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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 herby 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

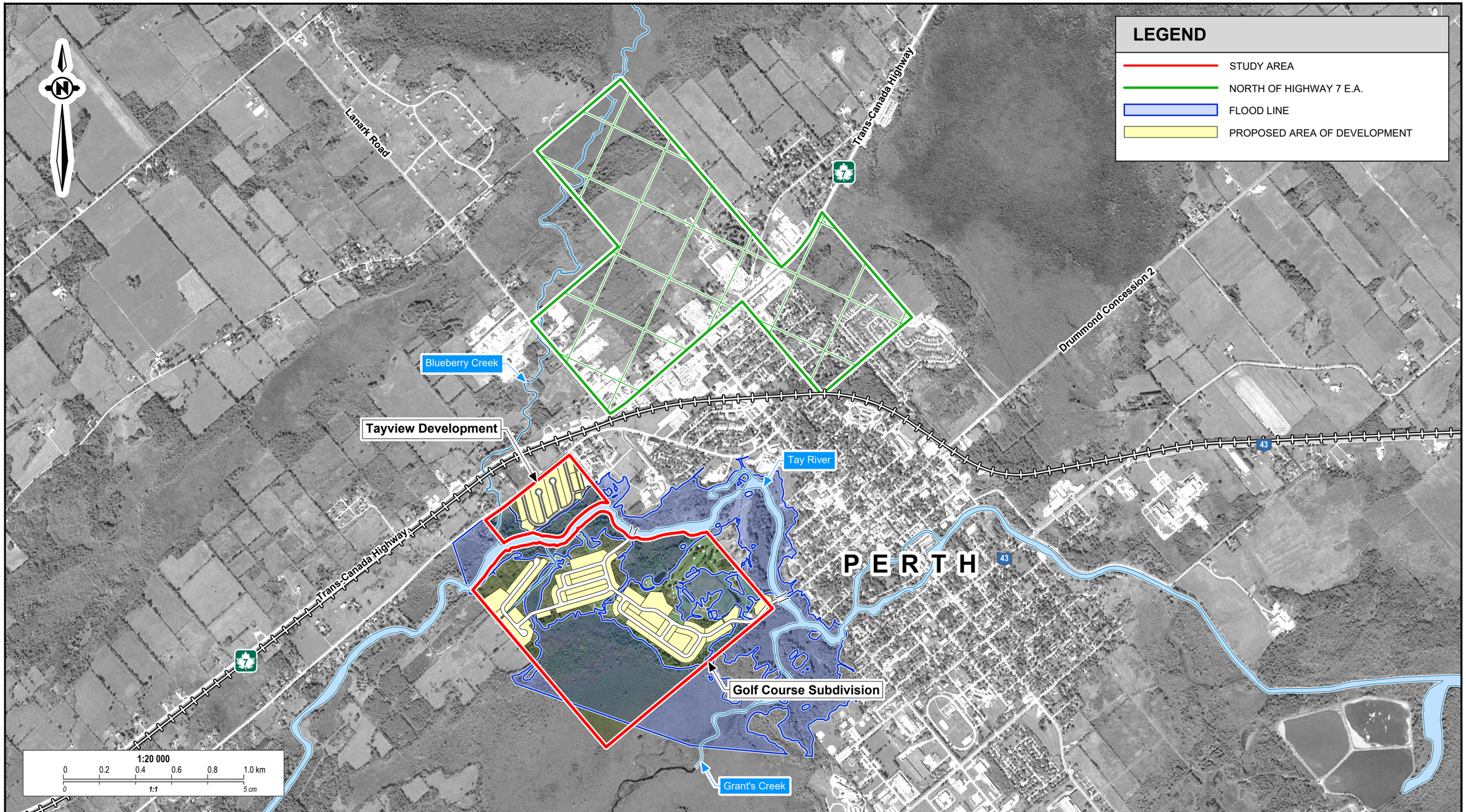
The Western Annexed Area comprises two (2) private landholdings bisected by the Tay River. According to Town records the Perth Golf Course property is approximately 300 ha, and the Tayview property is 35 ha. Note that both properties are subject to the 1:100 year flood plain of the Tay River, shown as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

Folder: \\JP2GOTTNAS\MAIN DATA\DOCS\1 - CIVIL\ACTIVE\2161774A - PERTH MASTER PLAN CLASS EA\07 DRAWINGS\ONGOING\INFRASTRUCTURE MASTER PLAN | Drawing: 1.1 - study plan.dwg | Layout: community concept plan | Print date: 11:08 AM November 27, 2019

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, neighourhood 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

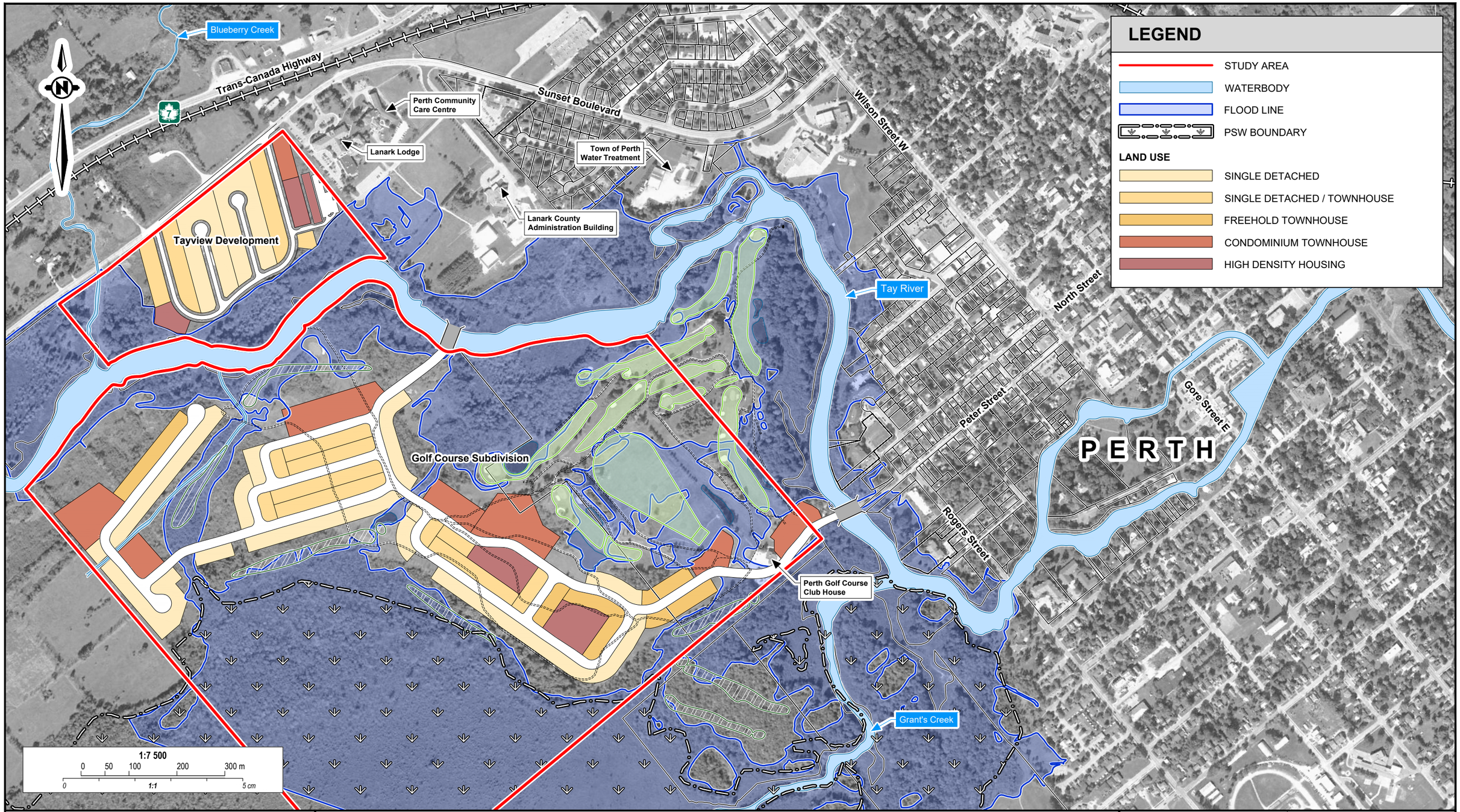
Metro Economics prepared population projections for Lanark County based on the 2016 census data (population 5930) and various historical growth, employment and migration factors for the periods 2041 and 2071.

	2041	2071
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

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

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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 and 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 MNRF 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 anthrogenic 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, CO_2 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.

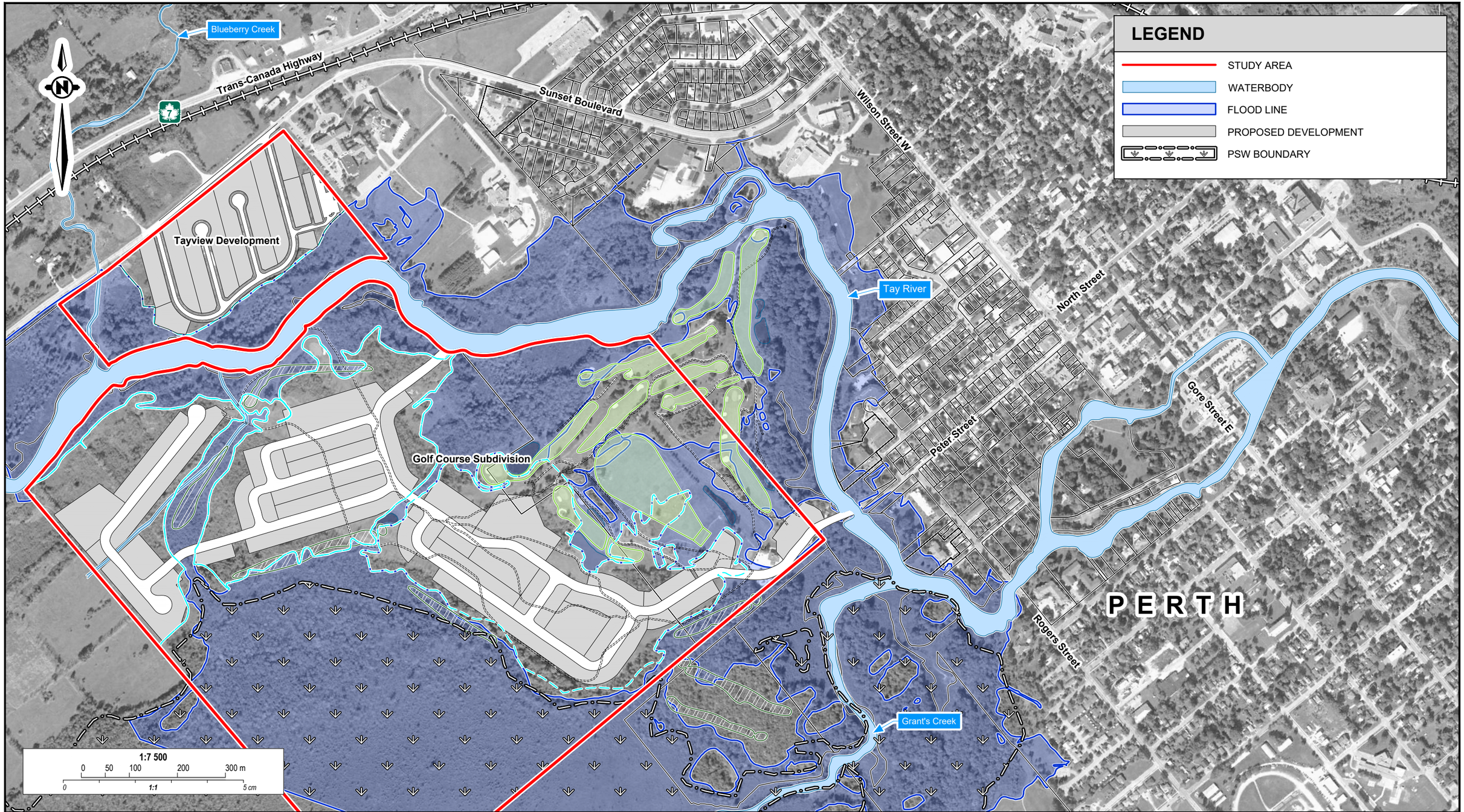
Two of the access options described in Section 5.1.1 of this report is to use the existing Peter Street golf course access and construct a new bridge across the Tay River. Should a new bridge be constructed in this area, RVCA advises in their March 22, 2019 letter that significant engineering, hydraulic 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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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.	REVISION No.:	
SCALE: As shown		FIGURE:	**3-1**

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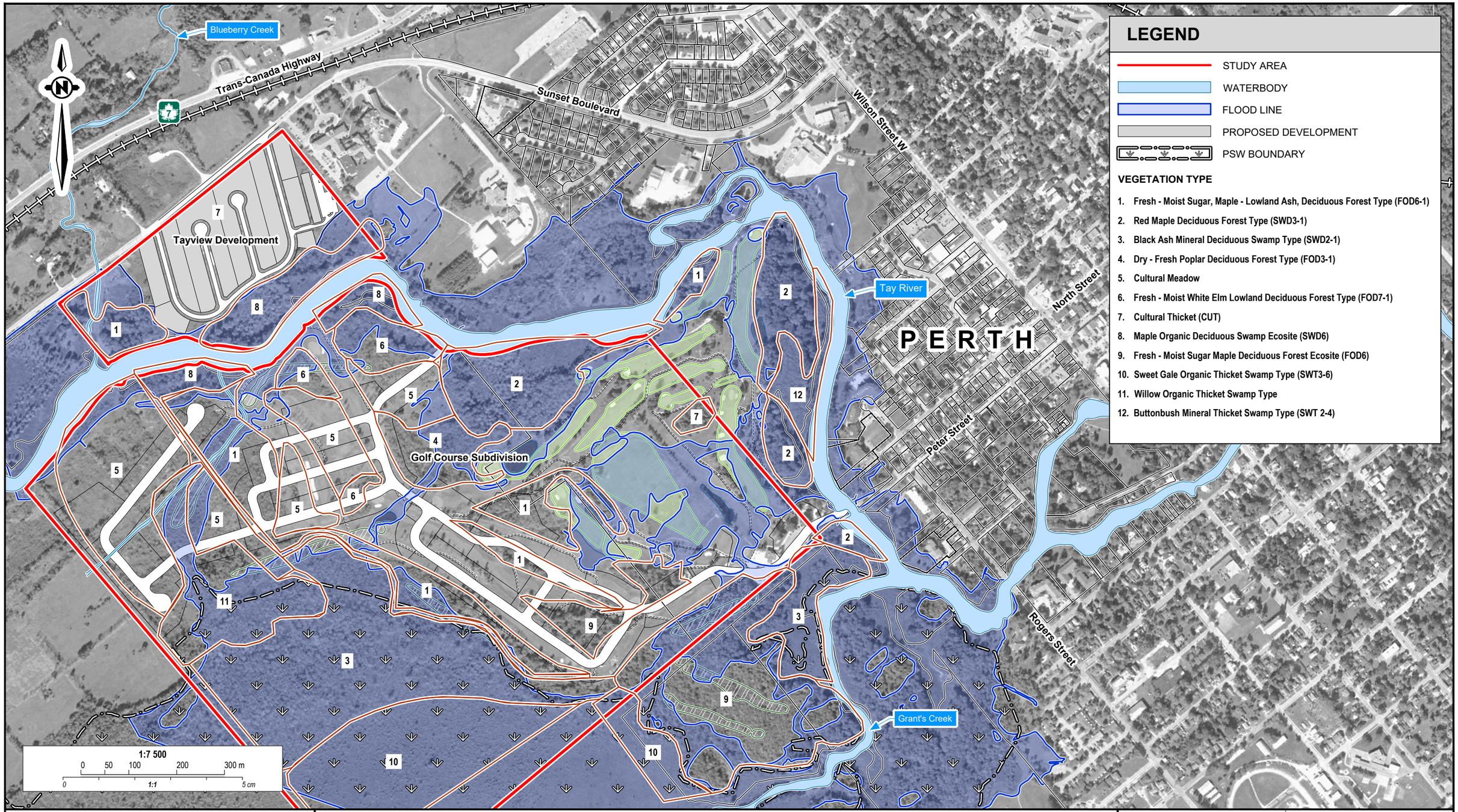

LEGEND

- STUDY AREA
- WATERBODY
- FLOOD LINE
- PROPOSED DEVELOPMENT
- PSW BOUNDARY

VEGETATION TYPE

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

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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
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SCALE: As shown		FIGURE:	3-2

Folder: \\JP2GOTTNAS\MAIN DATA\DOCS\1 - CIVIL\ACTIVE\2161774A - PERTH MASTER PLAN CLASS EA\07 DRAWINGS\ONGOING\INFRASTRUCTURE MASTER PLAN | Drawing: 3.2 - vegetation communities.dwg | Layout: community concept plan | Print date: 11:28 AM November 27, 2019

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, Brow 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 though 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

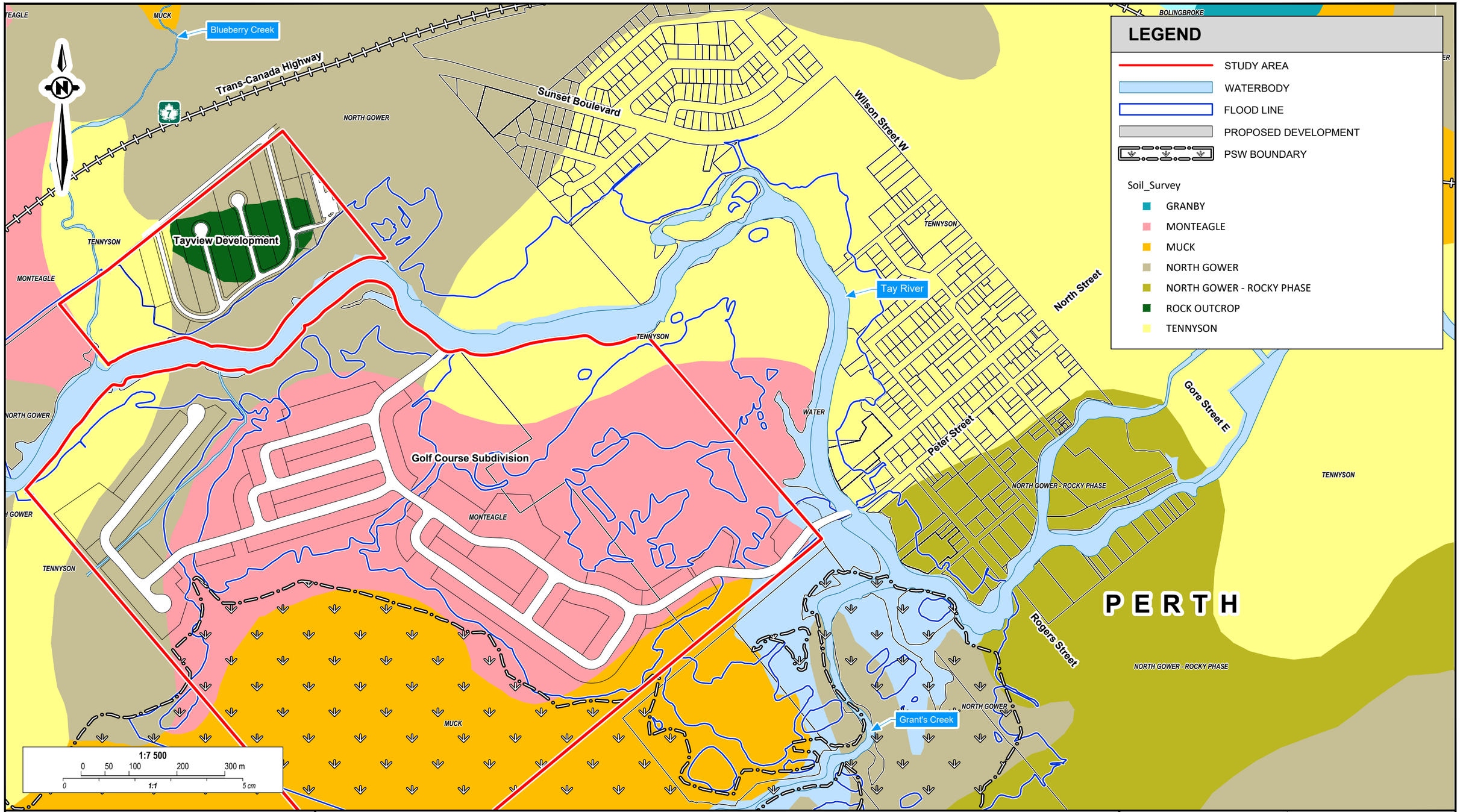
Prior to European settlers, the Omàmininini families of the Anishinaabe First Nation lived on the banks of the Tay River and the land is still considered Anishinabek territory. European and UEL Settlers started arriving in the area in the early 1800s, and began logging, farming, and using the river for 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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Infrastructure Master Plan Western Annexed Area

Town of Perth

Surficial Geology

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SCALE: As shown		FIGURE:	**3-3**

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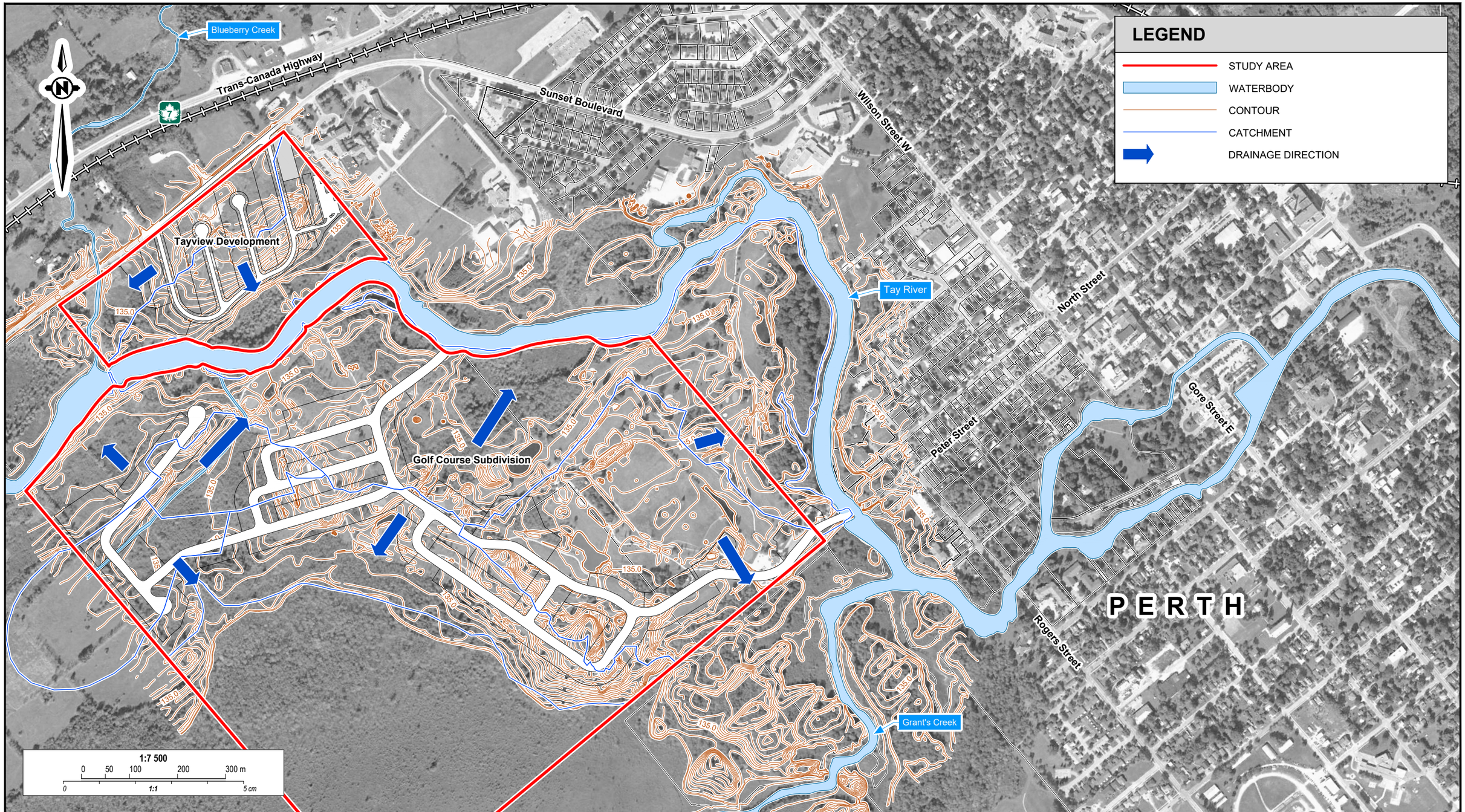

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Infrastructure Master Plan Western Annexed Area

Town of Perth

Topography

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SCALE: As shown		FIGURE:	**3-4**

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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 as 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 inter-connected "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

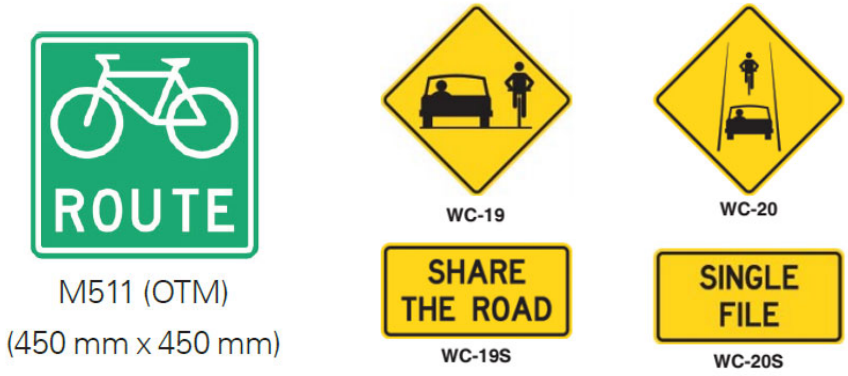


Figure 3-5 - Examples of Cycling Route Signage (OTM, Book 18)

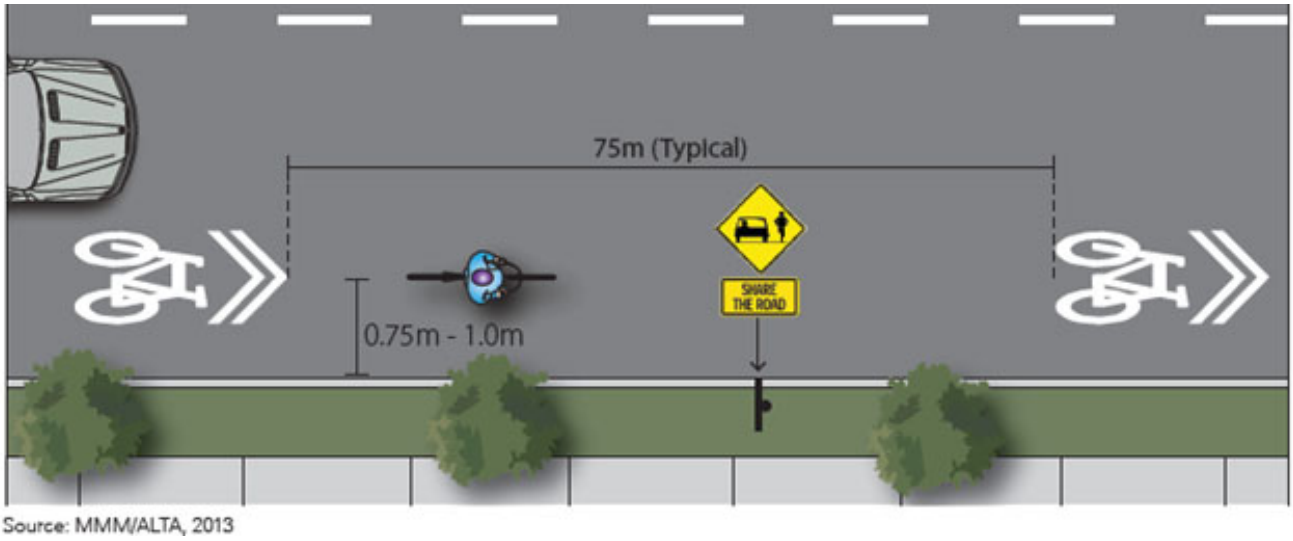


Figure 3-6 - Example of Sharrow Implementation (OTM, Book 18)

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 m^3 finished water reservoir. The existing water distribution system is pressurized by an elevated storage tank with a volume of 945 m^3. 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 note 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 (m3/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	24	8 (34%)	16 (66%)	30	16 (54%)	14 (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.

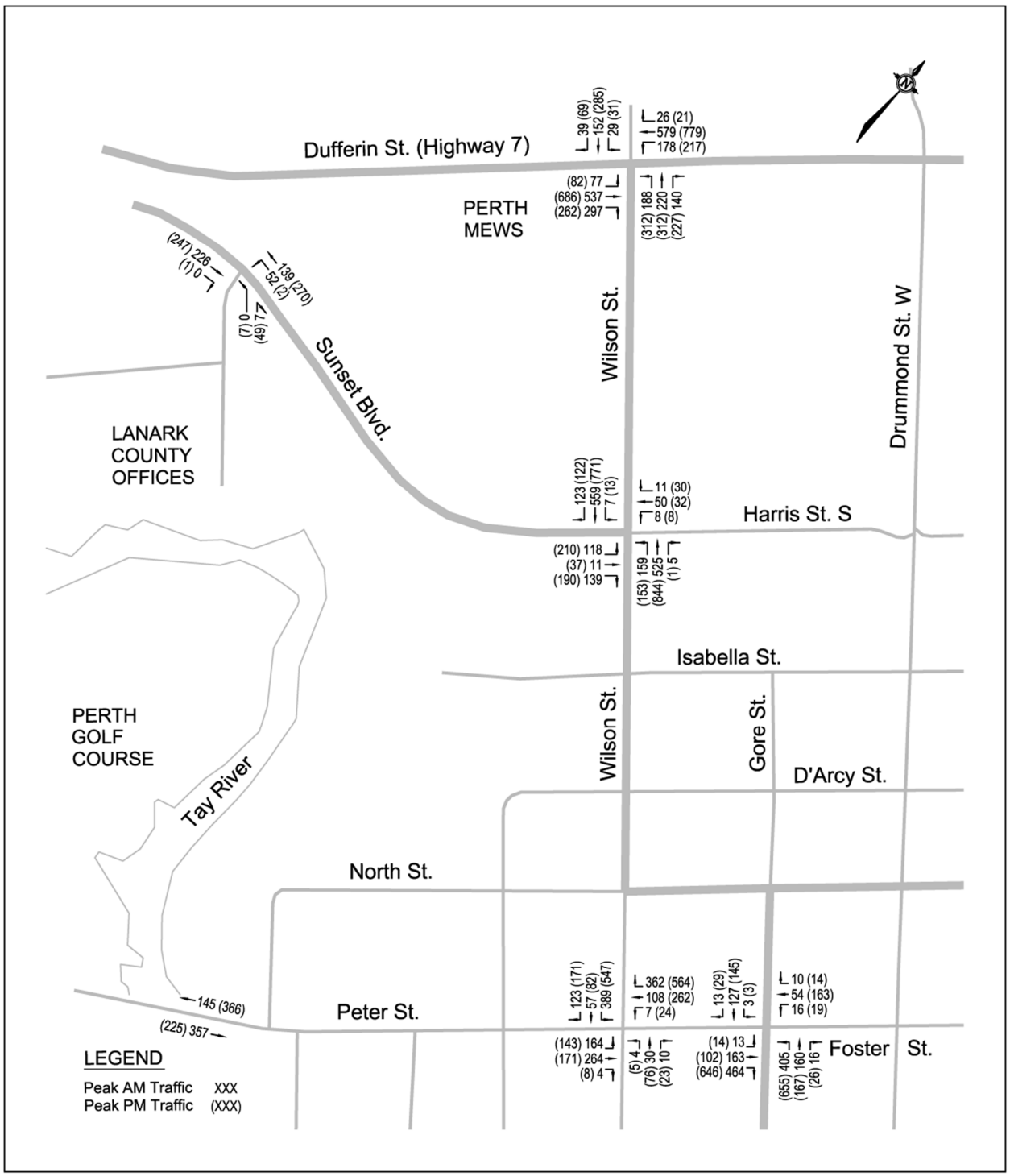
The intersection of Sunset Boulevard and Lanark County property access would experience an increase in traffic for Option 3. A traffic signal warrant analysis was conducted (Exhibit 30 in **Appendix E**) which showed that the intersection met 50 percent of the warrants for the installation of traffic 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.

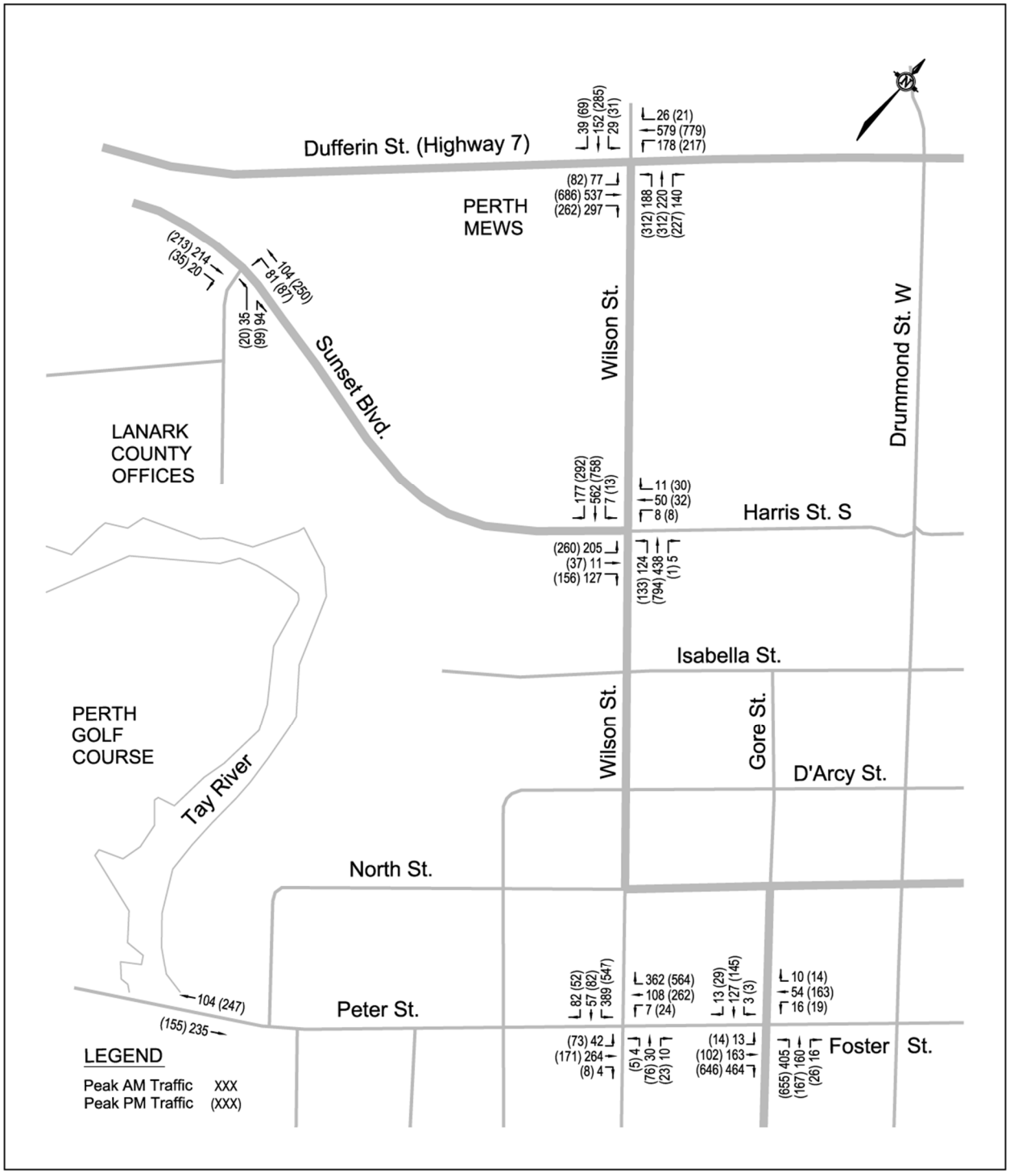


NOT TO SCALE

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	

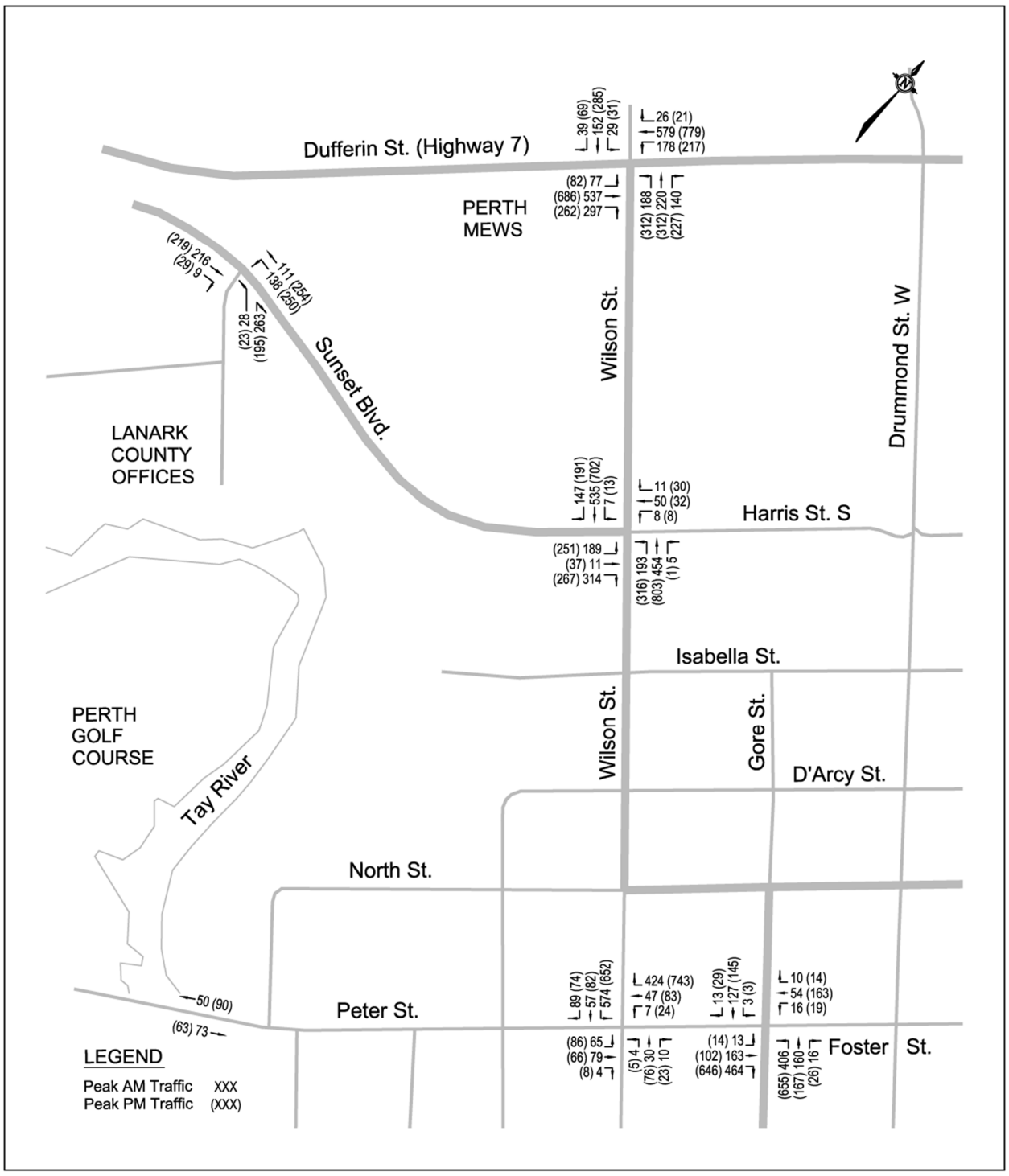


NOT TO SCALE

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	

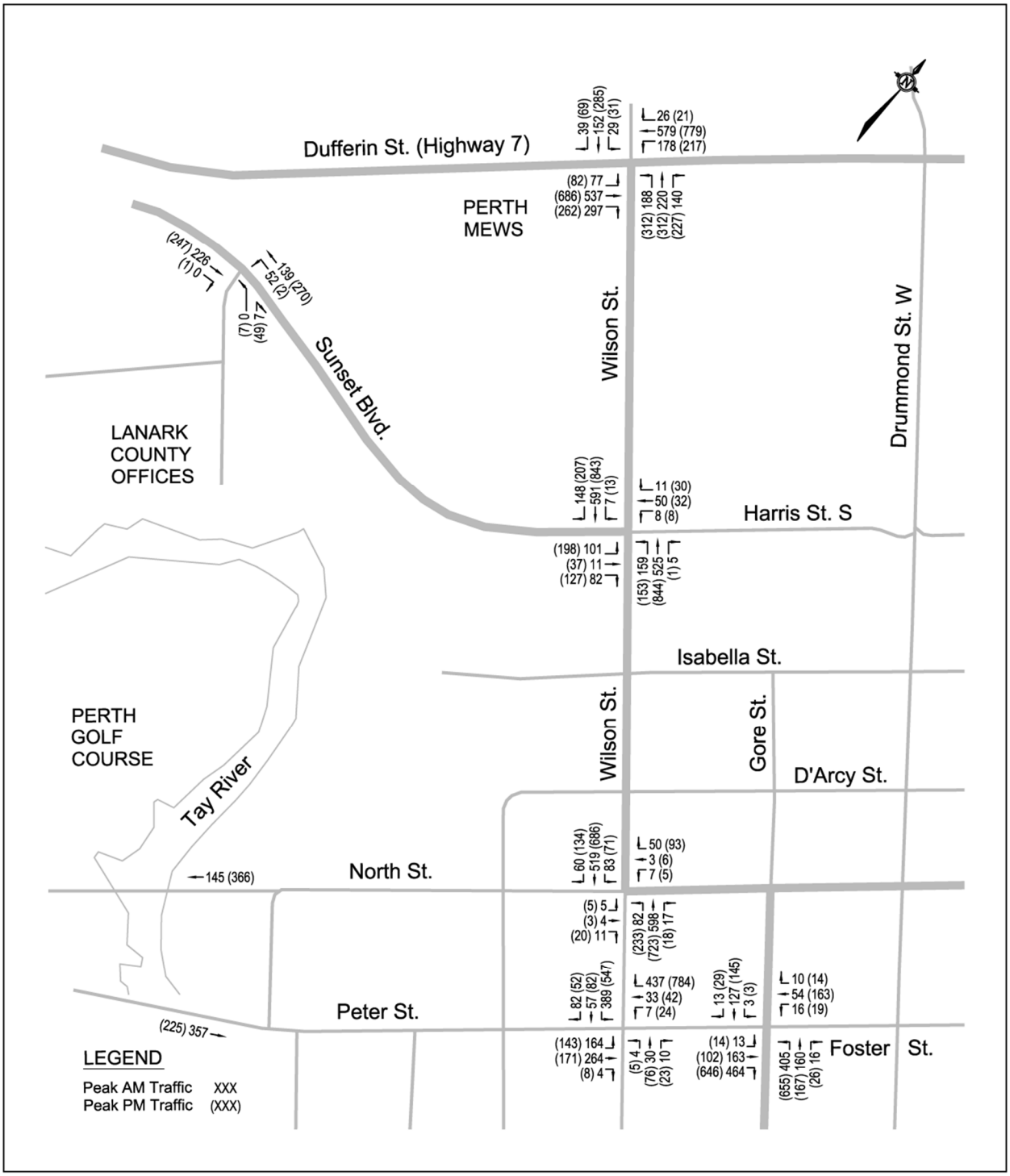


NOT TO SCALE

Figure 5-3 - OPTION 3 – 2041 TOTAL TRAFFIC – 120 Units to Peter Street & 530 Units to County Access

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.

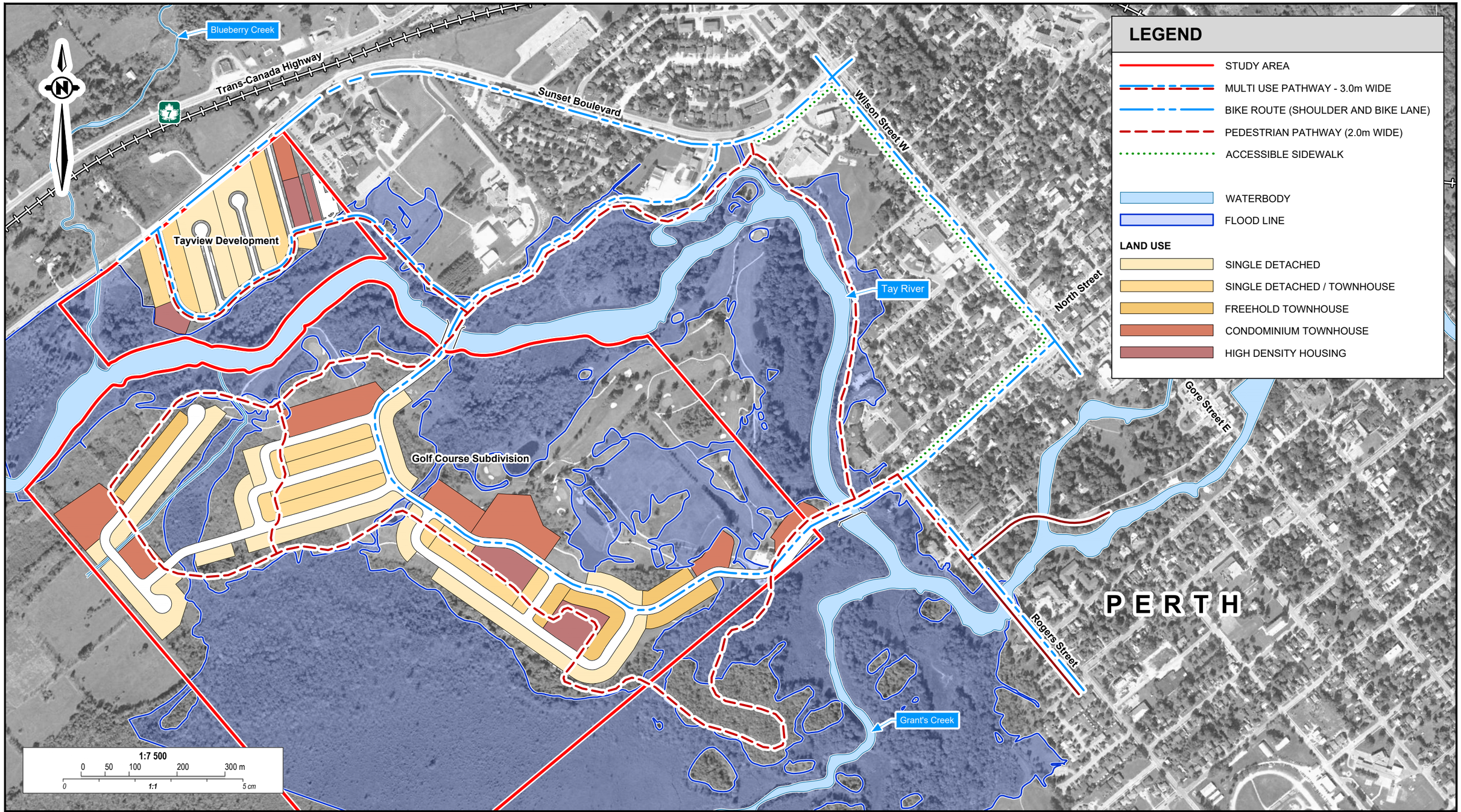
Option 2: Limited Multi-Use Pedestrian and Separated Pathway System

- 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 to1.5m 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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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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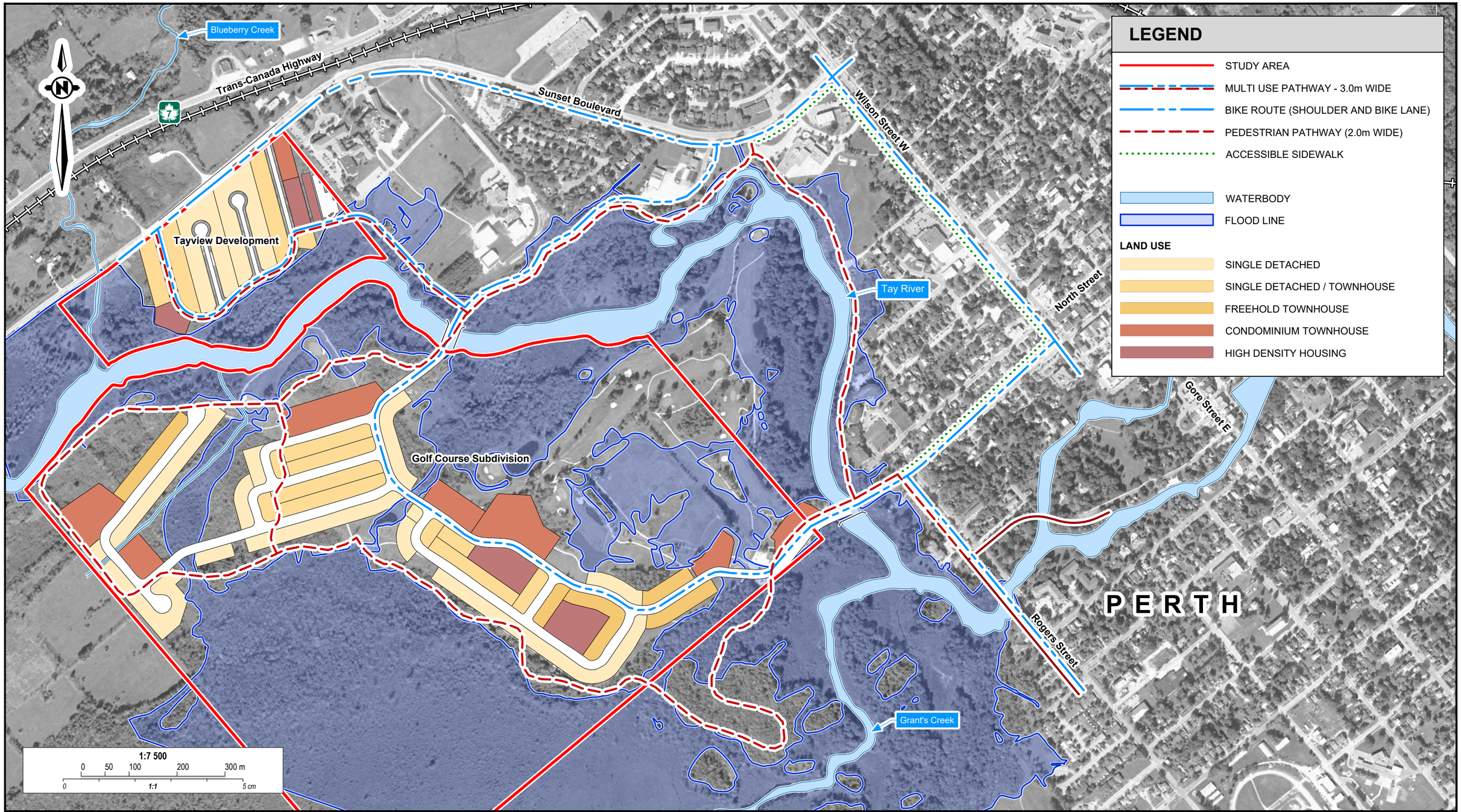

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Infrastructure Master Plan Western Annexed Area

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**

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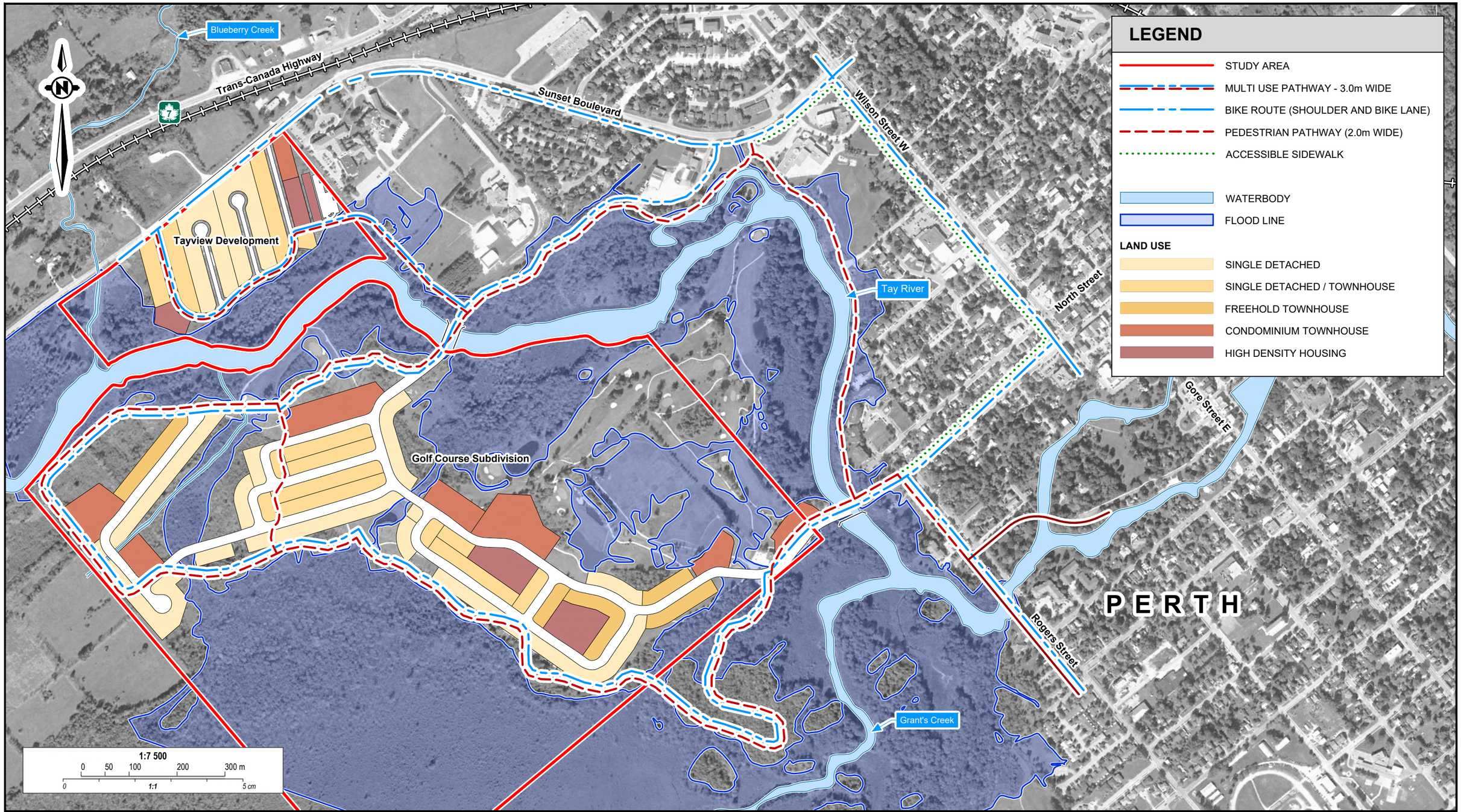

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Infrastructure Master Plan Western Annexed Area

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.	REVISION No.:	
SCALE: As shown		FIGURE:	**5-7**

Folder: \\JP2GOTTNAS\MAIN DATA\DOCS\1 - CIVIL\ACTIVE\2161774A - PERTH MASTER PLAN CLASS EA\07 DRAWINGS\ONGOING\INFRASTRUCTURE MASTER PLAN | Drawing: 5.5 - Options 1-3.dwg | Layout: Option 3 | Print date: 11:33 AM November 27, 2019

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 scnarios:

- **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) 200 mm – 250 mm (8 to 10 in)	 100 110 120

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 m^3/d, a maximum day demand of 4,570.0 m^3/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. Pop	Avg. Day m^3/d	Avg. Day L/min	Max Day Peak Factor	Max Day m^3/d	Max Day L/min	Max Hour Peak Factor	Max Hour m^3/d	Max Hour 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 m^3/d, a maximum day demand of 330.6 m^3/d and a peak hour demand of 494 m^3/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 m^3/d and a peak hour demand of 2,829 m^3/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 m^3 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 (m3)
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 m^3
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 m^3
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 m^3

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 m^3.

5.3.5 Hydraulic Analysis

The Western Annex Development will be serviced with watermains 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 m^3 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 m^3 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 (m^3)	Area (m^2)
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 945m^3 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.

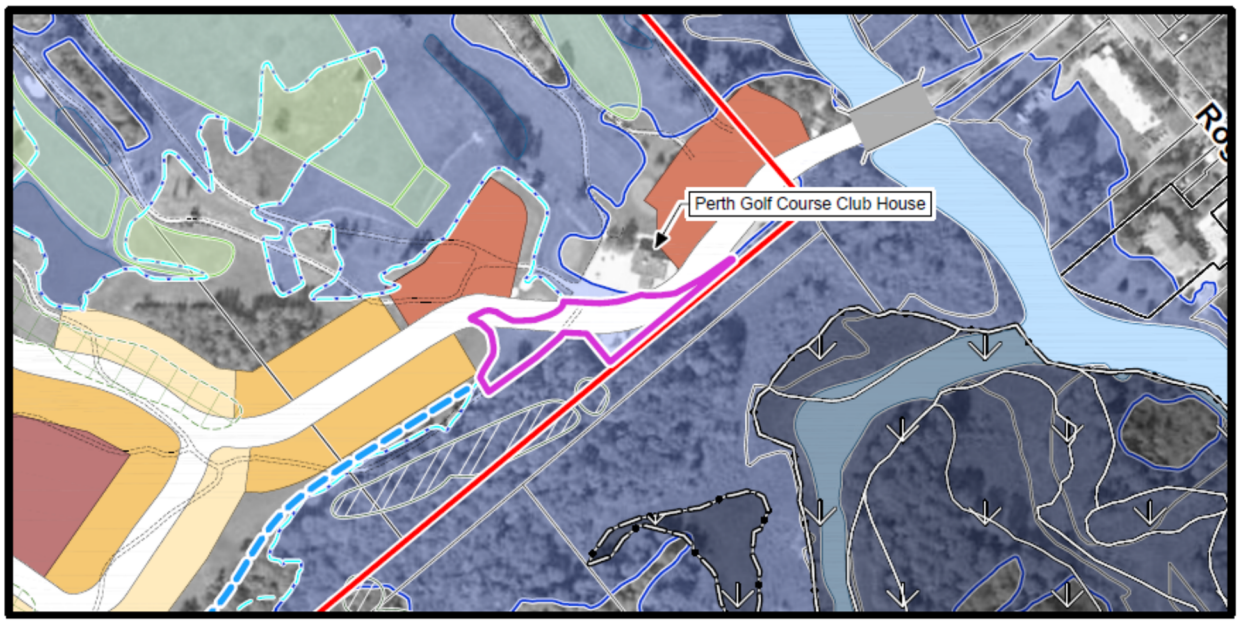


Figure 6-6 - Work Within the Flood Plain – Phase 1

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**.

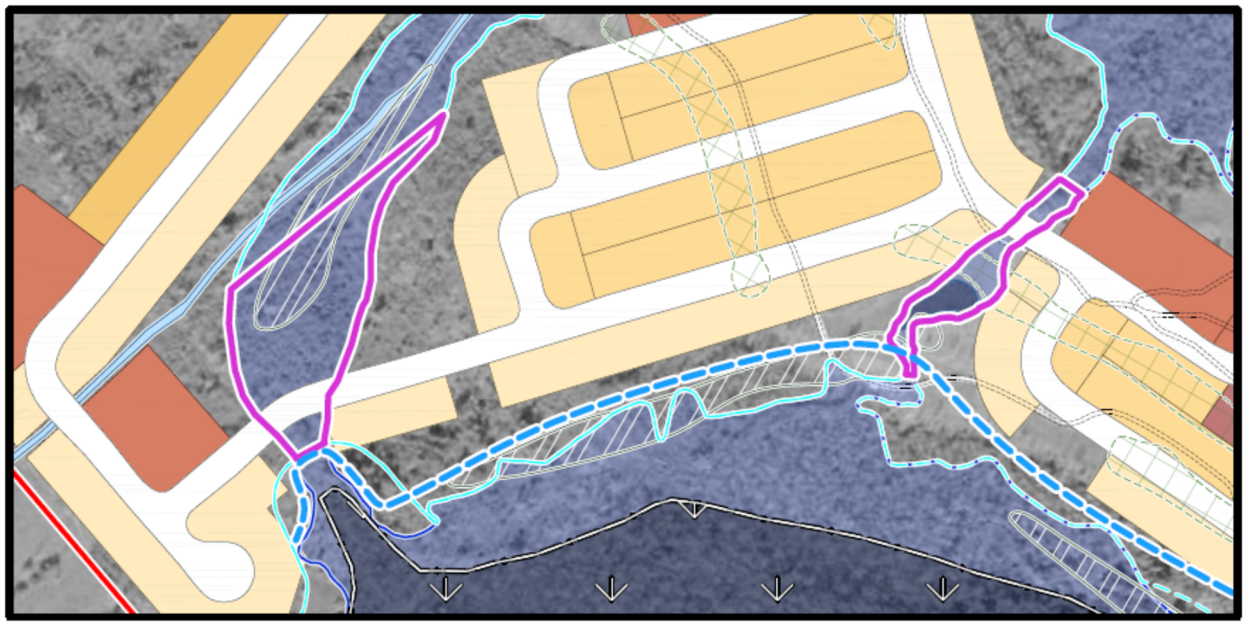


Figure 6-7 - Work Within the Flood Plain – Phase 2

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%

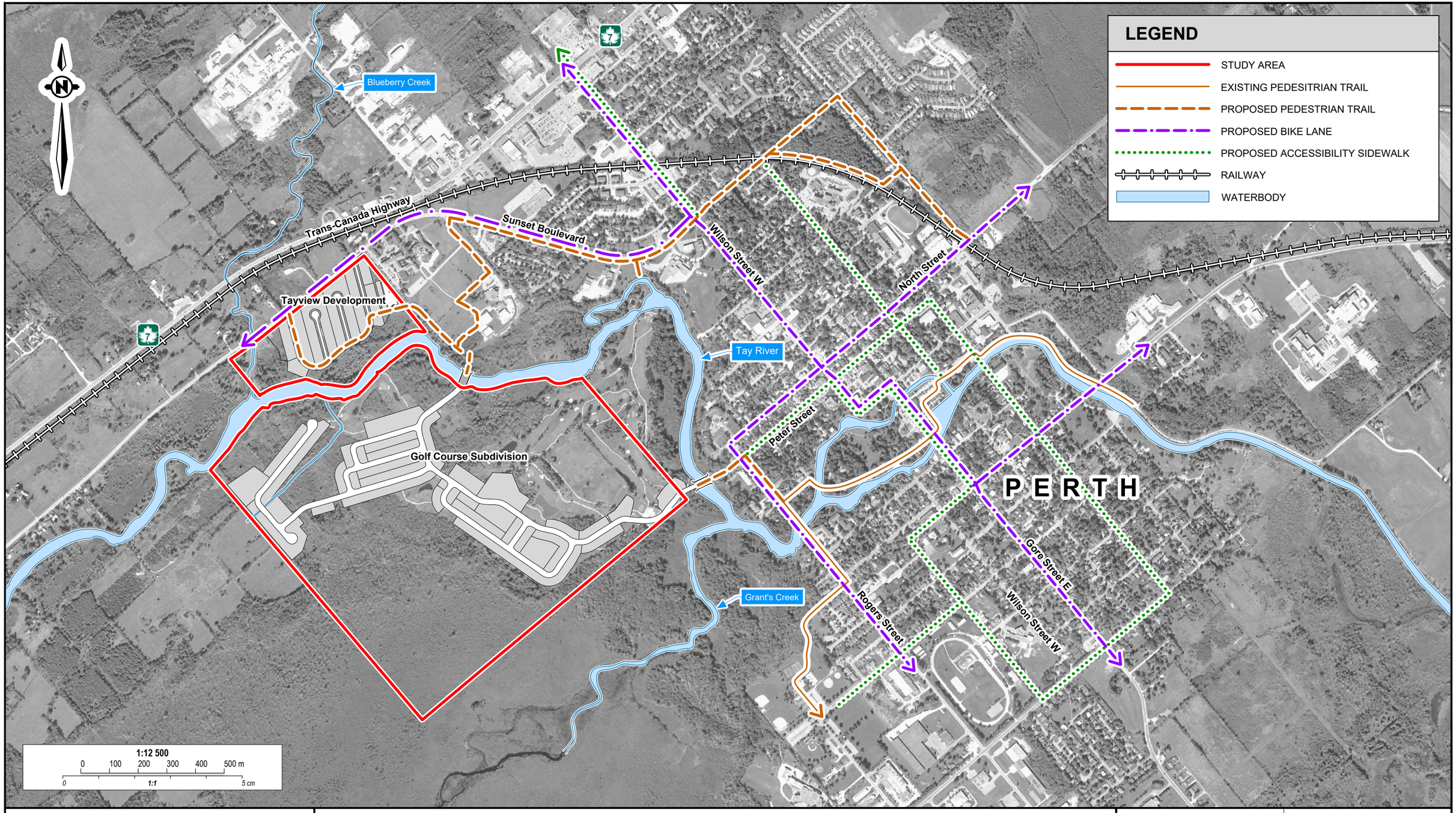
The Class 'D' cost estimate summary for the preferred transportation and servicing is provided in **Table 6-2**, detailed summary tables are provided in **Appendix H**

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.



Infrastructure Master Plan Western Annexed Area

Town of Perth

Preferred Transportation

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

12 INTERNATIONAL DRIVE, PEMBROKE. ON
Phone: (613)735-2507, Fax:(613)735-4513

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

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

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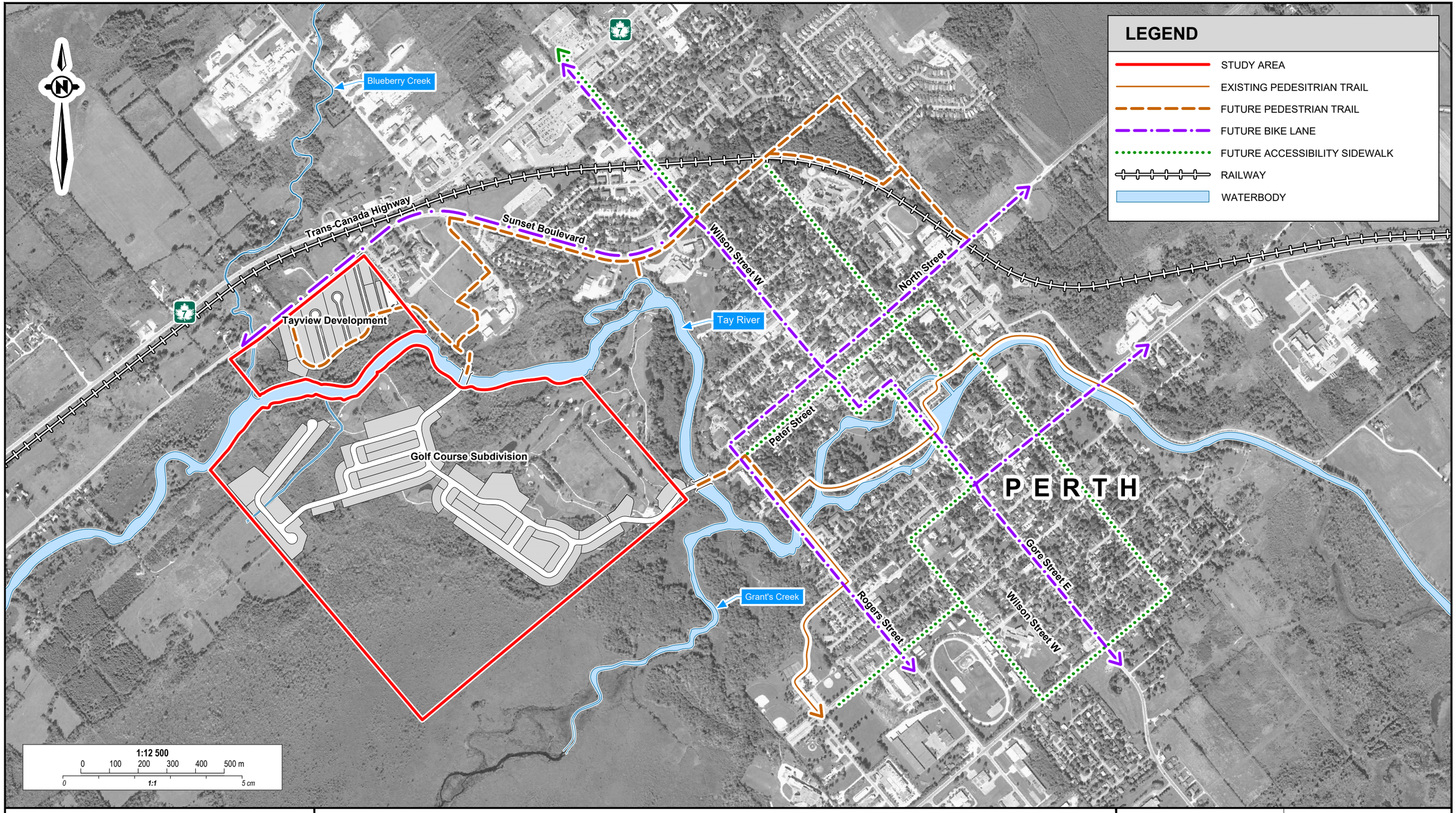

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

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Phone: (613)735-2507, Fax:(613)735-4513

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.	REVISION No.:	
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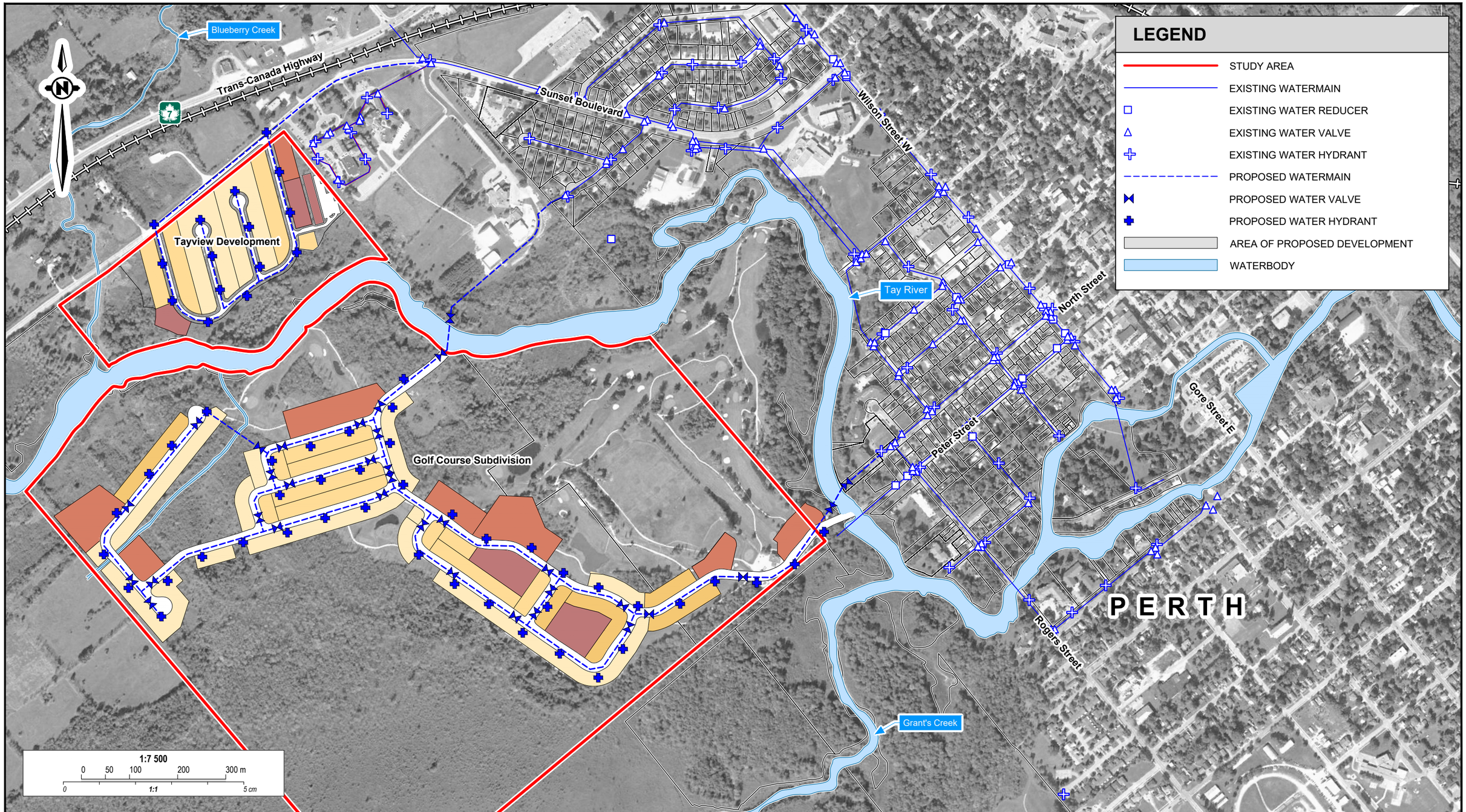

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

12 INTERNATIONAL DRIVE, PEMBROKE, ON
Phone: (613)735-2507, Fax:(613)735-4513

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: Water Distribution 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:	**6-3**

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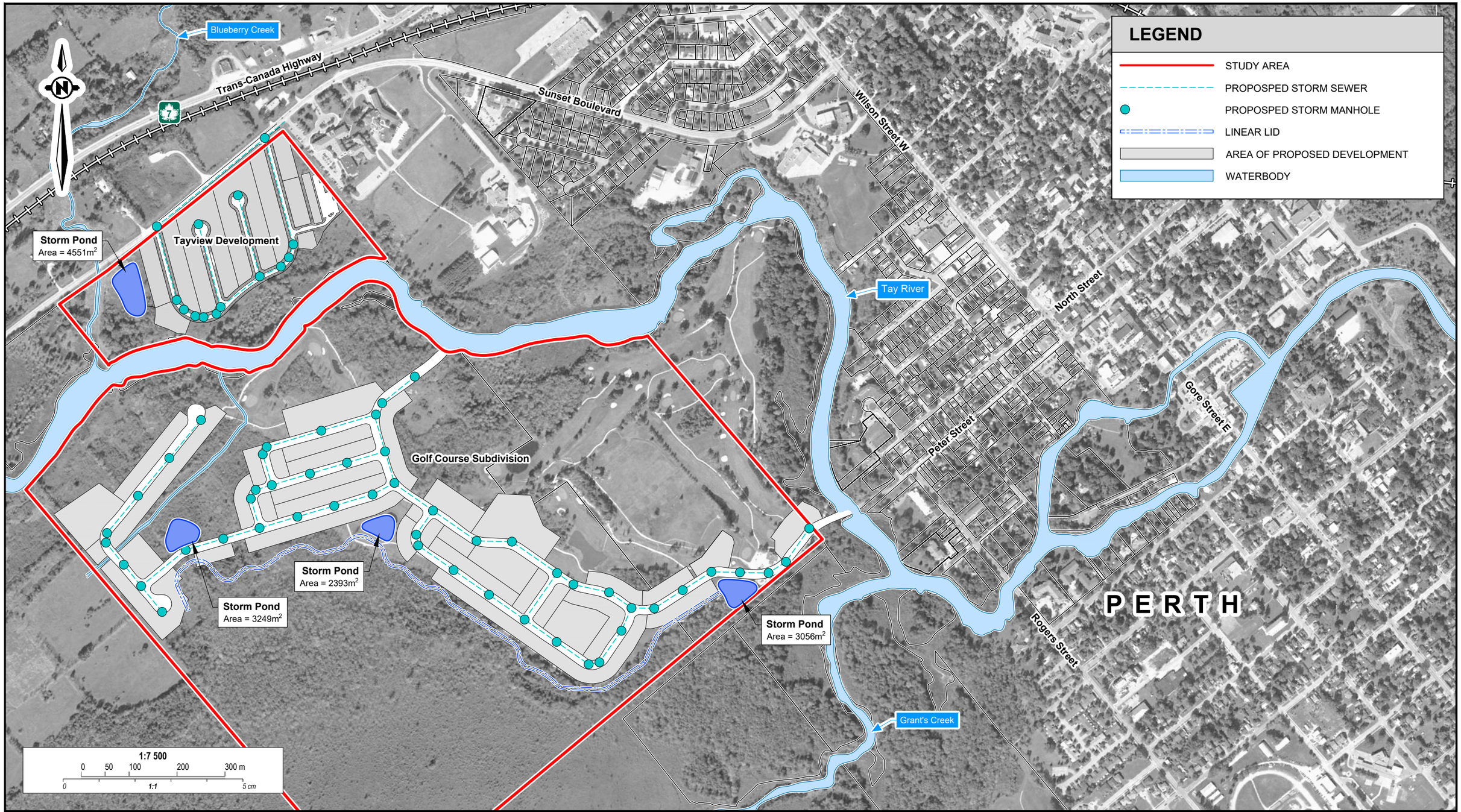

Jp2g Consultants Inc.
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1150 MORRISON DRIVE, SUITE 410, OTTAWA, ON
Phone: (613)828-7800, Fax: (613)828-2600

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.:	
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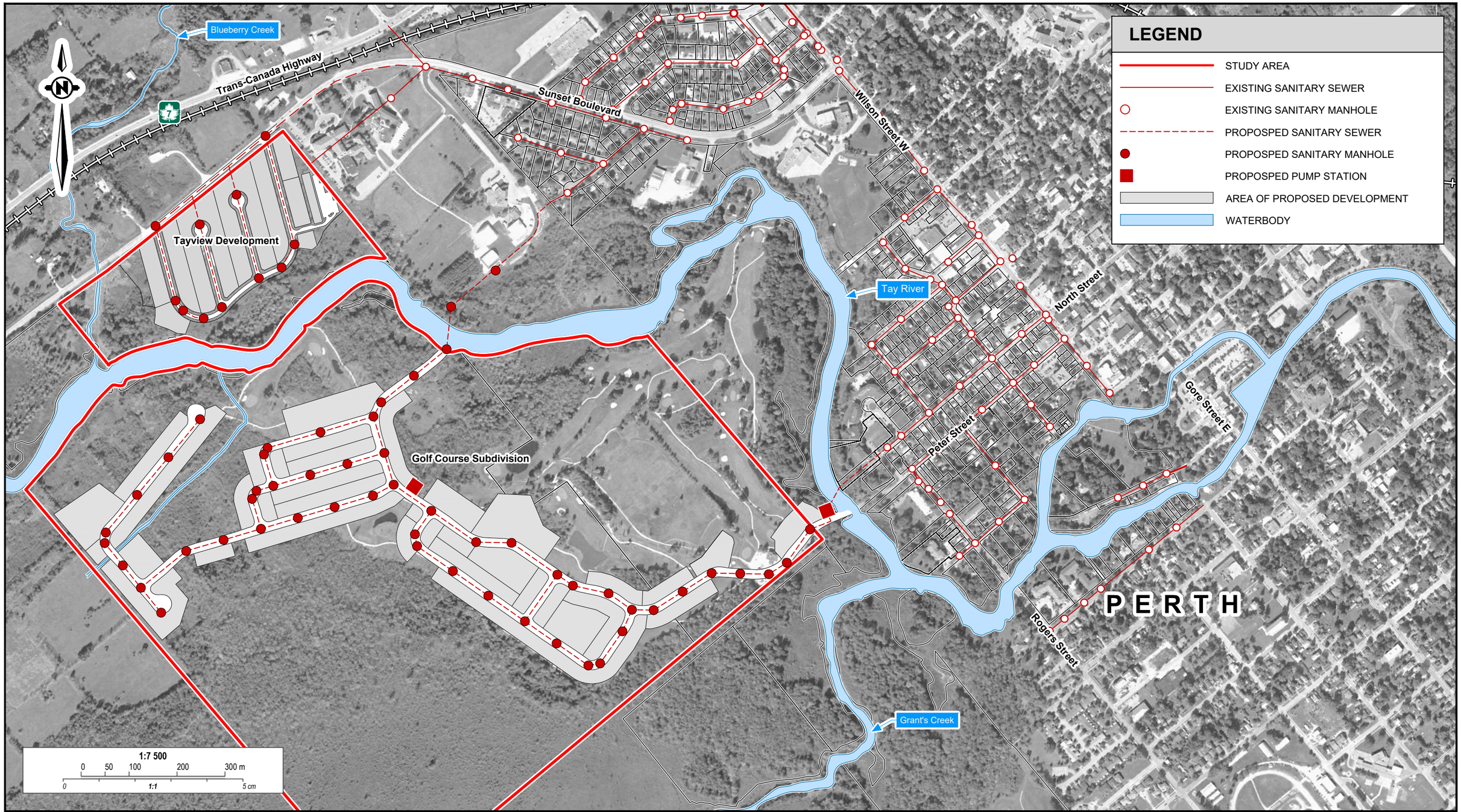

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12 INTERNATIONAL DRIVE, PEMBROKE, ON
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1150 MORRISON DRIVE, SUITE 410, OTTAWA, ON
Phone: (613)828-7800, Fax: (613)828-2600

Infrastructure Master Plan Western Annexed Area

Town of Perth

Preferred Option: 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**

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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

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

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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;

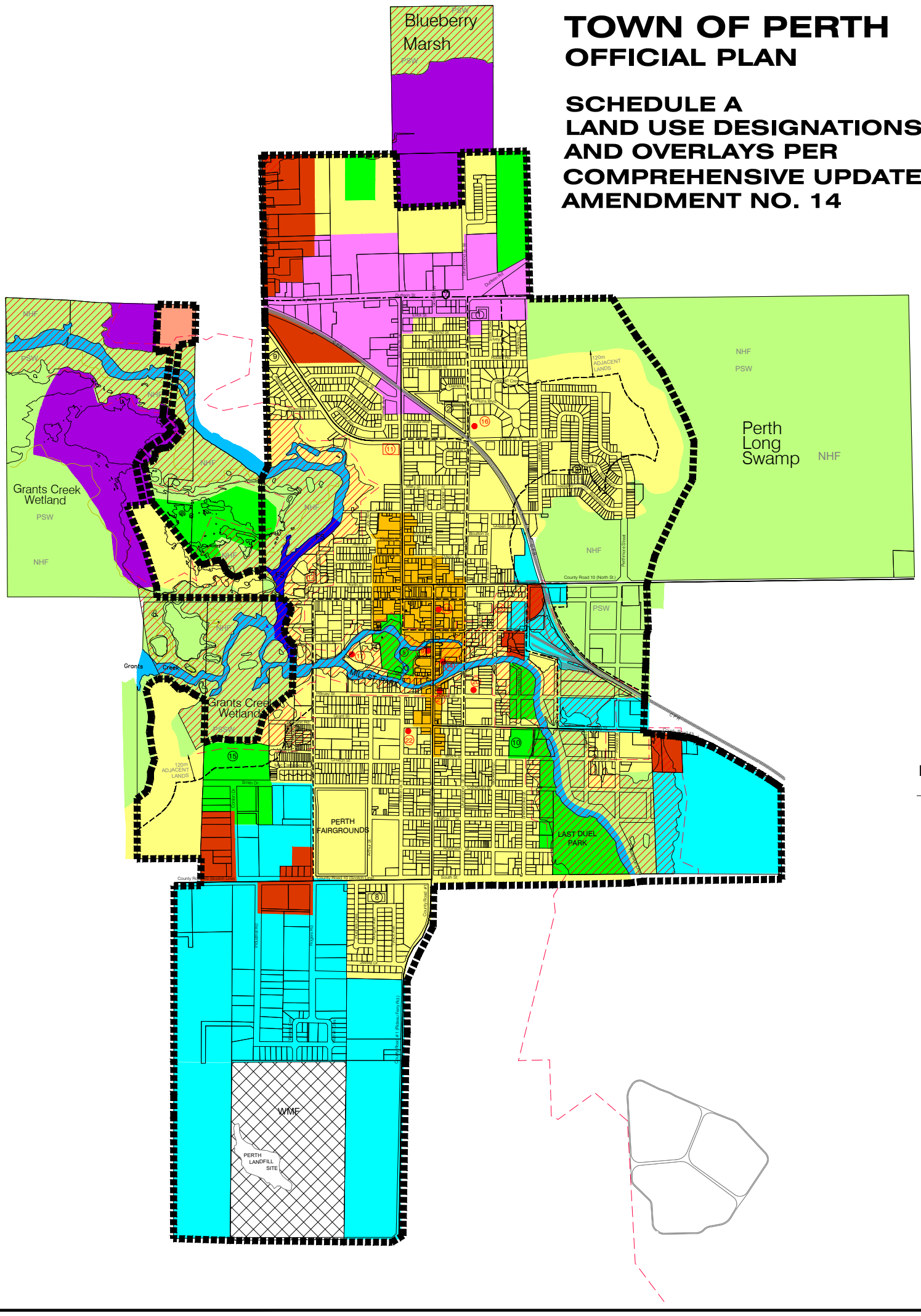
w. A definition of “Wildland Fire Assessment and Mitigation Standards” is added to clarify and assist with interpretation of the Official Plan and to be to be consistent with the 2014 PPS;

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
- NHF / FC / PSW / PSSW — ENVIRONMENTAL PROTECTION AREA DESIGNATION CONSISTS OF FLOOD PLAIN CONSTRAINT (FC), NATURAL HERITAGE FEATURES (NHF), PROVINCIALLY SIGNIFICANT WETLANDS (PSW) AND PROVINCIALLY SIGNIFICANT SHIELD WETLANDS (PSSW)

OTHER FEATURES

- FS — 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

1. SCOTT PARK
2. DAINES PARK
3. PERTHMORE PARK
4. STEWART PARK
5. CODE PARK
6. MILL STREET PARK
7. LAST DUEL PARK
8. MORGAN PARK
9. THE ROUND GARDEN
10. OLD BURYING GROUND
11. PERTH AND DISTRICT INDOOR SWIMMING POOL
12. TENNIS
13. PERTH AND DISTRICT COMMUNITY CENTRE
14. TAY BASIN
15. CONLON FARM RECREATION COMPLEX
16. NEVIS COTTAGE
17. HAGGART HOUSE
18. MATHESON HOUSE MUSEUM
19. PERTH PUBLIC LIBRARY
20. SUMMIT HOUSE
21. McMARTIN HOUSE
22. 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 pursing 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. _____ in accordance with the Planning Act, R.S.O. 1990, Chapter P. 13, as amended, on the _____ day of _____, _____.

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 Plank, 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”.

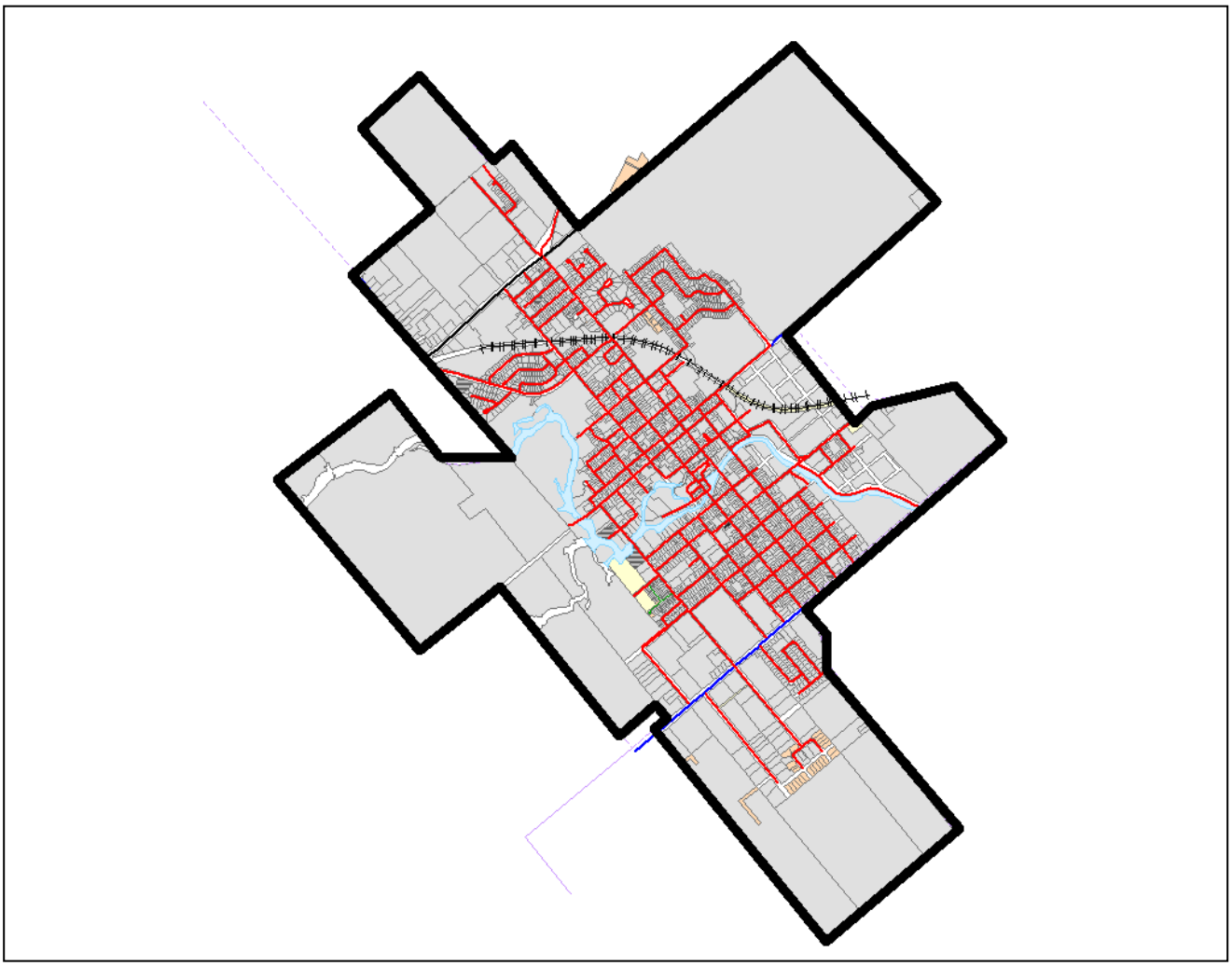
16. The Schedule ‘A’, Land Use Designation, to the Official Plan for the Town of Perth, as amended, is hereby further amended by changing the land use designation of the western half of the lands described as Part Lot 26, Concession 2, PIN 051860188 and shown on the Schedule ‘D’ to OPA #16 as the Subject 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.

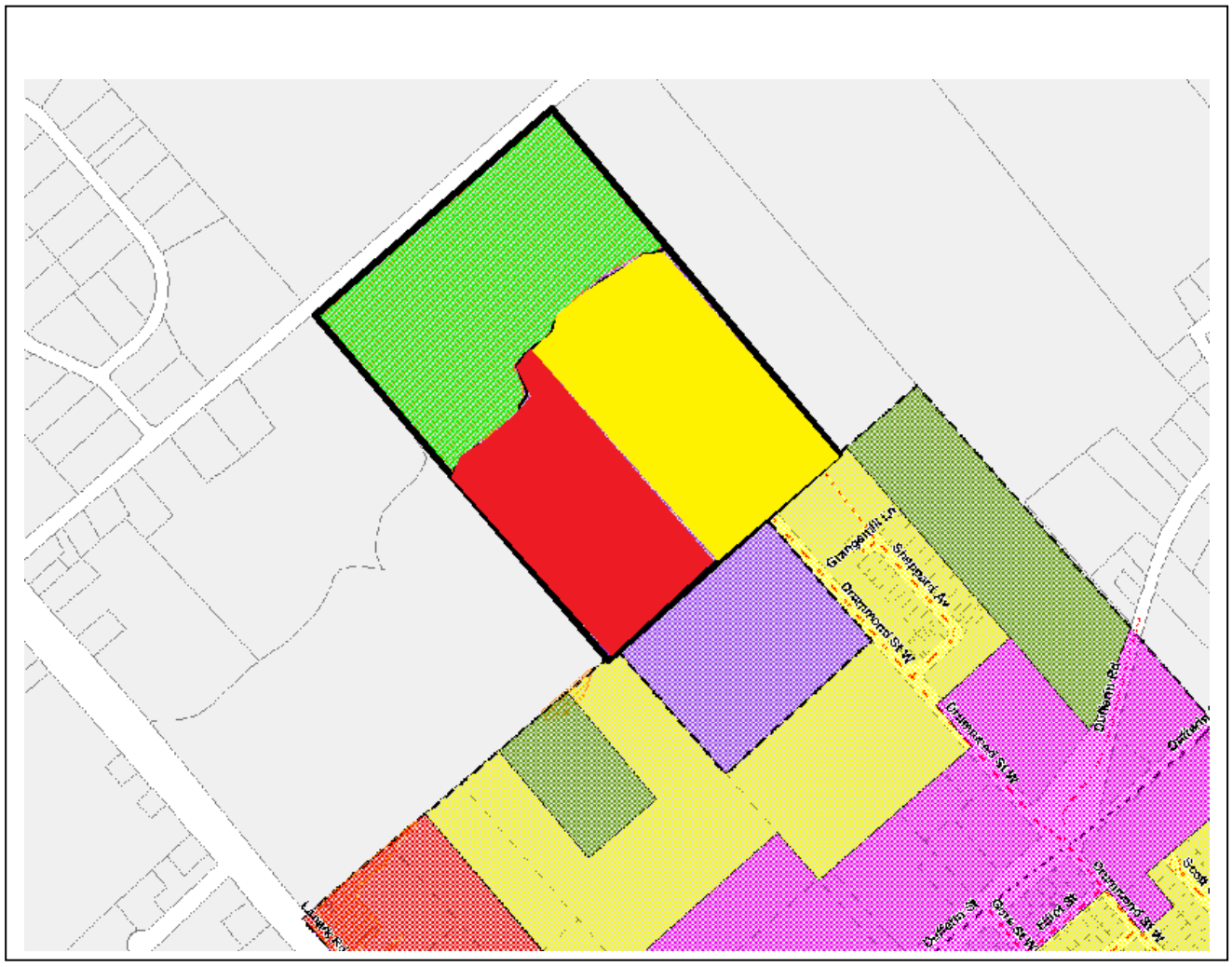
PART C: SCHEDULES

1. Schedule A: Town of Perth Urban Settlement Boundary



PERTH URBAN SETTLEMENT BOUNDARY

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



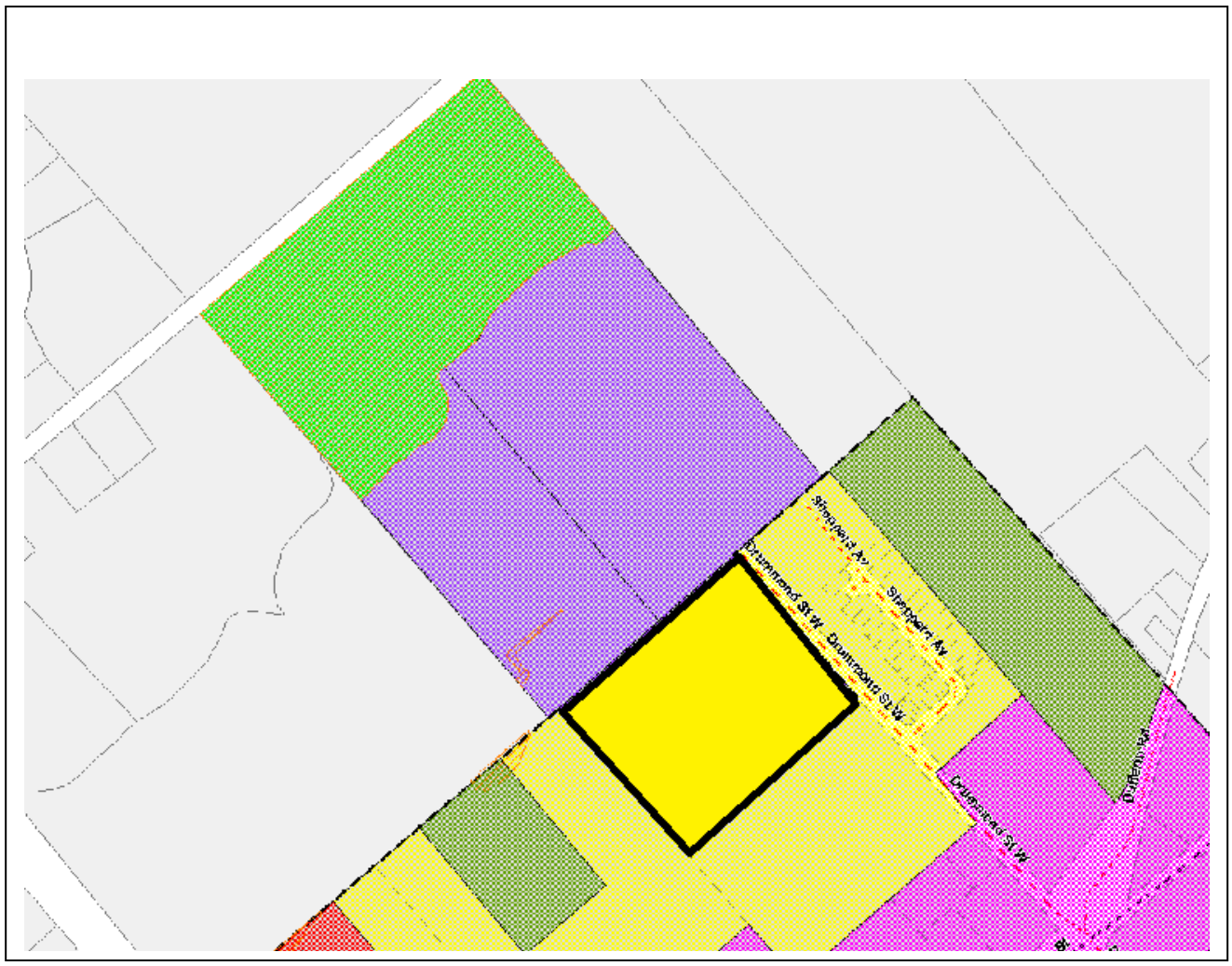
SUBJECT PROPERTY

LANDS TO BE DESIGNATED RESIDENTIAL

LANDS TO BE DESIGNATED FUTURE DEVELOPMENT

LANDS TO REMAIN ENVIRONMENTAL PROTECTION

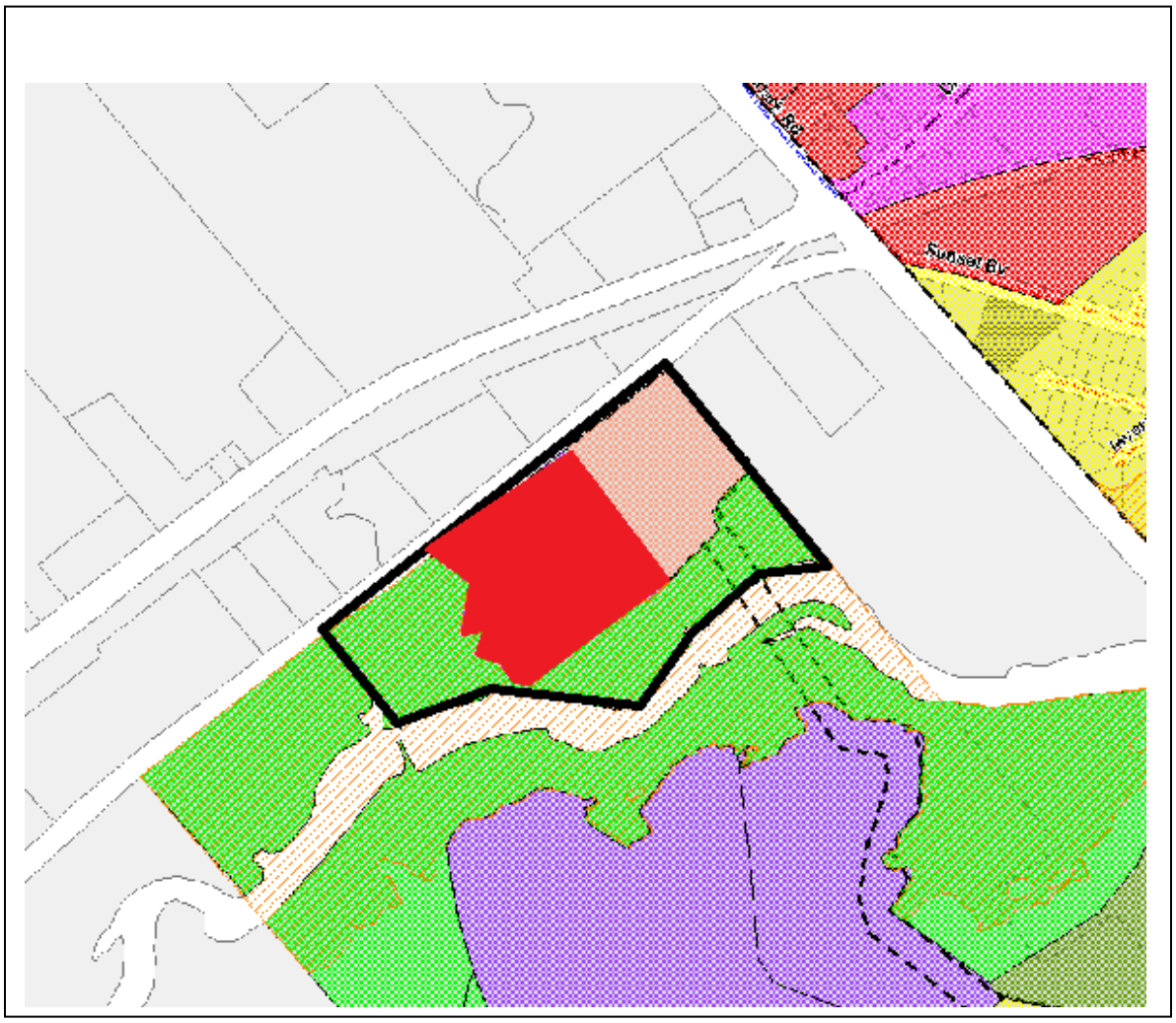
3. Schedule C: Part Lot 2, Concession 3, PIN 051710168



SUBJECT PROPERTY

LANDS TO BE DESIGNATED RESIDENTIAL

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



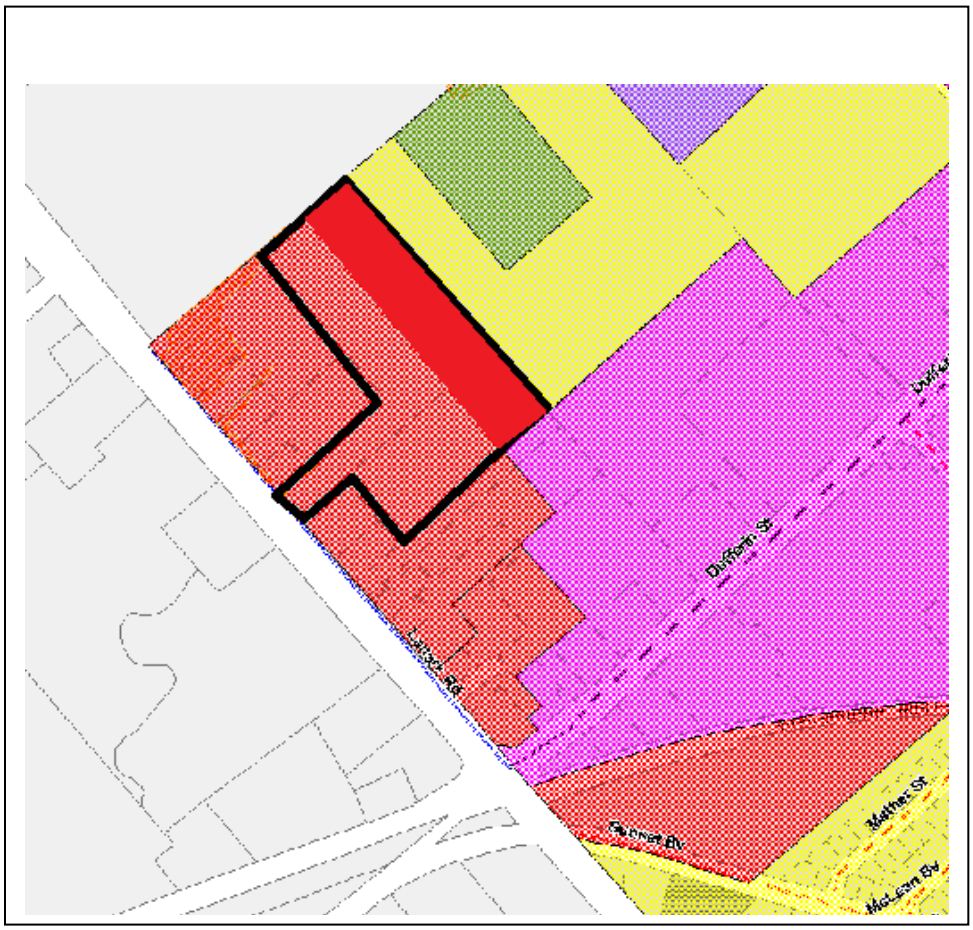
SUBJECT PROPERTY

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	*Acer saccharinum*	X		X					X		X		X
Green ash	*Fraxinus pennsylvanica*	X	X	X	X	X	X	X	X	X			
American elm	*Ulmus americana*	X	X	X	X	X	X	X	X	X	X		
Red maple	*Acer rubrum*	X	X	X	X		X		X		X	X	X
Apple	*Malus* spp.					X							
Eastern white cedar	*Thuja occidentalis*	X				X							
Trembling aspen	*Populus tremuloides*	X			X	X				X		X	
Red pine	*Pinus resinosa*	X				X							
Black ash	*Fraxinus nigra*	X	X	X							X	X	
White oak	*Quercus alba*	X	X				X			X			
White spruce	*Picea glauca*	X											
Sugar maple	*Acer saccharum*	X	X	X						X			
Basswood	*Tilia americanum*	X								X			
Balsam poplar	*Populus balsamifera*	X			X	X	X						
Black cherry	*Prunus serotina*	X					X			X			
Large-toothed aspen	*Populus grandidentata*	X											
Manitoba maple	*Acer negundo*	X											
Mountain ash	*Sorbus americana*	X											
Eastern white pine	*Pinus strobus*					X							
Tamarack	*Larix laricina*				X		X						
Eastern hemlock	*Tsuga canadensis*							X		X			
White birch	*Betula papyrifera*						X	X					
Blue beech	*Carpinus carolinia*									X			
Balsam fir	*Abies balsamea*									X			
Bitternut hickory	*Carya cordiformis*									X			
Yellow birch	*Betula alleghaniensis*									X			
Ironwood	*Ostrya virginiana*									X			
Scott's pine	*Pinus sylvestris*	X											
Bur oak	*Quercus macrocarpa*	X											
Colorado spruce	*Picea pungens*	X											
Butternut	*Juglans cinerea*	X								X			
Red cedar	*Thuja plicata*	X											
Shrub Species													
European buckthorn	*Rhamnus cathartica*	X	X	X	X	X	X	X	X	X	X		
Dwarf raspberry	*Rubus pubescens*			X				X	X				
Wild cucumber		X							X				
Sweet gale	*Myrica gale*	X	X	X					X		X		X
Speckled alder	*Alnus incana*	X	X	X		X	X		X		X	X	X
Prickly ash	*Xanthophylum americanum*	X		X	X	X	X			X	X		
Wild red raspberry	*Rubus idaeus*	X				X							
Nannyberry	*Viburnum lentago*	X		X		X	X						
Narrow-leaved meadowsweet	*Spiraea alba*				X	X			X			X	X
Wild black currant	*Ribes americanum*			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.	*Crataegus* spp.					X	X						
Pin cherry	*Prunus pensylvanica*	X				X						X	
Common juniper	*Juniperus communis*					X							
Lilac	*Syringa vulgaris*					X							
Wild rose	*Rosa* spp.	X	X			X							
Shrub willow spp.	*Salix* spp.	X	X			X					X	X	
Red osier dogwood	*Cornus sericea*	X			X	X					X	X	
Prickly gooseberry	*Ribes cynosbati*	X		X						X			
Fly honeysuckle	*Lonicera canadensis*	X		X						X			
Virginia creeper	*Parthenocissus quinquefolia*	X	X					X		X			
Tartarian honeysuckle	*Lonicera tartaria*	X			X					X			
Blackberry	*Rubus fruiticosus*	X				X	X	X		X			
Round-leaved dogwood	*Cornus rugosa*	X	X								X		
Black elderberry	*Sambucus nigra*	X				X							
Winterberry	*Ilex verticillata*	X	X		X				X				
Silky dogwood	*Cornus amomum*	X	X				X		X				
Riverbank grape	*Vitis riparia*	X		X			X	X					
Maple-leaf viburnum	*Viburnum acerifolium*	X											
Grey dogwood	*Cornus racemosa*				X				X	X			
Japanese barberry	*Eucryphia lucida*									X			
Leatherwood	*Cephalanthus occidentalis*									X			
Buttonbush			X										X
Choke cherry	*Prunus virginiana*	X											
Bush honeysuckle	*Diervilla lonicera*	X	X										
Beaked hazel	*Corylus cornuta*	X											
Wild raisin	*Viburnum cassinoides*	X											
Virgin's bower	*Clematis virginiana*	X											
High bush cranberry	*Viburnum trilobum*	X											
Burning bush	*Euonymus alatus*		X										
Wild coffee	*Triosteum perfoliatum*	X											
Staghorn sumac	*Rhus typhina*	X											
Partridgeberry	*Mitchella ripens*	X											
Herbaceous/Fern/Sedge/etc. Species													
Sensitive Fern	*Onoclea sensibilis*	X	X	X			X	X	X	X			X
Fragrant bedstraw	*Galium triflorum*			X					X	X			
Buttercup spp.	*Ranunculus* spp.	X		X					X	X			
Canada anemone	*Anemone canadensis*	X							X				
Blue flag iris	*Iris versicolor*		X						X	X		X	
Purple loosestrife	*Lythrum salicaria*		X			X			X			X	
Wild calla	*Calla palustris*	X							X		X		X
Meadow horsetail	*Equisetum pratense*	X							X				
Rough-fruited cinquefoil	*Potentilla recta*					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
Marsh fern	*Thelypteris palustris*	X		X					X		X		
Royal fern	*Osmunda regalis*	X		X					X				
Pickerel weed	*Pontederia cordata*		X						X				
Broad-leaved cattail	*Typhus latifolia*								X		X		X
dandelion	*Taraxacum officinale*	X			X	X				X			
Common milkweed	*Asclepias syriaca*					X							
Wild strawberry	*Fragaria vesca*	X		X		X	X	X		X		X	
Goldenrod spp.	*Solidago* spp.	X		X	X	X	X					X	
Yarrow	*Achillea millefolium*	X				X				X			
Cow vetch	*Vicia cracca*	X				X							
Hawkweed spp.	*Hieracium* spp.					X							
Brown-eyed susan	*Rudbeckia triloba*					X							
Pearly-everlasting	*Anaphalis margaritacea*					X							
Swamp milkweed	*Asclepias incarnata*		X						X		X	X	
Downy yellow violet	*Viola pubescens*			X									
March violet	*Viola palustris*	X		X	X		X				X		
Common blue violet	*Viola sororia*			X									
Smooth bedstraw	*Galium mollugo*		X	X				X					
Early meadowrue	*Thalictrum dioicum*	X		X					X		X		
Burdock	*Arctium lappa*	X											
White sweet clover	*Melilotus albus*	X				X							
Sarsaparilla	*Smilax officinalis*	X											
Canada mayflower	*Maianthemum canadensis*	X								X			
Ostrich fern	*Matteuccia struthiopteris*	X								X	X		
Wormseed mustard	*Erysimum cheiranthoides*	X											
Trout lily	*Erythronium americanum*	X											
Enchanter's nightshade	*Circaea lutetiana*	X								X			
Spotted jewelweed	*Impatiens capensis*	X	X	X						X	X		
Spinulose wood fern	*Aspidium thelypteris*	X								X			
Large-leaved aster	*Eurybia macrophylla*	X											
Bracken fern	*Pteridium aquilinum*	X								X			
Lily-of-the-valley	*Convallaria majalis*	X											
Rough bedstraw	*Galium asprellum*	X											
Cinnamon fern	*Osmundastrum cinnamomeum*	X		X									
Dame's rocket	*Hesperis matronalis*	X								X			
Common mullein	*Verbascum thapsus*	X											
Poison ivy	*Toxicodendron radicans*	X		X						X			
Wood nettle	*Laportea canadensis*	X	X							X			
Herb robert	*Geranium robertianum*	X								X			
Common plantain	*Plantago major*	X											
Mouse-ear chickweed	*Cerastium fontanum*	X			X								
Barren strawberry	*Waldsteinia fragarioides*	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
Great water dock	*Rumex hydrolapathum*	X	X	X					X				
Wild parsnip	*Pastinaca sativa*	X											
Cuckoo flower	*Cardamine pratensis*		X										
Jack-in-the-pulpit	*Arisaema triphyllum*			X						X	X		
Tufted loosestrife	*Lysimachia thyrsiflora*			X									
Agrimony	*Agrimonia gryposepala*				X		X						
False Solomon's seal	*Maianthemum racemosum*						X			X			
Deadly nightshade	*Atropa belladonna*							X					
Marginal wood fern	*Dryopteris marginalis*							X					
Marsh cinquefoil	*Comarum palustre*								X				
White trillium	*Trillium grandiflorum*								X				
Woolly blue violet	*Viola sororia*								X	X			
Pennsylvania sedge	*Carex pennsylvanica*									X			
Blue-stemmed goldenrod	*Solidago caesia*									X			
Christmas fern	*Polystichum acrostichoides*									X			
Lady fern	*Athyrium filix-femina*	X								X			
Foam flower	*Tiarella cordifolia*									X			
Oak fern	*Gymnocarpium dryopteris*									X			
Kidney-leaved buttercup	*Ranunculus abortivus*									X			
Tall rattlesnake root	*Prenanthes trifoliata*									X			
Veronica speedwell	*Veronica spicata*									X			
Blue cohosh	*Caulophyllum thalictroides*									X			
Maidenhair fern	*Adiantum pedatum*									X			
Wild leek	*Allium tricoccum*									X			
Rose-twisted stalk	*Streptopus roseus*									X			
White baneberry	*Actaea pachypoda*									X			
Heleborine	*Epipactis helleborine*	X								X			
Red clover	*Trifolium pratense*	X											
Broad-leaved arrowhead	*Sagittaria latifolia*		X										
Narrow-leaved cattail	*Typhus angustifolia*		X										
Giant burreed	*Sparganium eurycarpum*		X										
Soft-stem bulrush	*Scirpus validus*		X										
Swamp loosestrife	*Decodon verticillatus*		X										
Bladderwort	*Utricularia vulgaris*		X										
Woolgrass	*Scirpus cyperinus*	X											
Grass-leaved goldenrod	*Euthamia graminifolia*	X											
Evening primrose	*Oenothera macrocarpa*	X											
Hairy goldenrod	*Solidago hispida*	X	X										
Waterhorehound	*Lycopus americanus*		X										
Water arum	*Calla palustris*		X										
Tall meadowrue	*Thalictrum pubescens*	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
Bindweed	*Convolvulus arvensis*	X											
Wood sorrel	*Oxalis corniculata*	X											
Toadflax	*Linaria vulgaris*	X											
Silvery cinquefoil	*Potentilla Argentea*	X											
Matricary grape fern	*Botrychium matricariifolium*	X											
King devil hawkweed	*Hieracium piloselloides*	X											
Philadelphia fleabane	*Erigeron philadelphicus*	X											
Moneywort	*Lysimachia nummularia*	X	X										
Bladder campion	*Silene vulgaris*	X											
St. John's wort	*Hypericum perforatum*	X											
Green rush	*Juncus alpinoarticulatus*		X										
Curled dock	*Rumex crispus*		X										
Joe-pye weed	*Eupotorium maculatum*		X										
Marsh bedstraw	*Galium palustre*	X	X	X									
Black rush	*Juncus roemerianus*		X										
Ox-eye daisy	*Leucanthemum vulgare*	X											
Black medick	*Medicago lupulina*	X											
Bulb-bearing water hemlock	*Cicuta bulbifera*		X						X				
Orange hawkweed	*Hieracium aurantiacum*	X											
Bottle brush grass	*Elymus hystrix*	X					X						
Stinging nettle	*Urtica dioica*		X				X						
Polypody fern	*Polypodium virginianum*	X					X						
Motherwort	*Leonurus cardiaca*	X					X						
Wild basil	*Clinopodium vulgare*						X						
Hemp nettle	*Galeopsis tetrahit*						X						
Sheep sorrel	*Rumex acetosella*						X						
Yellow avens	*Geum aleppicum*						X						
Hog peanut	*Amphicarpaea bracteata*						X						
Beech drops	*Epifagus americana*	X											
Red baneberry	*Actaea rubra*								X				
Cleavers	*Galium aparine*	X											
Nodding sedge	*Carex gynandra*	X			X		X			X		X	
Fringed sedge	*Carex crinita*											X	
Common skullcap	*Scutellaria galericulata*										X		
Marsh bellflower	*Campanula aparinoides*										X		
Bladder sedge	*Carex intumescens*			X	X						X		
Green sedge	*Carex* spp.										X		
Swamp candles	*Lysimachia terrestris*										X		
Black knapweed	*Centaurea nigra*					X							
Dwarf enchanter's nightshade	*Circaea alpina*	X											
Small-fruited bulrush	*Scirpus microcarpus*		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 (Acer saccharum), green ash (Fraxinus pennsylvanica), trembling aspen (Populus tremuloides) and basswood (Tilia americana). Dominant woody vegetation in the sub-canopy included: red osier dogwood (Cornus sericea), prickly ash (Zanthoxylum americanum), tartarian honeysuckle (Lonicera tartaria), shrub willow and round-leaved dogwood (Cornus rugosa). Herbaceous vegetation present in the understory included: marsh violet (Viola palustris), woodland strawberry (Fragaria vesca), Canada anemone (Anemone canadensis), sarsaparilla (Smilax regelii), sensitive fern (Onoclea sensibilis), ostrich fern (Matteuccia struthiopteris), wood nettle (Laportea canadensis) and poison ivy (Toxicodendron radicans). 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 (Ulmus americana). Sub-canopy species included: winterberry (Ilex verticillata), European buckthorn, silky dogwood (Cornus amomum) 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 (Impatiens capensis), blue flag iris (Iris versicolor), swamp milkweed (Asclepias incarnata) and cuckoo flower (Cardamine pratensis). 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 (Fraxinus nigra), green ash, red maple and American elm. Dominant

		subcanopy species in this community included speckled alder (Alnus incana) and sweet gale (Myrica gale). There was a heavily vegetated understory in Community 3 that included multiple species of sedge, as well as royal fern (Osmunda regalis), sensitive fern, cinnamon fern (Osmundastrum cinnamomeum), jack-in-the-pulpit (Arisaema triphyllum) and tufted loosestrife (Lysimachia thyrsiflora). 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 (Spiraea alba) 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 (Populus balsamifera) and white pine (Pinus strobus). There were also pockets of shrubs present throughout the community, including such species as: shrub willow spp., hawthorn (Crataegus spp.) and black elderberry (Sambucus nigra). Herbaceous vegetation included grass species, common milkweed (Asclepias syriaca), goldenrod spp. (Solidago spp.) and rough fruited cinquefoil (Potentilla recta). 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 (Quercus alba), green ash, tamarack (Larix laricina) 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 (viburnum lentago). Herbaceous understory vegetation included: sensitive fern, false Solomon's seal (Maianthemum racemosum), 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 (Betula papyrifera) 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 (Toxicodendron radicans), marginal wood fern (Dryopteris marginalis) and Virginia creeper (Parthenocissus quinquefolia). 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 (Thelypteris palustris). 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 (Ostrya virginiana) saplings. Fern species dominated the understory, including: sensitive fern, Christmas fern (Polystichum acrostichoides), ostrich fern, lady fern (Athyrium filix-femina) and bracken fern (Pteridium aquilinum). Other herbaceous species present in the understory included: enchanter's nightshade (Circaea lutetiana), Pennsylvania sedge (Carex pensylvanica) 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 (Thalictrum dioicum), swamp milkweed, wild calla (Calla palustris), 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 (Cephalanthus occidentalis). 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

GEMTEC
www.gemtec.ca

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

experience • knowledge • integrity

GEMTEC Consulting Engineers and Scientists Limited
32 Steacie Drive
Ottawa, ON, Canada
K2K 2A9

July 24, 2019 File: 63988.75

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

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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LIST OF APPENDICES

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 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 or 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.

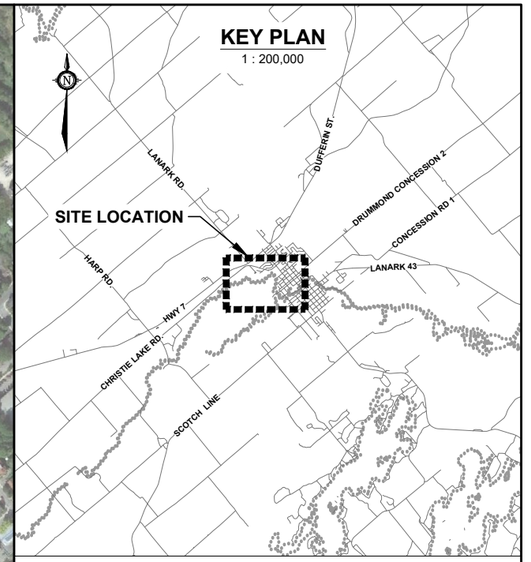
We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.

Joseph Berkers, B.Eng

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

KEY PLAN

1 : 200,000



LEGEND

- HA # — **HAND AUGER HOLE** (current investigation by GEMTEC)
- BH # — **BOREHOLE LOCATION IN PLAN** (previous investigation by Houle Chevrier Engineering Ltd.)
- **TEST PIT LOCATION IN PLAN** (previous investigation by Houle Chevrier Engineering Ltd.)
- **BEDROCK OUTCROP(S) OBSERVED**

Scale 1:7500

0 150 300 450m

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Tel: (613) 836-1422
www.gemtec.ca
ottawa@gemtec.ca

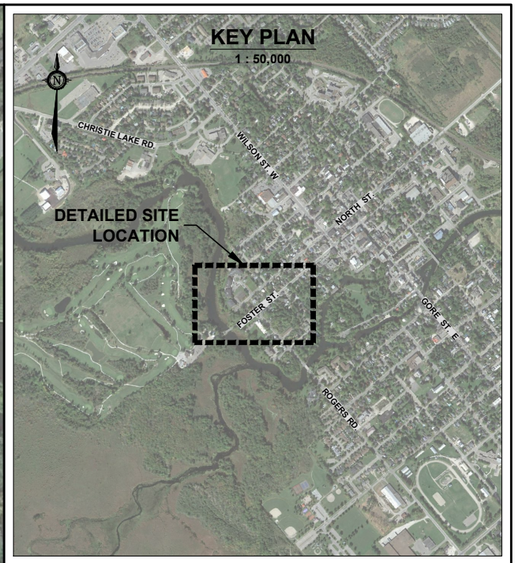
Client	Project
Jp2g Consultants Inc.	63988.75

Location: PERTH WEST ANNEX, PERTH, ON

Drwn by	Chkd by	
P.C.	J.B.	SITE PLAN

Date	Rev.	
OCTOBER 2018	0	**FIGURE 1**

P:\0. Files\63900\63988.75\Site Investigation\Drafting\Drawings\63988.75_FG1_V01_2018-10-18.dwg, FIGURE 1, 18/10/23 4:02:32 PM



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.)

Scale 1:2000

0 40 80 120m

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

FIGURE 2

P:\0. Files\63900\63988.75\Site Investigation\Drafting\Drawings\63988.75_FG1_V01_2018-10-18.dwg, FIGURE 2, 18/10/23 4:03:10 PM

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Hand Augerhole 1
Proposed Residential Development
October 5, 2018

FIGURE 3

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Hand Auger 2
Proposed Residential Development
October 5, 2018

FIGURE 4

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Hand Augerhole 3
Proposed Residential Development
October 16, 2018

FIGURE 5

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Hand Augerhole 4
Proposed Residential Development
October 16, 2018

FIGURE 6

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Proposed Bridge Location
Proposed Residential Development
October 5, 2018

FIGURE 7

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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

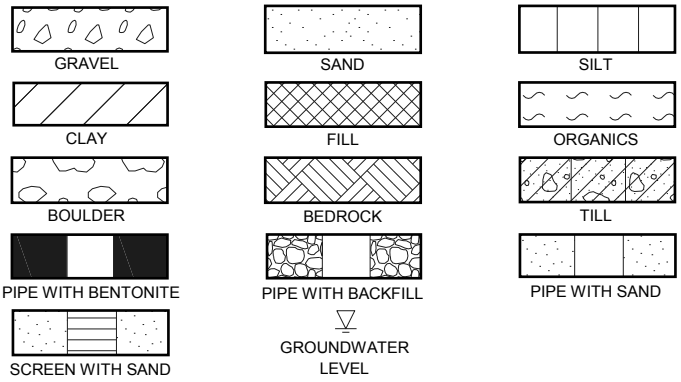
PENETRATION RESISTANCE

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.

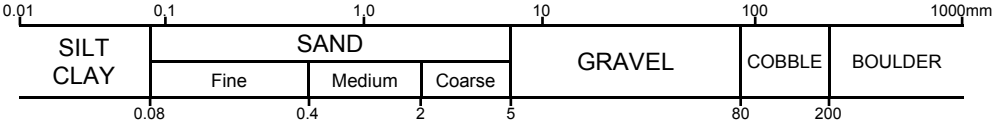
Dynamic Penetration Resistance
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive a 50 mm (2 in.) diameter 60° cone attached to 'A' size drill rods for a distance of 300 mm (12 in.).

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**	**Cu, 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

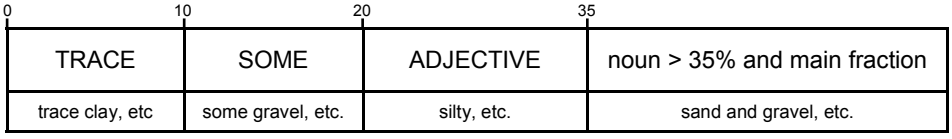


GRAIN SIZE



DESCRIPTIVE TERMINOLOGY

(Based on the CANFEM 4th Edition)



RECORD OF BOREHOLE 16-1

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

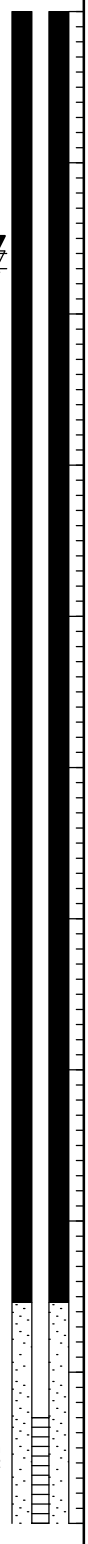
SHEET: 1 OF 2
DATUM:
BORING DATE: Dec 19 2016

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING
0		Ground Surface							
	Power Auger 200 mm Diameter Hollow Stem	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	PHCs, BTEX, VOCs, Metals
2		Light brown silty sand, trace clay and gravel, possible cobbles and boulders (GLACIAL TILL)		1.37	3	50 D.O.		6	
					4	50 D.O.		24	PHCs, BTEX, VOCs, Metals
3	HQ Rotary Diamond Drill Bit	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%	UCS #1
5					7	R.C.		TCR = 95%, SCR = 92%, RQD = 92%	
6									
7					8	R.C.		TCR = 100%, SCR = 95%, RQD = 67%	
8									
9					9	R.C.		TCR = 97%, SCR = 94%, RQD = 93%	UCS #2
10									

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
10 20 30 40 50 60 70 80 90

PIEZOMETER OR STANDPIPE INSTALLATION



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LOGGED: M.L.
CHECKED:

GEO - BOREHOLE LOG GINT_BOREHOLE LOGS_V01_DECEMBER 19-20, 2016.GPJ GEMTEC 2018.GDT 15/10/18

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: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, mm	SAMPLES: BLOWS/0.3m	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
10					10	R.C.		TCR = 100%, SCR = 95%, RQD = 95%			38 mm Diameter, 1.52 metre long well screen
		End of borehole		10.82							
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

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
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

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

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CHECKED:

GEO - BOREHOLE LOG GINT_BOREHOLE LOGS_V01_DECEMBER 19-20, 2016.GPJ GEMTEC 2018.GDT 15/10/18

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	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface									
		Dark brown silty sand, with organics (TOPSOIL)									
		Brown silty sand, some clay, trace gravel and rootlets (FILL MATERIAL)		0.31	1	50 D.O.		5		PHCs, BTEX, VOCs, Metals	Bentonite seal
1	Power Auger 200 mm Diameter Hollow Stem	Brown silty sand, trace clay and gravel, probable cobbles, boulders (GLACIAL TILL)		0.76	2	50 D.O.		3		PHCs, BTEX, VOCs, Metals	
2					3	50 D.O.		26			
					4	50 D.O.		15			
3											
		Fresh to slightly decomposed, slightly to moderately fractured, grey GRANITE BEDROCK with interbedded quartz		3.05	5	R.C.		TCR = 100%, SCR = 100%, RQD = 100%			
4	HQ Rotary Diamond Drill Bit				6	R.C.		TCR = 93%, SCR = 93%, RQD = 91%		UCS #3	
5											
6					7	R.C.		TCR = 100%, SCR = 65%, RQD = 47%			Filter sand
7					8	R.C.		TCR = 100%, SCR = 49%, RQD = 39%			38 mm Diameter, 1.52 metre long well screen
8											
9					9	R.C.		TCR = 100%, SCR = 82%, RQD = 70%			Bentonite seal
10											

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LOGGED: M.L.
CHECKED:

GEO - BOREHOLE LOG GINT_BOREHOLE LOGS_V01_DECEMBER 19-20, 2016.GPJ GEMTEC 2018.GDT 15/10/18

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: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, mm	SAMPLES: BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED) / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10					10	R.C.		TCR = 100%, SCR = 100%, RQD = 84%			Bentonite seal
		End of Borehole		10.59						UCS #4	
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

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
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

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

GEMTEC
Consulting Engineers and Scientists

LOGGED: M.L.
CHECKED:

GEO - BOREHOLE LOG GINT_BOREHOLE LOGS_V01_DECEMBER 19-20, 2016.GPJ GEMTEC 2018.GDT 15/10/18

PROJECT: 09-079

RECORD OF TEST PIT 1

SHEET 1 OF 1

LOCATION: See Site Plan, Figure 2

DATUM: Not Applicable

DATE OF EXCAVATION: April 23, 2009

TYPE OF EXCAVATOR: Mini Excavator

DEPTH SCALE METRES	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural. V - + Remoulded. V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp — W — Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
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					Groundwater inflow observed at 0.86 metres below ground surface on April 23, 2009.
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

PROJECT: 09-079

RECORD OF TEST PIT 2

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: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural. V - + Remoulded. V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp — W — Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
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					Groundwater inflow observed at 0.8 metres below ground surface on April 23, 2009.
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

PROJECT: 09-079

RECORD OF TEST PIT 3

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: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) — Natural. V - +, Remoulded. V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) — Wp, W, Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
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								
	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.
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

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: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) (Natural. V - +, Remoulded. V - ⊕; 20 40 60 80)	WATER CONTENT (PERCENT) (Wp ⊢ W ⊣ Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
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					▽ Groundwater inflow observed at about 0.9 metres below ground surface on April 23, 2009.
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

PROJECT: 09-079

RECORD OF TEST PIT 5

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: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural. V - + Remoulded. V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp W Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
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					Groundwater inflow observed at about 0.9 metres below ground surface on April 23, 2009.
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

RECORD OF BOREHOLE 12-1

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

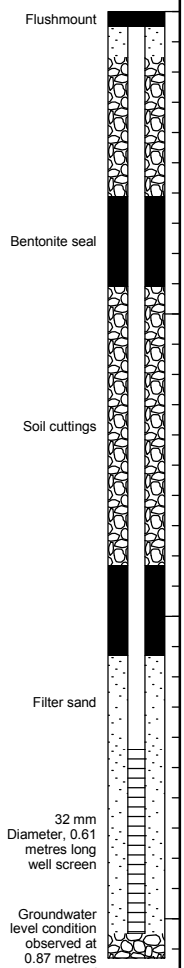
SHEET: 1 OF 1
DATUM: Geodetic
BORING DATE: Apr 26 2012

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING
0	Power Auger 200 mm Diameter Hollow Stem Auger	Ground Surface		135.28					
		Asphaltic concrete		135.22 / 0.06					
		Brown sand and gravel, trace to some silt (BASE/SUBBASE MATERIAL)			1	GS			M (see Fig. 3)
				134.59 / 0.69					
1		Stiff to very stiff, grey brown SILTY CLAY, trace sand seams (Weathered Crust)			2	50 D.O.		8	
					3	50 D.O.		11	
2					4	50 D.O.		14	
				132.43 / 2.85					
3		Blackish grey silty sand, some gravel, trace clay with possible cobbles and boulders (GLACIAL TILL)		132.15	5	50 D.O.		>50 for 50 mm	
		End of Borehole Auger Refusal		3.13					
4									
5									

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
10 20 30 40 50 60 70 80 90

PIEZOMETER OR STANDPIPE INSTALLATION



GEMTEC
Consulting Engineers and Scientists

LOGGED: M.L.
CHECKED:

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

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

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
10 20 30 40 50 60 70 80 90

Backfilled with soil cuttings

GEMTEC
Consulting Engineers and Scientists

LOGGED: M.L.
CHECKED:

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

RECORD OF BOREHOLE 12-3

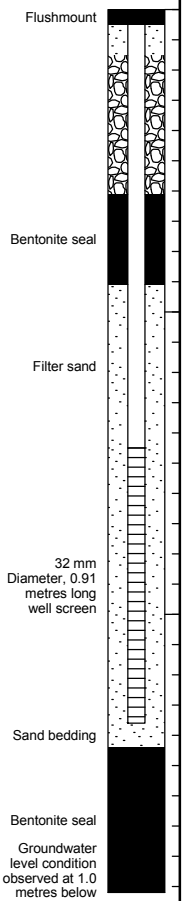
CLIENT:
PROJECT:
JOB#:
LOCATION: See Borehole Location Plan, Figure 2

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

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING
0		Ground Surface		135.18					
		Asphaltic Concrete		135.08					
	Power Auger 200 mm Diameter Hollow Stem Auger	Light brown to dark grey brown, sand and gravel, trace to some silt (BASE MATERIAL)		0.10	1	GS			M (see Fig. 3)
					2	GS			
		Grey brown, crushed sand and gravel, some silt (SUBBASE MATERIAL)		134.72 0.46	3	GS			M (see Fig. 4)
1		Loose, brown sand, some silt (Fill Material)		134.09 1.09	4	50 D.O.		7	
		Stiff, grey brown SILTY CLAY (Weathered Crust)		133.66 1.52	5	50 D.O.		8	
2		Grey brown silty sand, some gravel, trace clay with possible cobbles and boulders (GLACIAL TILL)		133.05 2.13	6	50 D.O.		>50 for 75 mm	
	Rotary Drill NQ RC	Faintly weathered to fresh, grey, green, and pink GRANITE GNEISS		132.57 2.61	7	R.C.		TCR = 88%, SCR = 46%, RQD = 38%	
3		End of borehole		132.26 2.92					
4									
5									

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
10 20 30 40 50 60 70 80 90

PIEZOMETER OR STANDPIPE INSTALLATION



Groundwater level condition observed at 1.0 metres below top of road surface on May 3, 2012.

GEMTEC
Consulting Engineers and Scientists

LOGGED: M.L.
CHECKED:

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: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural. V - + Remoulded. V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp — W — Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
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					Groundwater seepage at 1.7 metres below ground surface.
3								
4								

DEPTH SCALE

1 to 20

Houle Chevrier Engineering Ltd.

LOGGED: J.C.

CHECKED:

TESTPIT_RECORD 10-512 TEST PITS 1-6.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: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural. V - + Remoulded. V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp W Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
0	Ground Surface							
	TOPSOIL							
	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								

DEPTH SCALE

1 to 20

Houle Chevrier Engineering Ltd.

LOGGED: J.C.

CHECKED:

TESTPIT_RECORD 10-512 TEST PITS 1-6.GPJ HCE DATA TEMPLATE.GDT 11/19/10

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: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural. V - + Remoulded. V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp — W — Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
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					Groundwater inflow at 1.7 metres below ground surface.
3								
4								

DEPTH SCALE

1 to 20

Houle Chevrier Engineering Ltd.

LOGGED: J.C.

CHECKED:

TESTPIT_RECORD 10-512 TESTT PITS 1-6.GPJ HCE DATA TEMPLATE.GDT 11/8/10

RECORD OF TEST PIT 10-4

PROJECT: 10-512

LOCATION: See Site Plan, Figure 2

DATE OF EXCAVATION: November 2, 2010

SHEET 1 OF 1

DATUM: N/A

TYPE OF EXCAVATOR: Mini Excavator

DEPTH SCALE METRES	DESCRIPTION	STRATA PLOT	ELEV DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural. V - + Remoulded. V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp W Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
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					▽
	Grey SILTY CLAY, trace to some sand Note: Appears to have a stiff to very stiff consistency.		1.80	1				
2								
3	End of test pit Refusal to excavating on inferred bedrock		3.00					Groundwater seepage at 1.8 metres below ground surface.
4								

DEPTH SCALE

1 to 20

Houle Chevrier Engineering Ltd.

LOGGED: J.C.

CHECKED:

TESTPIT_RECORD 10-512 TESTT PITS 1-6.GPJ HCE DATA TEMPLATE.GDT 11/8/10

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: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural. V - + Remoulded. V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp W Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
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					Groundwater inflow at 1.5 metres below ground surface.
4								

DEPTH SCALE

1 to 20

Houle Chevrier Engineering Ltd.

LOGGED: J.C.

CHECKED:

TESTPIT_RECORD 10-512 TESTT PITS 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: DESCRIPTION	STRATA PLOT	ELEV DEPTH (m)	SAMPLE NUMBER	SHEAR STRENGTH, Cu (kPa) Natural. V - + Remoulded. V - ⊕ (20 40 60 80)	WATER CONTENT (PERCENT) Wp — W — Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
0	Ground Surface							
	TOPSOIL							
			0.30					
	Grey brown silty sand with numerous large boulders, cobbles and gravel, wood, metal (FILL MATERIAL)							
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:

TESTPIT_RECORD 10-512 TESTT PITS 1-6.GPJ HCE DATA TEMPLATE.GDT 11/8/10

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: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	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
0	Portable Drill Rig, Rotary Drilling	Ground Surface		97.16							
		WATER		96.78							
		GRAVEL AND BOULDERS		0.38							
1				95.43							
		Very stiff grey brown SILTY CLAY		1.73							
2				94.29							
		SAND and GRAVEL		2.87 94.14							
3		Fresh, grey and pink GRANITE, some open joints		3.02	1	RC		REC=100% SCR=78% RQD=43%			
				93.38							
		End of borehole		3.78							
4											
5											
6											
7											
8											
9											
10											

GEMTEC
Consulting Engineers and Scientists

LOGGED: JC
CHECKED:

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	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				
		GRAVEL AND BOULDERS		0.38 / 96.27	1	RC		REC=80% SCR=45% RQD=25%
1		Fresh, grey and pink GRANITE, some open joints		0.89 / 95.23	2	RC		REC=95% SCR=63% RQD=21%
2		End of Borehole		1.93				
3								
4								
5								
6								
7								
8								
9								
10								

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
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GEMTEC
Consulting Engineers and Scientists

LOGGED: JC
CHECKED:

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	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	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
0		Ground Surface		97.16					10 20 30 40 50 60 70 80 90		
		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		0.08	1	RC		REC=100% SCR=67% RQD=28%			
1	Portable Drill Rig			96.02	2	RC		REC=100% SCR=0% RQD=0%			
		End of Borehole		1.14							
2											
3											
4											
5											
6											
7											
8											
9											
10											

GEMTEC
Consulting Engineers and Scientists

LOGGED: JC
CHECKED:

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

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: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	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
0	Portable Drill Rig, Rotary Drilling	Ground Surface		97.71							
		WATER		97.33							
		BOULDERS		0.38							
1				96.64							
		Fresh, grey and pink GRANITE, some open joints		1.07	1	RC		REC=95% SCR=63% RQD=21%			
					2	RC		REC=95% SCR=70% RQD=23%			
2				95.65							
		End of Borehole		2.06							
3											
4											
5											
6											
7											
8											
9											
10											

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
10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: JC
CHECKED:

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	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Portable Drill Rig, Rotary Drilling	Ground Surface		97.71							
		WATER									
1				96.64							
		BOULDERS		1.07							
				95.91							
2		Fresh, grey and pink GRANITE, some open joints, void starting at 2.6 metres depth		1.80	1	RC		REC=37% SCR=32% RQD=24%			
				94.92							
3		End of Borehole		2.79							
4											
5											
6											
7											
8											
9											
10											

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
10 20 30 40 50 60 70 80 90

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LOGGED: JC
CHECKED:

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: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	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
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%			
				95.27							
		End of Borehole		2.49							
3											
4											
5											
6											
7											
8											
9											
10											

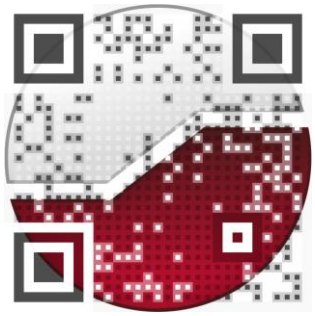
10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: JC
CHECKED:

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

experience • knowledge • integrity



civil	civil
geotechnical	géotechnique
environmental	environnementale
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

expérience • connaissance • intégrité

Appendix D
Archeological and Cultural Heritage Checklists

Ontario

Ministry of Tourism,
Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Archaeological Potential

A Checklist for the Non-Specialist

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)?	☐	☑
4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property (or project area)?	☐	☑
5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or project area)?	☐	☑
6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?	☐	☑
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.

	Yes	No
9. Are there present or past water sources within 300 metres of the property (or project area)?	☑	☐

If Yes, an archaeological assessment is required.

If No, continue to question 10.

	Yes	No
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

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