budgets.

The figure has been amended to include a statement that guidance is available from the MECF SWM document.

Trusting this is satisfactory.

Yours truly,

Douglas Nuttall, P.Eng.
Senior Civil Engineer

Cc Forbes Symon, Town of Perth



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F 613-692-0831 | www.rvca.ca

October 22, 2019
19-TOP-EA

Town of Perth
80 Gore Street East
Perth, ON
K7H 1H9

Attention: Forbes Symon

Subject: **Western Annex In the Town of Perth – Infrastructure Master Plan; Notice of Completion**

Dear Mr. Symon,

Thank you for coming to the RVCA office on October 3, 2019 to discuss the Notice of Completion for the Western Annex in the Town of Perth – Infrastructure Plan.

During our discussion, confirmation was provided by RVCA engineers and representatives from Jp2g indicating that the “preferred concept”, which would involve cutting off floodplain connections between the Tay River and Grants Creek, would not result in significant impact on expected flood levels or velocities. To further clarify, this statement was made on the understanding that cutting of these floodplain connections would not result in change to the existing mapped 1:100 year regulatory floodplain.

Based on the expert opinion of qualified professionals within the field of floodplain mapping, our office is now in a position to offer support for the “preferred concept”. A regulatory permit will still be required from our office to complete the exercise of cutting of the regulatory floodplain.

As always, please continue to keep us informed of the EA as it is finalized.

Thank you for the opportunity to comment and please do not hesitate to contact the undersigned at (613) 267-5353 x 131 should you have any questions. Please advise us on any decision respecting this application or any changes in the status of the application.

Yours truly,

Phil Mosher, RPP

cc – Doug Nuttall, Jp2g

Proudly working in partnership
with our 18 watershed municipalities

Athens, Augusta, Beckwith, Central Frontenac, Clarence-Rockland,
Drummond/North Elmsley, Elizabethtown-Kitley, Merrickville-Wolford, Montague,
North Dundas, North Grenville, Ottawa, Perth, Rideau Lakes, Smiths Falls, South Frontenac, Tay Valley, Westport



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Jp2g No. 2161774B

November 29, 2019

Via e-mail

Robert Strachan, P.Eng.

bobsperth@gmail.com

Re: Infrastructure Master Plan for Western Annexed Area, Town of Perth

Thank you for your letter dated September 6, 2019. There are 1 principal concern in your letter, and we are addressing it as described below:

- The consultants have not shown as an alternative the logical route for this new infrastructure to follow the 66 ft unused road allowance (Town of Perth) parallel to the County Administration Building driveway that is centered on the "Bathurst" side of the double road allowance formerly between Bathurst Twp and the Town of Perth.

Based on the expected timing of this project, we have assumed that the work on Inverness would be done concurrently with the Town of Perth infrastructure renewal program, and as such, the associated incremental costs and disturbance of the residents will be minimized (although this is not reflected in the costs). If it turns out that the two projects can not be done concurrently, this assumption will have to be re-evaluated, and the unopened road allowance adjacent to the county lands would have to be considered as a potential alternative.

We have made it clear in the report that the alternative you have recommended is to be considered if the timing of the works can not be coincident with the planned infrastructure renewal.

The Infrastructure Master Plan, amended to include all of the comments received, is available at the Town of Perth's website.

Yours truly,

Douglas Nuttall, P.Eng.
Senior Civil Engineer

Cc Grant Machan, Town of Perth



Jp2g Consultants Inc.

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Jp2g No. 2161774B

November 29, 2019

Via e-mail

Glenn Tunnock, MPA, MCIP, RPP

gtunnock@tunnockconsulting.ca

Re: Infrastructure Master Plan for Western Annexed Area, Town of Perth

Thank you for your letter dated September 5, 2019. There are 5 comments in your letter, and we are addressing them as described below:

1. FoTW supports OPA 16 requirements (Section 8.8.3 d.) that the impact on the Natural Heritage Features "must be considered prior to any change in this designation". The commitment to the conservation of natural heritage features and areas will ensure that the integrity of the area's ecology is maintained before, during and after the development process.

Noted.

2. Section 3.1.1: FoTW concurs with the need to mitigate and adapt to the effects of climate change and that a detailed analysis should be undertaken as part of future design studies. Further to this objective Section 6.1.7 should specify a target, preferable 40%, for the vegetative canopy cover as an additional measure as the extent of canopy cover is considered essential to provide for a required level of carbon sequestration and a level that will also help to sustain pre-development stormwater volumes.

We have recommended that the Town consider an overall target of 30% to 40% tree cover within the Town as part of their discussions with RVCA regarding Conservation of Land. While we concur that tree cover is important for both Mitigation and Adaptation to Climate Change, the area of tree canopy is less important than both the services of shading/evaporative cooling and carbon sequestration. The first is a function of orientation of building and trees, while the second is a function of tree type and depth of soils. We do not expect to provide direction on either of these as part of the Master Plan.

3. The Problem Statement (Section 4) identifies the scope of issues of interest to FoTW in Bullets 3, 5, 11, 15 and 16. However, bullet # 3 should more appropriately refer to "stormwater services" as stormwater management services or stormwater management facilities. Bullet 5 should more correctly refer to both natural heritage features and areas and adjacent lands, not just adjacent lands. Bullet 11 should more correctly refer to the "habitat of endangered and threatened species" in order to be consistent with the Provincial Policy Statement and the Official Plan. Bullet 16 refers only to climate change adaptation. The design for any development must consider climate change mitigation first and foremost. Such wording would also be consistent with Section 6.1.7.

Noted. We have reviewed bullets #3, 5, 11, and 16, and have revised where appropriate to make this clear.



4. Section 5.4, 5.4.2, 6.1.4, 6.1.6: Stormwater Management. The Master Plan sets out three options for stormwater management, all of which establish the maintenance of pre-development flows as the objective. All three options will require significant regrading including removal of much of the forest in the urbanized area. "This will increase the runoff coefficients of the open space." Section 6.1.4 is not clear as to whether any of the three options is a preferred option; rather, the preference appears to be a combination of the three options with deference to the LID berm as an important feature. Section 6.1.4 also indicates that a hydrologic model and water balance study would be required notwithstanding that there is no regulatory requirement for the hydrologic impact study.

Phase 2 (p.74) of the development works within the flood plain talks to raising the land by filling part of the flood plain. The proposal intends to maintain the ecological function over a program of replanting coincident with the regrading of the lands, installation of SWM ponds and the LID linear corridor. Despite the proposal, the plan states: "While it is possible to clear, raise, and replant the area to allow it to return to a forest, due to the surrounding disturbance associated with residential development, it is not clear that this would be the most effective manner to attempt to maintain the ecological function. Rather, it is proposed that the Town of Perth and the RVCA are to negotiate the most appropriate method ensuring the requirement for Conservation of Land is maintained."

The clearing of forested land for urban development will have an impact on the ecological functions of the existing forest ecosystem as will any alteration to the flood plain. The intent to replant with native species to compensate for the loss of the forested area reflects conventional practice; however, the renaturalization through replanting means that the ecological functions may not be restored for an extended time period, perhaps 25 – 50 years. The preferred alternative does not appear to require replanting of the developed properties within the subdivision and even replanting of surrounding lands is questioned as to whether the approach "would be the most effective manner." A more integrated approach should be required starting with and including an EIS-based forest management plan that identifies what/which trees and vegetative communities should be conserved in the design and layout of lots, streets and infrastructure. The lot fabric should be designed to integrate with the natural environment not the reverse. SWM planning should be integrated with the forest management plan since effective SWM should start with the retention of run-off on lots to minimize off-site discharge into sewers, swales etc. Development should be integrated into the existing topographic features to the greatest extent possible and with the intent to minimize the need for regrading. The forest management plan, coincident with the Master Plan's proposal for climate change mitigation, should establish a minimum forest canopy retention target, preferably 40% as part of the Plan and the target should be science-based to also address carbon sequestration. Building design should incorporate on-site soakaway pits, measures for minimizing impervious surfaces, recycling rain-water etc.

A construction plan should also be a requirement to ensure effective implementation of the forest management plan during the installation of services and the building of homes/lot development. Such a plan will ensure that trees and other vegetation are not damaged by heavy equipment during construction.

The Master Plan provides an opportunity to implement state-of-the-art SWM best practices that are ecologically-driven rather than development driven. The Town's intent to partner with the RVCA on developing the best approach to the design and development of land for conservation of natural features and the environment is commendable, but not fully evident in the proposed Master Plan.



The Golf Course lands Concept Plan development will require significant regrading and removal of mature trees in the urbanized area. It is noted extensive areas of existing vegetation are maintained and that the Phase 1 lands comprise the existing fairways for holes 11, 12 part of 13, 17 and 18; and part of Phase 2 comprise existing fairways for part of hole 13, 14, 15 and 16. The development will increase runoff coefficients, which will be mitigated with the preferred stormwater management approach and the compensation for lost forest cover. We have revised Section 6.1.4 to make it clear that the preferred alternative is the linear LID system with sediment forebays described as Option 3 in Section 5.4. The text of the report has been changed to clarify that there is a regulatory requirement for a Hydraulic Impact Study (HIS) but that RVCA policy does not provide details of such an approach. The recommended negotiation between the Town and the Conservation Authority provides the opportunity to provide for forest cover in locations and/or in manners that would be more beneficial than just replanting in-situ as a requirement for Conservation of Land. This may mean planting specific species and/or using specific techniques on other Town-owned land. It may be that the best location for forest development is on site, but that comparison is beyond the scope of this EA.

We have noted in Table 8-1 that further studies, including an Environmental Impact Study and a Tree Preservation Plan, will be required as part of future subdivision development proposals. A Forest Management Plan for the Town as a whole does not exist, and it is beyond the scope of this Master Infrastructure planning process or subsequent development proposals to create one. A Tree Preservation Plan has been added to the required studies. The use of soak-aways or other lot-level controls will have to be considered at a detailed design stage, due to the general presence of very shallow soils, imperfect drainage, and high groundwater.

5. Section 6.1.7 – Climate Change. Suggestions are made for mitigating climate change; however, the proposal makes the application of mitigation measures optional rather than regulatory. A more detailed climate change plan as suggested above could be a landmark feature of the Master Plan. As an example, the conventional approach to flood plain management is to use the 1:100 year flood design. Extreme climate events in today's context appear to have exceeded this parameter as witnessed on Christie Lake where the 1:100 flood was exceeded. Extreme climactic events raise the question as to whether this could occur within the Perth community as well. The question of how such an extreme event would be addressed through development guidelines is not addressed in the Master Plan?

Currently, there is no consensus as to how best to adapt to extreme events. Arbitrary measures are applied (15% increase above the 1:100 year flood flow, 1:100 year flood flow +25% as a stress test, etc) in different ways by different authorities. The choice of such a method is generally by the municipality as a whole, rather than on a significantly smaller scale, such as the scope of this Master Infrastructure Plan. Town of Perth has their Climate Change Action Plan, which provides the recommendation for solar orientation of streets and homes. The other recommendations are expected to carry the same weight.

The Infrastructure Master Plan, amended to include all of the comments received, is available at the Town of Perth's website.

Yours truly,

Douglas Nuttall, P.Eng.
Senior Civil Engineer

Cc Grant Machan, Town of Perth



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Jp2g No. 2161774A

November 29, 2019

Via e-mail

Ministry of Tourism, Culture, and Sport
Programs and Service Branch
401 Bay St. Suite 1700
Toronto, ON M7A 0A7
(416)314-7133
Kimberly.livingstone@ontario.ca

Attn Kimberly Livingstone, Heritage Planner

Re: Infrastructure Master Plan for Western Annexed Area, Town of Perth

Thank you for your letter dated September 17, 2019. There are 5 bullets to your letter, which we have addressed as described below:

- On September 26, 2016, MTCS provided advice on this project as follows:

Noted.

- The completed screening checklists in Appendix D (Criteria for Evaluating Archaeological Potential and Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes) indicates that the study area does have archaeological potential as well as potential for built heritage resources and/or cultural heritage landscapes.

Noted.

- MTCS does note that in Section 3.2 (Cultural Heritage- page 23) that the plan states that any applications under the Planning Act will require both an Archaeological Assessment and a Cultural Heritage Evaluation. MTCS also notes that Table 8-1 (Documentation for Plan of Subdivision and Approvals- page 93) includes archaeological assessment but it does not include cultural heritage evaluation. MTCS would like further clarification in terms of timing and coordination between the Environmental Assessment and Planning Act processes. MTCS is still of the opinion that technical cultural heritage studies be undertaken by a qualified person in order to inform the Master Plan EA process. The same studies would likely be accepted for Planning Act purposes in order to avoid duplication and additional costs.

Table 8-1 has been revised to include Cultural Heritage Evaluation. We concur that the technical archaeological and cultural heritage studies need to be undertaken by a qualified person, but believe the studies are better done as part of the Subdivision application and review process. The Infrastructure Master Plan completed under the Municipal Class EA process is done at a broad level of assessment unlike the level of investigation for specific municipal projects. The scope of the final land use plan and timing of a subdivision application for Tayview and the Phase 1 Golf Course lands is dependant on the landowners. The development plan for these properties is not well defined, may not involve all lands, may proceed in stages over many years or may not proceed at all. Phase 2 of the Golf Course project is even less defined as it is designated as 'Future Development' in the Official Plan, with the expectation of the project proceeding well past the current planning horizon.



We acknowledge that an Archaeological Assessment and Cultural Heritage Evaluation is required and it may have been more efficient and less costly if done for the study area, however it is not reasonable for the Town to incur these costs under the Municipal Class EA but rather by the landowners under a Planning Act application.

- Under Section 4 (Problem Statement- page 34), it is noted that, "The Perth Golf Course is the oldest in Canada and the first 9 holes should be protected from development". However, it is noted that in Appendix D in the Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes checklist that the property contains a parcel of land that is the subject of a municipal, provincial or federal commemorative plaque. MTCS recommends that these sections are reviewed and aligned as appropriate. At this time, it is not clear if the golf course is a potential cultural heritage resource or whether there are any other cultural resources in the study area. MTCS strongly recommends that a cultural heritage evaluation be undertaken for the study area. An Existing Conditions and Preliminary Impact Assessment report would be appropriate for the size of the study area.

The decision was made by the owner of the golf course to avoid disturbing the first 9 holes, which are the holes that were developed in the late 1800s. It has been assumed for the Infrastructure Master Plan that the first 9 greens, tees, and fairways have heritage potential. An error was made –there isn't a formal commemorative plaque on the property, and this has been corrected on the checklist and clarified in the report. We have revised the report to make it clear that a Cultural Heritage Impact Assessment will be required on both properties, prior to applying for Draft Plan of Subdivision.

- Under Section 5.6 (Assessment Alternatives- page 64), it states that, "The Cultural and Socio-Economic criteria will be addressed on the comparative evaluation of an alternative to minimize impact on the sensitive features identified in Section 3.2 and 3.3 of this report". Please clarify how cultural heritage resources were assessed and informed the evaluation of alternatives if no technical cultural heritage studies have been undertaken.

It has been assumed that the portion of the golf course site that was in use prior to 1980 has the potential to be a cultural heritage landscape. All infrastructure alternatives avoid this part of the site. A Cultural Heritage Evaluation Report will be required to be completed on the site prior to applying for a Draft Plan of Subdivision. Heritage Impact Studies may be required as development proceeds.

The Infrastructure Master Plan, amended to include all of the comments received, is available at the Town of Perth's website.

Yours truly,

Douglas Nuttall, P.Eng.
Senior Civil Engineer

Cc Grant Machan, Town of Perth



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Jp2g No. 2161774B

November 29, 2019

Via e-mail

MNRF Kemptville District
10-1 Campus Drive
Kemptville ON K0G 1J0
Tel.: 613 258-8204
Fax: 613 258-3920
Mary.Dillon@ontario.ca

Attention Mary Dillon, District Planner

Re: Infrastructure Master Plan for Western Annexed Area, Town of Perth

Thank you for your letter dated September 5, 2019. There are 9 distinct comments in your letter, and we are addressing them as described below:

1. The Tay River provides habitat for a variety of spring and fall spawning species. There is walleye spawning habitat in a reach of the Tay River adjacent to the project site. These habitats are considered critical fish habitat and should be protected from adverse effects. A new bridge across the Tay River as an extension of North Street is not a preferred access option given the walleye spawning area.

Noted. The proposed bridge crossing is at the County lands.

2. No in-water work should be carried out between October 15th and June 30th in any given year, to protect spring and fall spawning species.

Noted. We have made this evident in the report. See Section 3.1.4.

3. We recommend the establishment and/or retention of a minimum 30 m of natural vegetated cover from the high-water mark to protect fish habitat and water quality. Appropriate measures to avoid harm to fish and fish habitat (including measures to maintain or improve water quality) should be implemented if any infrastructure or facilities are constructed adjacent to fish habitat. Generally, development should be directed to areas outside of the floodplain.

Noted. We have made this evident in the report. See Section 3.1.4.

4. There is unevaluated wetland within and adjacent to the Tayview property which should be evaluated prior to development approvals to ensure adequate protection and setbacks. There is other unevaluated wetland along the shores of the Tay River (e.g., where the new bridge crossing is proposed) which should be evaluated for the same reasons before any development is approved.

Noted. We will ensure this is evident in the report. See Section 3.1.4.

5. The Grant Creek Wetland Provincially Significant Wetland (PSW) is located at the southern limits of the project site. It appears from the mapping in the report that no development

(e.g., multi-use pathway, bike route, pedestrian pathway etc.) is proposed within the PSW. Can you please confirm? Development and site alteration should not occur in the adjacent lands either, unless it has been demonstrated that there will be no negative impacts on the feature or its ecological functions. Has this been demonstrated?

No development is proposed within 30m of the PSW. With each phase of development, a Hydrologic Impact Assessment will be required to demonstrate that there are no negative impacts on the hydrologic function of the wetland due to the proposed development. With each phase of development, an Ecological Impact Assessment will be required to demonstrate there are no negative impacts on the feature or its ecological functions. We will ensure that this is evident in the report.

6. We recommend the establishment and/or retention of a minimum 30 m of natural vegetated cover adjacent to PSW. At the detail design stage, wetland boundaries should be staked by a qualified professional to protect the feature and ensure adequate setbacks are maintained.

Noted. We have made this evident in the report. See Section 3.1.4.

7. The Ministry of Environment, Conservation and Parks (MECP) assumed responsibility for the Endangered Species Act (ESA), including species at risk (SAR), earlier this year. Please contact MECP directly regarding the ESA or SAR at SAROntario@ontario.ca.

Noted. We have made this evident in the report. See Section 3.1.4.

8. Development should be directed away from areas that are unsafe for development due to the presence of hazardous forest types for wildland fire. The risks associated with wildland fire in the project area are anticipated to be low, based on the Ministry's generalized wildland fire hazard data which provides a coarse scale assessment of areas with the greatest potential for risks associated with wildland fire. Site-specific information obtained as part of the existing environmental conditions investigation for this project should provide more confidence regarding the wildland fire hazardous forest types and risk level.

Noted. We will have made this evident in the report. See Section 3.1.4.

9. Work in and adjacent to the Tay River or Grant Creek may require authorization under the Lakes and Rivers Improvement Act and/or the Public Lands Act. Please contact Tarique Kamal (tarique.kamal@ontario.ca) for further information.

Noted. We will have made this evident in the report. See Section 3.1.4.

The Infrastructure Master Plan, amended to include all of the comments received, is available on the Town of Perth's website.

Yours truly,



Douglas Nuttall, P.Eng.
Senior Civil Engineer

Cc Grant Machan, Town of Perth



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Jp2g No. 2161774A

November 29, 2019

Via e-mail

Rideau Valley Conservation Authority
3889 Rideau Valley Drive
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Tel.: 613 692-3571
Fax: 613 692-0831
phil.mosher@rvca.ca

Attention Phil Mosher, Planner

Re: Infrastructure Master Plan for Western Annexed Area, Town of Perth

Thank you for the letter dated October 22, 2019 (your file number 19-TOP-EA). The Infrastructure Master Plan, amended to include all of the comments received, is available on the Town of Perth's website.

Trusting this is satisfactory.

Yours truly,

A handwritten signature in black ink, appearing to read 'Douglas Nuttall', is written over a horizontal line.

Douglas Nuttall, P.Eng.
Senior Civil Engineer

Cc Grant Machan, Town of Perth

