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Final Report

Ayr Stormwater Management Guiding Principles

Community of Ayr

Prepared for The Township of North Dumfries
by IBI Group
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Executive Summary

The Community of Ayr requires completion of a Stormwater Management Guiding Principles [SWMGP]. Originally, the document was following a Master Planning approach in accordance with the Environmental Assessment Act as outlined by the Municipal Engineer's Association Municipal Class Environmental Assessment (MEA), October 2000, as amended. However, as no projects were determined to be required, the EA component was removed.

The Study is to focus on the Urban Area of the Community of Ayr (existing and emerging), as illustrated in the Township's Official Plan [OP]. The Township also requires an analysis through this Study on the potential urbanization of lands framing the Northumberland Street corridor, extending from Greenfield Road to Highway No. 401.

The SWMGP will serve as a decision support tool, a methodology for the prioritization of works, a means to estimate future SWM requirements and costs and a transparent community process by which the Township can establish stormwater management guidelines and policies for the next ten to fifteen years.

The SWMGP shall be an integrated approach that considers flood and erosion control, groundwater and surface water quality management, natural heritage environment management and infrastructure. In addition, the plan shall integrate existing policies, regulations, acts and guidelines and where appropriate develop new policies and design guidelines to aid in implementation and shall do so within a water sustainability context. In addition, the SWMGP should provide sufficient information for the Township to develop a framework for the provision of a stormwater user fee, if desired.

IBI Group will work closely with the Township to ensure that the goals of the SWMGP can be accomplished in an effective and efficient manner. Based on Addendum #4, there may be challenges working within the budget set out to Council, and IBI Group will work with the Township to deal with these issues.

1 Introduction

The Community of Ayr requires completion of a Stormwater Management Guiding Principles [SWMGP]. Originally, the document was following a Master Planning approach in accordance with the Environmental Assessment Act as outlined by the Municipal Engineer's Association Municipal Class Environmental Assessment (MEA), October 2000, as amended. However, as no projects were determined to be required, the EA component was removed.

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1.1 Background

The Community of Ayr has a population of approximately 5,000 persons and is anticipated to increase to a population of 10,000 to 11,000 persons by 2031. Increases in population require residential and employment lands, which increase the impervious cover of existing lands, and the stormwater which runs off during events requires mitigation. The SWMGP will provide specific recommendations for SWM measures to mitigate urban growth in the Study Area.

The Ayr Urban Area is designated on Maps 2 and 2.1 of the OP. This designation is intended to serve as the primary focus for growth and development in the Township to the year 2031. Development within this designation will provide for a range of residential, commercial, employment, recreational and institutional uses. Future development within the Ayr Urban Area will be directed predominantly to the Urban Growth Centre and Designated Greenfield Area.

A goal of the OP is to concentrate most of the growth in the Township within the Ayr Urban Area, with limited growth in designated Rural Settlement Areas and Rural Employment Area where municipal services can be provided in a cost effective and environmentally responsible manner.

The Township encourages the provision of new dwelling units in built-up areas in the Ayr Urban Area and existing Rural Settlement Areas, through infill, conversion, intensification or redevelopment compatible with surrounding uses, except where infrastructure is inadequate or there are significant physical constraints.

The SWMGP provides guidance for future development in these areas, including an overview of opportunities and constraints for SWM measures.

Nith River: The Nith River drains the western part of the Grand River watershed in Waterloo Region as well as Brant and Oxford counties. In the northern part of the river, water runs off the land quickly so flows can rise and fall quickly. Demand for water is high in the southern part of the river where farm irrigation is common. Typical summer flow in the Nith River at Ayr is 2.6m^3/s, with low lying areas flooded when flows exceed 110m^3/s. Per Ayr Flooding, the Regional event flow is approximately 600-800m^3/s.

Cedar Creek: The Upper Cedar Creek Scoped Subwatershed Study (UCCSSS) is intended to guide and coordinate decision making by the Region, area municipalities, the Grand River Conservation Authority (GRCA) and others involved in development planning, subwatershed stewardship and restoration. Cedar Creek supports a coldwater brook trout fishery and drains primarily agricultural lands, remnant natural woodlands, and low-lying wetlands south and west of the Cities of Kitchener and Cambridge, respectively. The northern part of the subwatershed is bisected by the Highway 401 corridor. The main Urban Area is the community of Ayr, in the Township of North Dumfries, located at the confluence of Cedar Creek and a meandering section of the Nith River.

Per the Grand River Watershed Management Plan (GRWWMP) and Ayr Flooding, Ayr is located within an Existing Flood Damage Centre (a community that has several structures located within the floodplain). Ayr experiences frequent nuisance flooding.

An initial review of flooding in Ayr suggests that there are few practical options to reduce riverine flooding to the most frequently flooded properties along Tanner Street. Next steps will focus on flood preparedness, implementing flood inundation mapping and increasing awareness of those residents located in the floodplain. Damages to property and a risk to life can occur during significant flood events. Therefore, the GRWWMP Team recommended that additional ways to reduce the flood damage potential in the community of Ayr be investigated.

1.2 Location

Ayr lies at the confluence of the Nith River and Cedar Creek, which generally flow north to south. There is a stream flow monitoring station in Ayr upstream of the confluence. Approximately 74.51ha drains to the Cedar Creek at Ayr Gauge. Regional flows at that gauge are 90.35 m^3/s, per UCCSSS.

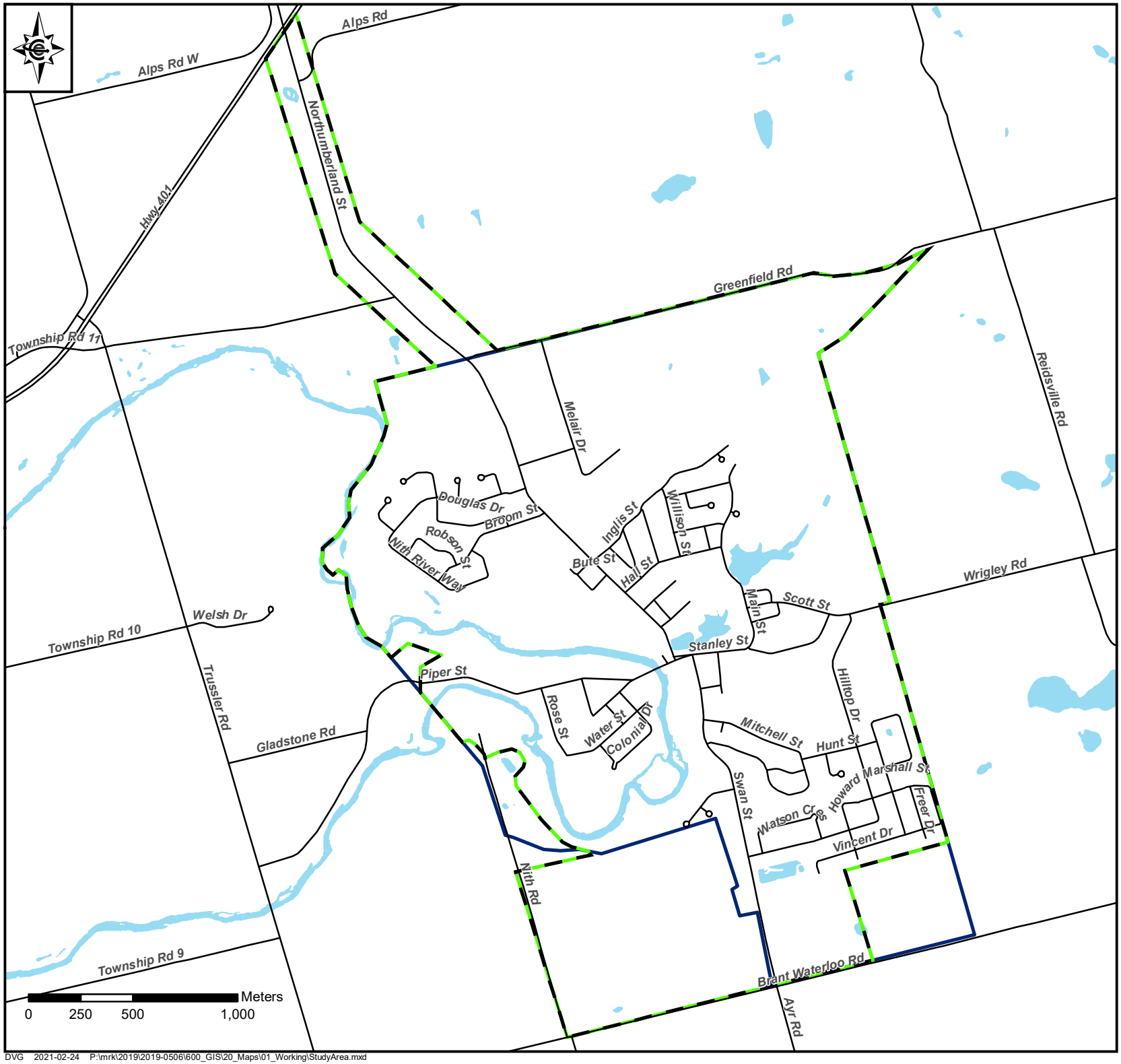
The following **Figure 1-1**, shows the Ayr site boundary as well as the boundary of this study.

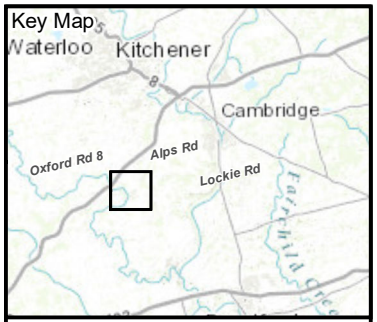
1.3 Study Overview

A Kickoff Meeting with the Township was held February 28, 2020 (Minutes attached in **Appendix A**).

It was assumed that the Township would provide, according to the RFP documents:

- GIS Mapping layers, including watercourses, property boundaries, existing and/or future Official Plan land use; natural features mapping; natural hazard areas or zones including regulatory floodplain zones; and any other relevant GIS layers that the Township can supply.
- LIDAR and/or existing digital elevation models for the Study Area
- Stormwater Management Reports for any developed areas with the Study Areas
- List of stakeholders
- Available record drawings, base plans, reports, digital ortho photography, and other relevant existing information
- Existing SWM pond assessments with their respective design reports, as available





Legend

- Approximate Study Boundary
- Municipal Boundary
- Watercourse

Figure 1.1
Ayr Township Location and Study Boundary

Township of North Dumfries
Storm Water Management
Guiding Principles

IBI

Project No.:	Date:
2019-0506	September 2022

DVG 2021-02-24 P:\mrk\2019\2019-0506\600_GIS\20_Maps\01_Working\StudyArea.mxd

As noted by Township staff, however, the Township did not routinely keep such records, therefore staff noted that alternative sources of that information will need to be developed and allow the Township to maintain up to date records. Such sources include GRCA, Region of Waterloo, and the Town's technical reviewer, K. Smart Associates Consulting Engineers & Planners located in Kitchener.

The information supplied by the Township was reviewed and any significant gaps in the available information that could affect the project was identified. Discussions were then had with Township staff to address these gaps in the most practical way. Examples of data gaps were:

- Existing storm sewer information
- Drainage area information outside of settlement areas
- Drainage areas to oil grit separators
- Drainage areas to uncontrolled outlets
- Existing SWM Pond IDs and reports

The Township does not have GIS information on existing storm sewers. As a result, no analysis of the system can be completed without a survey or other information on how the existing system was designed or built. This is critical to meeting the timelines outlined herein. Regional storm sewers, if any, are not included in this Study.

The Ministry of the Environment, Conservation and Parks [MECP] Access Environment website was used to search for Environmental Compliance Approval (ECAs) in the Study Area. We located two Oil-Grit Separator (OGS) ECAs, and three SWM Facility ECAs.

The most significant water quality issue in the Grand River Watershed is the eutrophication of the river from both anthropogenic and natural sources. Eutrophication results from excessive loadings of nutrients, specifically nitrogen, phosphorus and/or carbon to freshwaters, resulting in increased growth of aquatic plants and algae. It is our understanding that in the case of the Grand River, the nutrient of most concern in phosphorus.[1]

The available information was reviewed and the estimates of existing phosphorus loadings to the Nith River attributable to existing stormwater discharges were developed, and the potential change in loadings that might result from the foreseeable land development. This will help put future development in context and help to define what mitigation measures may be required as part of the overall SWM strategy.

1.3.1 Meeting Class EA Requirements

IBI Group's approach to completing a Class EA, is one of open involvement of all affected stakeholders early in the process. It is therefore proposed to inform the public through multiple points of contact, exceeding the requirements under the Class EA process. As the document was developed, it became apparent that there were no project that would benefit from the document being completed as a formal Class EA. Therefore the Township chose to complete the document as a Guiding Principles document.

1.3.2 Stakeholder List

A first step in the project was to prepare a comprehensive list of stakeholders to consult as a fulfillment of the Class EA Master Plan process. This list was based on parties identified by the Township as being interested in this or similar projects, as well as approval agencies and First Nations. During the full course of the project, the project stakeholder list will be maintained, and interested parties will be added for future mailings. IBI Group assumed that the cost of publishing all notices in local newspapers and the cost of facilities for public meetings will be paid directly by the Township. Refer to **Section 9.2** for the Stakeholders List.

[1] *Water Management Plan: Technical Memorandum, Report No. WMPSC-2011-06-01, Conceptual Understanding of Phosphorus Delivery in the Grand River Watershed*, prepared by Water Quality Working Group, dated June 7, 2011

1.3.3 Township of North Dumfries Official Plan

On December 16, 2013, Township Council passed By-law No. 2605-13 to adopt Official Plan Amendment No. 26 to the Official Plan for the Township of North Dumfries. This amendment updated the Township's existing Official Plan to bring it into conformity with changes in Ontario planning policy and the Official Plan for the Region of Waterloo.

The Township has prepared a 2018 Official Plan Consolidation. This copy has been published for reference only. In the case of a discrepancy between this consolidation and any amendments, the amendment will be used. For Official Plan policies that were appealed or deferred in the 2018 Consolidation, the policies in the May 2008 Consolidation are applicable.

1.3.4 Ayr Urban Area

The Ayr Urban Area is designated on Maps 2 and 2.1 of the Official Plan. This designation is intended to serve as the primary focus for growth and development in the Township to the year 2031. Development within this designation will provide for a range of residential, commercial, employment, recreational and institutional uses. Future development within the Ayr Urban Area will be directed predominantly to the Urban Growth Centre and Designated Greenfield Area. Specific land use designation policies relating to the Ayr Urban Area are contained in Section 2.7 of the Official Plan. The Ayr Urban Area is designated as illustrated on Maps 2 and 2.1 of the Official Plan.

The following summarizes the relevant sections of the Official Plan (numbering refers to related section of OP).

"2.7.2 In preparing or reviewing planning studies, or in reviewing development applications or site plans, the Township will ensure that development occurring within the Ayr Urban Area is planned and developed to:

a) Support the Planned Township Structure described in this Plan.

b) Contribute to the creation of complete communities that take into account the availability and location of existing and planned community infrastructure and human services with efficient and effective development patterns, densities and an appropriate mix of land uses that optimize the use of land, resources and public investment in infrastructure and public service facilities while supporting walkability, cycling and the use of transit.

c) Protect the natural environment, and surface water and groundwater resources.

2.7.3 The Township will within one year of the approval of this Plan commence a community planning process for the Ayr Urban Area to address:

a) The potential for implementation of a two-zone flood plain policy framework

IBI Notes in this Guiding Principles document that should the Township pursue a two-zone flood plain policy that, per the input of the GRCA, the Township would have early discussions with GRCA staff to establish a Terms of Reference prior to undertaking the study. Additionally, the GRCA's Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation (Ontario Regulation 150/06) sets out the parameters for establishing a two-zone policy area under policies 8.1.29. Specific two-zone floodplain policies

would need to be developed and incorporated into the Township's OP.

b) The distribution of densities and land uses, including the appropriate integration of future development with the existing community

c) A review of the function of the Urban Growth Centre as designated on Map 2.1 with the intent being to identify means to promote the vitality of the Ayr Urban Core Area as the focus of the community

d) The future development of stormwater management facilities … including where feasible, the completion of associated environmental assessments required under the Environmental Assessment Act

g) The determination of the appropriate designation for the vacant lands north of the railway tracks identified as Special Policy Area 2.7.7 on Map 2.1

h) The determination of the appropriate designation for the vacant lands located adjacent to the Regional Road No. 50 and Township Road No. 3 Rural Employment Area identified as Special Policy Area 2.9.3.5.3 on Map 2.30

k) Appropriate integration of environmental areas into the urban environment

2.7.6 Prior to the approval of the Community Plan provided for in Policy 2.7.5, the re-designation of lands identified as Special Policy Area 2.7.6 on Map 2.1 of this Plan will not be permitted.

2.7.7 Notwithstanding the designation of General Industrial on the lands identified as Special Policy Area 2.7.7, no development of these lands will be permitted until such time as the Community Plan as provided for in Policy 2.7.5 has been approved.

2.7.8 Infill residential development, including new development on brownfield and greyfield sites, will be encouraged within the Urban Residential and Ancillary designation by way of consent where:

a) The proposed development conforms to the policies of this Plan and the ROP.

b) The severed and retained parcels conform to the requirements of the Township Zoning By-law or that a minor variance has been approved by the Committee of Adjustment.

c) The severed and retained parcels have frontage on an existing open road of a standard satisfactory to the Township, and that no new road (other than road widening) will be required.

d) That the proposed development conforms to the provisions of Subsection 53(1) of the Planning Act.

e) The proposed development will be compatible with the uses in the immediate neighbourhood in form and function with respect to lot size and configuration, so as to minimize the impact of the proposed development on existing uses.

2.7.9 Notwithstanding the designation of Urban Residential and Ancillary, this Plan recognizes the existing privately serviced residential development on lands

identified as Special Policy Area 2.7.9 on Map 2.1. This Plan supports development proposing residential infill on private services on these lands, subject to the provisions of Policy 2.7.8.

2.7.10 Lands identified on Map 2.1 as Special Policy Area 2.7.10 will be identified with an 'f' suffix in the Township Zoning By-law. These lands are located below the regulatory flood plain as identified by the Grand River Conservation Authority. Prior to the establishment of a Two-Zone Flood Plain policy framework for the Ayr Township Urban Area, new development will not be permitted on these lands, however, additions to the existing structures may be permitted by amendment to the Township Zoning By-law and are subject to the approval of the Grand River Conservation Authority.

2.7.11 Freure Homes – Designated as Part 1 on Registered Plan 58R-9383 Part of Lots 35 and 36, Concession 8, Ayr Southeast corner of Greenfield Road and Northumberland Street. In recognition of the strategic location of the property and its prominence at the northerly entrance into the Community of Ayr via Northumberland Street, the development of the subject lands warrants special considerations.

Through the site plan process, an integrated architectural control manual and landscaping plan shall be undertaken by the Owner and submitted to the Township for review and approval, in addition to the standard menu of technical studies outlined elsewhere in this Plan.

Residential development may be in the form of townhouse, stacked townhouse and/or low-rise apartment buildings.

The development of this property shall require the incorporation of the triangular shaped parcel to be brought into the ownership and title of this larger landholding through the approval and finalization of Consent Application B-01/14.

2.7.12 Lands illustrated on Map 2.1 as Special Policy Area 2.7.12 and designated as Urban Residential and Ancillary Area may allow for commercial land use activities such as an office building.

2.8 AYR URBAN AREA EXPANSIONS/RATIONALIZATIONS

2.8.1 Future expansions to the boundaries of the Ayr Urban Area are only permitted onto lands within the Countryside Line as shown on Map 7 of this Plan, and will be subject to the following:

a) The expansion is justified through the preparation of a Regional Land Budget completed by the Region as part of a municipal comprehensive review of the ROP, or the completion of a municipal comprehensive review as otherwise initiated by Regional Council.

e) The existing or planned infrastructure required to accommodate the proposed expansion is financially viable over its life-cycle, can be provided in an environmentally sustainable manner and is consistent with any applicable Township and/or Regional infrastructure master plan.

g) Any applicable watershed studies have been completed prior to the approval of the expansion.

j) The expansion is accompanied by detailed environmental and servicing studies as required by the policies of this Plan.

2.8.2 Prior to any future expansions of the Ayr Urban Area in accordance with Policy 2.8.1, the Township will initiate a community planning process to establish the detailed land, transportation and infrastructure policies to guide the development of the lands to be brought into the Urban Area. The results of the community planning process will be implemented through a future amendment to this Plan. Until such time as appropriate land use designation and planning policies are determined, land uses in this area will be in conformity with the underlying prime agricultural areas designation.

2.8.3 The Township may propose a rationalization of the boundaries of the Ayr Urban Area and/or the Countryside Line applicable to the Ayr Urban Area, to be implemented through a further amendment to this Plan, provided that the rationalization:

a) Only occurs at the time of the next municipal comprehensive review of this Plan.

b) Takes into consideration existing property configurations, patterns of existing land use, natural and constructed features, and will not extend or promote strip development.

c) Does not result in a net increase in the amount of land designated as Designated Greenfield Area and/or located within the Countryside Line, except as provided for in accordance with Policy 2.8.4.

d) Does not exchange provincially constrained environmental areas for unconstrained developable areas."

1.4 References

- *A Place to Grow – Growth Plan for the Greater Golden Horseshoe*, prepared by the Government of Ontario, dated May 2019 [Places to Grow]
- Best Practices Guide for Reducing Urban Non-Point Source Pollution in the Grand River Watershed, prepared by AECOM, dated March 27, 2014
- *Grand River Watershed Water Management Plan*. 2014. Prepared by the Project Team, Water Management Plan. Grand River Conservation Authority [GRCA], Cambridge, ON [GRWWMP] [2]
- Hilltop Estates Subdivision, Stage 4, Ayr, Stormwater Management Plan, prepared by Stantec Consulting Ltd., dated September 22, 2017
- Hilltop Stage 3, (Phase 4) and Broos Property (Phase 1), Ayr, Ontario, Stormwater Management Report, prepared by Stantec Consulting Ltd., dated July 13, 2015
- Hilltop Subdivision, Ayr, Final Stormwater Management Report, prepared by Stantec Consulting Ltd., dated August 2006
- Identification of the Effect of Climate Change on Future Design Standards of Drainage Infrastructure Ontario, prepared by McMaster University, dated June 2005 [Final MTO Report]
- *Managing New Urban Development in Phosphorus Sensitive Watersheds*, prepared by Hutchinson Environmental Sciences Ltd., dated October 31, 2014 [NVCA P Tool]
- *Nith River Flows*, Grand River Conservation Authority Website

[2] https://www.grandriver.ca/en/our-watershed/resources/Documents/WMP/Water_WMP_Plan_Complete.pdf

- *Phosphorus Budget Tool in Support of Sustainable Development for the Lake Simcoe Watershed*, prepared by Hutchinson Environmental Sciences Ltd., dated October 31, 2014 [MOE P Tool]
- Policies for the Administration of the Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulation, Ontario Regulation 150/06, prepared by GRCA, approved October 23, 2015 [O. Reg. 150/06]
- Preparing for Flooding, A Guide for Residents of Ayr, prepared by GRCA [Ayr Flooding]
- Region of Waterloo and Area Municipalities, Design Guidelines and Supplemental Specifications for Municipal Services, prepared by Region of Waterloo, dated January 2018 [Region Guidelines][3]
- *Regional Official Plan 2031*, prepared by the Region of Waterloo, dated June 18, 2015 [ROP][4]
- *Strategic Plan*, Grand River Conservation Authority, 2019/2021 [GSP]
- *Township of North Dumfries Official Plan*, Consolidation Date: November 2018 [OP]
- *Upper Cedar Creek Scoped Subwatershed Study*, prepared by Matrix Solutions Inc. et al, dated October 2019 [UCCSSS]
- *Water Management Plan: Technical Memorandum, Report No. WMPSC-2011-06-01, Conceptual Understanding of Phosphorus Delivery in the Grand River Watershed*, prepared by Water Quality Working Group, dated June 7, 2011 [P Delivery]

1.5 Previous Studies Additional Details

1.5.1 Grand River Watershed Management Plan (GRWWMP)

Per GRCA's website: [5]

> Water is a shared resource and therefore collaboration is essential to carefully manage it. The Grand River Conservation Authority supports and facilitates a collaborative Water Management Plan with municipalities, provincial and federal government agencies, and Six Nations of the Grand River to discuss water management challenges and to develop best-value solutions.

The Plan is like a municipal master plan - it is a system-wide, or watershed-wide approach to address overall needs and to achieve common goals. It provides a framework for collective and collaborative action on water management that goes beyond municipal boundaries.

The goals for water management planning support communities, economies and ecosystems, and are to:

- Ensure water supplies
- Improve water quality to improve river health and reduce the river's impact on Lake Erie
- Reduce flood damage potential
- Build resilience to deal with climate change

The Grand River has a long history of integrated water management planning. See the historic water management documents dating back to 1932.

[3] https://www.regionofwaterloo.ca/en/living-here/resources/Design-Standards/2018_DGSSMS.pdf
[4] https://www.regionofwaterloo.ca/en/regional-government/land-use-planning.aspx
[5] https://www.grandriver.ca/en/our-watershed/Water-management-plan.aspx

As identified in the GRWWMP and Ayr Flooding, Ayr is located within an Existing Flood Damage Centre (a community that has several structures located within the floodplain). Ayr experiences frequent nuisance flooding.

An initial review of flooding in Ayr suggests that there are few practical options to reduce flooding to the most frequently flooded properties along Tannery Street. Next steps will focus on flood preparedness, implementing flood inundation mapping and increasing awareness of those residents located in the floodplain. Damages to property and a risk to life can occur during significant flood events. Therefore, the GRWWMP Team recommends that additional ways to reduce the flood damage potential in the community of Ayr be investigated.

1.5.1.1 Urban Nonpoint Source Pollution Strategy

Urban stormwater contributes significantly to the phosphorus and sediment levels in the central Grand River. To reduce sediment and phosphorus loads and associated pathogens from urban stormwater in the middle Grand River, the Project Team recommends that the central Grand River watershed municipalities implement best practices as listed in the 'Best Practice Guide for Reducing Urban Non-point Source Pollution of the Grand and Speed Rivers'. Best practices focus on:

- Sustainable funding to support an appropriate stormwater management program
- Development and implementation of stormwater management master plans
- Improvements to sediment and erosion control implementation and enforcement for developing sites
- Enhanced communication and education programs
- Opportunities to retrofit existing uncontrolled areas
- Maintenance and operations of facilities.

Action:

- GRCA will continue to facilitate a watershed Stormwater Management Working Group (Cities of Waterloo, Kitchener, Cambridge, Guelph, Brantford, Centre Wellington and County of Brant) and host biannual meetings to share information and identify roles and responsibilities among watershed urban municipalities.
- The Cities of Waterloo, Kitchener, Cambridge, Guelph, Brantford, Centre Wellington (Fergus, Elora) and County of Brant (Paris) plan to pursue stormwater management best practices as listed in the 'Best Practice Guide for Reducing Urban Non-point Source Pollution of the Grand and Speed Rivers'.
- GRCA, municipalities (Cities of Waterloo, Kitchener, Cambridge, Guelph, Region of Waterloo, Central Wellington, County of Brant, and Brantford) will work together to optimize current stormwater monitoring programs to characterize the effects of stormwater on the central Grand River.

1.5.2 Strategic Plan (GSP)

Through four strategic priorities, GRCA's Strategic Plan 2019-2021 serves as GRCA's guide to enhance and build on their programs and services. GRCA operates a wide range of programs in engineering, planning, land management, recreation and education in order to:

1. Protect life and minimize property damage from flooding and erosion.
2. Improve the health of the Grand River watershed.
3. Connect people to the environment through outdoor experiences.
4. Manage landholdings in a responsible and sustainable way.

1.5.3 Upper Cedar Creek Scoped Subwatershed Study (UCCSSS)

The Regional Municipality of Waterloo, partnered with the Grand River Conservation Authority (GRCA), has retained the consulting teams of Matrix Solutions Inc. (Matrix), Wood Environment and Infrastructure (Wood), Natural Resource Solutions Inc. (NRSI), and SGL Planning & Design (SGL Planning) to undertake the Upper Cedar Creek Scoped Subwatershed Study.

The Project Study Area (PSA) lies almost entirely within the Township of North Dumfries, with a small section of the northwest headwaters of Cedar Creek extending to the outskirts of the City of Kitchener, within the Regional Municipality of Waterloo. The Project includes two levels of study – a subwatershed-scale analysis for the entirety of the 7,463ha Cedar Creek Subwatershed (i.e., the PSA), and a detailed local-scale analysis for those lands within the Detailed Study Area (DSA). The DSA consists of Cedar Creek Subwatershed lands north of Cedar Creek Road and west of Dumfries Road within the City of Kitchener and the Township of North Dumfries.

The objective of the Scoped Subwatershed Study is to maintain, restore, or enhance the health of the Cedar Creek Subwatershed, with a focus on lands north of Cedar Creek Road and west of Dumfries Road. Over the course of this Scoped Subwatershed Study Process, a set of Objectives has been developed based upon the findings of the study area characterization, as well as the insights gained from the impact assessment. A series of targets have been established which represent functional criteria and requirements to mitigate anticipated impacts from potential future development and thereby achieve the management objectives. Furthermore, the targets guided the evaluation and development of recommendations to manage and mitigate the impacts of potential future development within the Subwatershed as evaluated as part of this Study. The Study Objectives and targets are summarized in Table 2 in Appendix B of the UCCSSS, along with the associated management strategies to mitigate impacts. These objectives have further served to develop a broad policy framework to direct future potential growth in the DSA.

1.5.3.1 Hydrology Modeling

The study completed a continuous simulation using a calibrated GAWSER hydrologic model which applied the precipitation and temperature data from the Roseville Gauge.

The report makes various recommendations for SWM mitigation, including:

- Any potential development should be required, at a minimum, to maintain existing groundwater recharge rates.
- Potential urban developments shall only discharge stormwater offsite at an approximately similar frequency, rate, and volume as is occurring under baseline conditions. Stormwater that is not discharged offsite should be infiltrated.
- Potential urban developments shall only discharge stormwater offsite at an approximately similar frequency, rate, and volume as is occurring under baseline conditions.
- Infiltration of potentially contaminated water shall only be performed in areas where there is a lessor chance of the contaminated water reaching the municipal supply aquifer. Runoff from areas that are more likely to be contaminated (e.g., roads, sidewalks, parking spaces) should be directed toward end-of-pipe recharge facilities that are sited outside those lands that contribute recharge to AFD1. Water entering these facilities should undergo appropriate quality treatment prior to infiltration. This quality treatment may include capturing spring freshet flows to capture salt-laden water for subsequent pumping to the sanitary system or evaporate during the following summer months.

1.5.3.2 Recommended Strategy

Based upon the results of the impact assessment, the water management strategy for the potential development within the Cedar Creek Subwatershed is required to satisfy the following criteria:

1. Control post-development flows to pre-development levels at the outlets from potential development areas, to provide flood protection for downstream properties.
2. Reduce surface runoff volume from potential development areas to maintain pre-development water budget and mitigate erosion impacts to downstream watercourses, including areas with no defined drainage features.
3. Provide stormwater quality control to an enhanced standard of treatment per current Provincial criteria.
4. Manage chloride loadings to runoff, particularly from snowpack during spring freshet.

The Cedar Creek Subwatershed is a unique environment, and as such, the management strategy developed for the potential land use scenarios needs to be specifically tailored to that environment.

The DSA, as well as the remaining portions of Cedar Creek, has a very low density of perennial watercourses, particularly so in the extreme headwaters of the watershed.

Perennial watercourses emerge in groundwater discharge areas, typically found in wetland areas associated with the Roseville Swamp. The perennial watercourses that are present have a strong baseflow component, and infrequently receive overland runoff. This is due to large proportion of both surficial, and subsurface, sand deposits within the watershed, which promotes infiltration (and subsequently groundwater recharge) rather than overland flow. As a result of the strong baseflow component, Cedar Creek watercourses are typically characterized as cold or cool water and are host to cold water species such as brook trout. Groundwater recharge generated within the DSA, and the resultant groundwater flow system, also supports other natural features such as Roseville Swamp, watercourses in adjacent watersheds (i.e. Blair Creek), with only a minor portion of municipal withdrawals reliant on DSA-derived recharge.

Protecting the quantity and quality of the groundwater system is critical to maintaining the ecologic and human function of those features.

1.6 Data Gaps

Based on the Kickoff Meeting with the Township, historically little data has been kept on catchbasin locations or stormwater assets. IBI Group has reached out the K. Smart, GRCA, Region of Waterloo and other sources to attempt to fill the gaps.

Stantec provided the following reports:

- *Hilltop Subdivision, Ayr, Final Stormwater Management Report*, prepared by Stantec Consulting Ltd., dated August 2006 [SWMF3/4]
- Hilltop Stage 3, (Phase 4) and Broos Property (Phase 1), Ayr, Ontario, Stormwater Management Report, prepared by Stantec Consulting Ltd., dated July 13, 2015 [SWMF4]
- *Hilltop Estates Subdivision, Stage 4, Ayr, Stormwater Management Plan*, prepared by Stantec Consulting Ltd., dated September 22, 2017 [SWMF5]

1.7 Problem and Opportunity Statements

The Township has retained IBI Group to develop a SWMGP to define all anticipated works necessary to maintain, expand and improve the existing storm drainage system (including SWM ponds) while protecting the valued natural resources both within and beyond Township limits.

The SWMGP has been prepared in accordance with the Class EA process and is available for public review.

This project presents an opportunity to improve the management of stormwater for both existing and planned development, which is based on changes in land use as outlined in the *Township of North Dumfries Official Plan*, Consolidation Date: November 2018 [OP] and *Waterloo Regional Official Plan*, Chapter 8 Consolidated New ROP, 2015 [WROP].

An opportunity exists to implement a drainage strategy within the Township to be consistent with the GSP and GRWWMP. While implementing drainage improvements, there will be opportunities to minimize ongoing erosion and sedimentation, phosphorus loadings and changes in water balance which may cause a negative impact on the Grand River watershed. GRCA recommends that potential net change on hydrologic water balance and pollutant loadings to natural watercourses and wetlands be assessed.

1.8 Study Objectives

The primary objective of the study is to lay out a strategy of stormwater management for future development areas and provide guidance on how to best achieve SWM objectives.

Given the high permeability of the underlying soils, one important aspect of that strategy is infiltration. Consequently, it is recommended that future development employ a treatment train approach to stormwater management consistent with the MOE 2003 Stormwater Planning and Design Guide as well as the following documents:

a) Low Impact Development Stormwater Management Planning and Design Guide (TRCA/CVC, 2010 V1.0)

b) Stormwater Management Criteria (CVC, August 2012 V1.0)

c) Stormwater Management Criteria (TRCA, August 2012, V1.0)

d) Drainage Management Manual (MTO, 1997)

The study follows the above documents while maintaining consistency with the current stormwater direction of the Township which promotes infiltration and further establishes parameters for the creation of a Stormwater User fee if desired. This could include incentive programs for the implementation of on-site controls as well as the use of Low Impact Development (LID) stormwater management practices.

The SWMGP includes a detailed assessment of the stormwater sewer (600mm or greater) for capacity for both existing conditions and future conditions resulting from areas of new development, infill and re-development. Further, this includes an overland flow route analysis to determine the areas at risk during a major storm event and make recommendations on how the overland flow route system can be improved. This task will use LIDAR data to develop a surface and identifying areas at risk for severe ponding during design storm events.

The SWMGP reflects and integrates the ongoing Asset Management Plan which includes long-range forecast and planning direction for many of the specific policy items and recommendations (i.e. ponds, OGS and stream rehabilitation).

The SWMGP will consider and create the SWM design standards to be incorporated into a Development Manual as well as considering the cost of maintenance and life cycles costs for SWM approaches. It will also provide direction with respect to existing easements, corridors and access agreements that may require renewals.

Future development requirements: Laying out the SWM criteria applicable to future development, along with design approaches to meet these criteria.

Long term maintenance plans: For SWM assets to be assumed and subsequently maintained by the Town, to lay out in general terms expectations for inspection, operation, and maintenance, along with estimated costs.

Funding: Provide guidance on potential funding sources of said maintenance plans, sufficient for the Township to develop a stormwater user fee if desired.

Flooding: Provide suggestions on mitigating local flooding caused by insufficient stormwater system capacities.

1.9 Purpose of Project File

The SWMGP document will be the key deliverable for the project for the implementation of future works. The document will provide the planning rationale and EA documentation required to proceed with detailed design of the recommended works. The SWMGP is expected to contain, at a minimum:

- Problem/Opportunity statement
- Documentation of all public, agency, and First Nations comments and responses
- Review of best practices and minimum design guidelines
- Rationale for evaluation criteria
- Summary evaluation of alternatives
- Summary of preferred solution prioritization
- Implementation, feasibility and staging recommendations
- Supporting technical memoranda (in appendices), including:
  - Results of field data investigation of stormwater management infrastructure
  - Maintenance program for individual stormwater assets
  - Recommendations for stormwater management policies to be developed by others
- Cost estimates
- SWM Pond Long-Term Maintenance Program
- Recommendations for Township Design Guidelines
- Mitigation measures and commitments
- Enough information to formulate a framework for stormwater user fee, if desired
- Operations and maintenance costs
- Prioritization of works
- Provide a basis for future investigations for the specific Schedule C projects identified within it, i.e. identify everything the Township needs for the first five years after study completion and complete all the site specific work required, including public consultation to meet Municipal Class EA requirements for Schedule A and B projects
- SWM Policy for integration into Development Manual
- Water Resources Monitoring Program.

The SWMGP document includes an Executive Summary that provides a clear picture of the recommendations, and a description of how those recommendations were arrived at.

As needed, the final document will be formatted to meet the Township's AODA requirements or policies.

2 Planning Context and the EA Planning Process

The following section lays out the planning context and EA planning process for the SWMGP Municipal Class EA process that was used as a guideline in preparing this document.

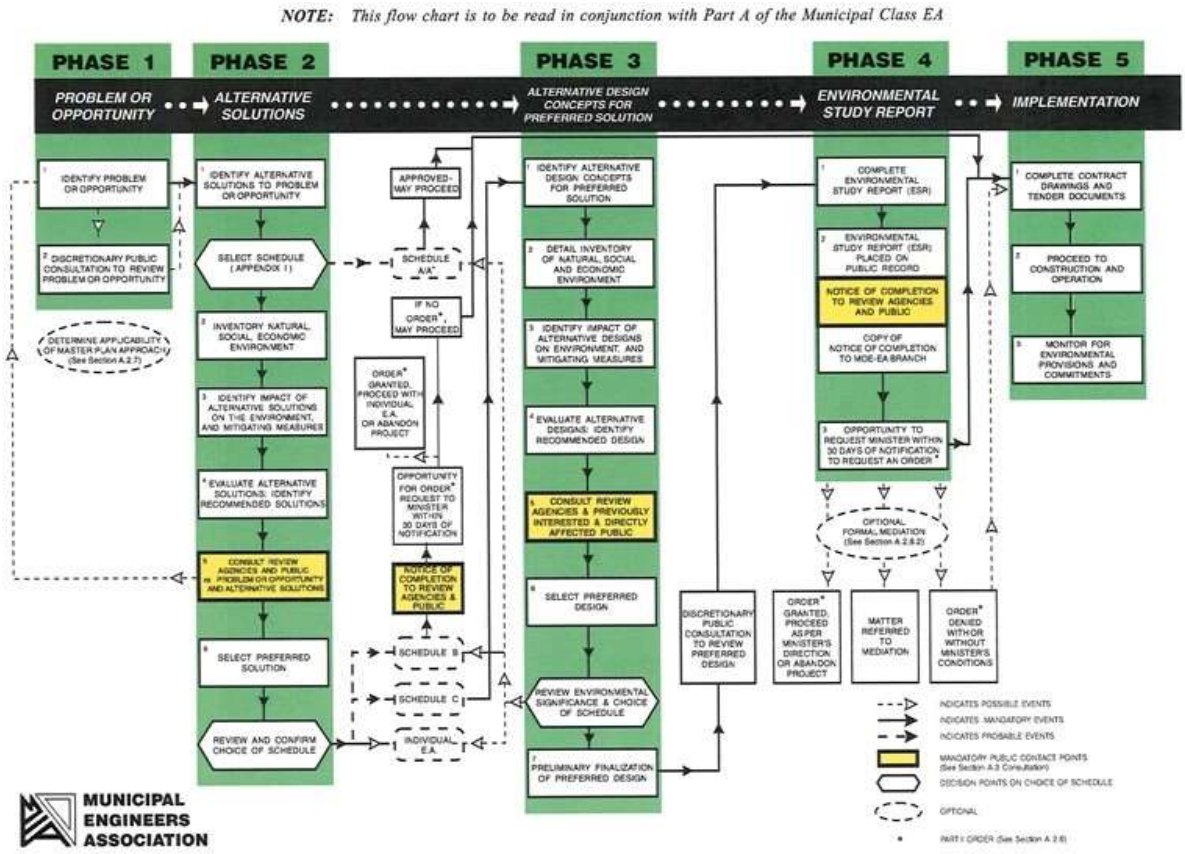


Figure 2-1 Municipal Class EA Process

Appendix 4 of the Municipal Class EA document outlines various approaches to conducting master plans (available online at https://municipalclassea.ca/manual/page79.html). All master plans, at a minimum, must address at least the first two phases of the Class EA process (identifying a problem or opportunity and identifying alternative solutions to address the problem or opportunity).

The master planning process under Approach #1 as described in Appendix 4 is completed at a broad level of assessment, requiring more detailed investigations at the project-specific level to fulfill Class EA requirements. The master plan in Approach #1 becomes the basis for specific Schedule B and C projects that are required to undergo a Class EA in future.

Like Approach #1, Approach #2 must also satisfy Phases 1 and 2 of the Class EA. However, this approach involves a level of investigation, consultation, and documentation sufficient to fulfill the requirements for Schedule B projects. A Notice of Completion for this approach should identify/list specific Schedule B projects.

The Report should clearly identify the Master Plan Approach adopted during this study and should include a list of schedule B, C projects for which Class EA requirements have been fulfilled in the Master plan. The list should also be included in the Notice of Completion.

2.1 Public Consultation

Public Information Sessions are provided to allow the public to learn about the project and provide feedback.

2.2 Policy Review

The following summarizes the policy review for the SWMGP.

2.2.1 A Place to Grow

The Growth Plan for the Greater Golden Horseshoe (GGH) 2019 was prepared and approved under the Places to Grow Act, 2005 to take effect on May 16, 2019.

A Place to Grow Plan, together with the Greenbelt Plan, Oak Ridges Moraine Conservation Plan, and the Niagara Escarpment Plan, builds on the Provincial Policy Statement (PPS) to establish a unique land use planning framework for the GGH that supports the achievement of complete communities, a thriving economy, a clean and healthy environment, and social equity.

The plan provides guidance on the preparation of stormwater management plans. The following summarizes those requirements.

1. Municipalities will develop stormwater master plans or equivalent for serviced settlement areas that:

   a) are informed by watershed planning or equivalent

   b) protect the quality and quantity of water by assessing existing stormwater facilities and systems

   c) characterize existing environmental conditions

   d) examine the cumulative environmental impacts of stormwater from existing and planned development, including an assessment of how extreme weather events will exacerbate these impacts and the identification of appropriate adaptation strategies

   e) incorporate appropriate low impact development and green infrastructure

   f) identify the need for stormwater retrofits, where appropriate

   g) identify the full life cycle costs of the stormwater infrastructure, including maintenance costs, and develop options to pay for these costs over the long-term

   h) include an implementation and maintenance plan.

2. Proposals for large-scale development proceeding by way of a secondary plan, plan of subdivision, vacant land plan of condominium or site plan will be supported by a stormwater management plan or equivalent, that:

   a) is informed by a sub-watershed plan or equivalent

   b) incorporates an integrated treatment approach to minimize stormwater flows and reliance on stormwater ponds, which includes appropriate low impact development and green infrastructure

   c) establishes planning, design, and construction practices to minimize vegetation removal, grading and soil compaction, sediment erosion, and impervious surfaces

   d) aligns with the stormwater master plan or equivalent for the settlement area, where applicable

2.2.2 Grand River Conservation Authority O. Reg. 150/06

The Conservation Authorities Act first empowered conservation authorities to make regulations to prohibit filling in floodplains below the highwater mark in 1956. These powers were broadened in 1960 to prohibit or regulate the placing or dumping of fill in defined areas where, in the opinion of the conservation authority, the control of flooding, pollution or the conservation of land may be affected (R.S.O. 1960, c. 62, s. 20 (1)). In 1968, an amendment to the Conservation Authorities Act (Statutes of Ontario, 1968, c. 15) further extended the power of Conservation Authorities to prohibit or control construction and alteration to waterways, in addition to filling.

In 1998, the Conservation Authorities Act was changed as part of the Red Tape Reduction Act (Bill 25), to ensure that regulations under the Act were consistent across the province and complementary with contemporary provincial policies. To better reflect provincial direction and to strengthen protection of public safety and the environment, the Conservation Authorities Act was modified to enable conservation authorities to enact the Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulation (Ontario Regulation 97/04) to replace the Fill, Construction and Alteration to Waterways Regulation (R.R.O. 1990, Regulation 149 as amended by Ontario Regulation 142/98). All applications for permission received after May 4, 2006, are processed subject to the provisions of the *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation*.

Ontario Regulation 97/04 allows conservation authorities to prevent or restrict development in areas where the control of flooding, erosion, dynamic beaches, pollution or the conservation of land may be affected by development, in order to prevent the creation of new hazards or the aggravation of existing ones.

The Minister of Natural Resources approved Ontario Regulation 150/06, for the GRCA, consistent with Ontario Regulation 97/04, on May 4, 2006. This regulation is entitled the Development, Interference with Wetlands and Alteration to Shorelines and Waterways Regulation (hereafter referred to as the Regulation).

Permission from the GRCA is required to develop in river or stream valleys, wetlands, shorelines or hazardous lands; alter a river, creek, stream or watercourse; or interfere with a wetland.

2.2.2.1 Stormwater Management

Section 8.1.14 of the O. Reg. states Stormwater Management Facilities may be permitted within the Riverine Flooding Hazard but outside of the riparian zone or effective flow area, whichever is greater, in accordance with the policies in Sections 7.1.2-7.1.3 - General Policies, provided that there is no feasible alternative site outside the Riverine Flooding Hazard and where it can be demonstrated that:

8.1.1.4

a) there is no loss of flood storage,

b) natural erosion and sedimentation processes within the receiving watercourse are not impacted,

c) where unavoidable, intrusions on significant natural features or hydrologic or ecological functions are minimized and it can be demonstrated that best management practices including site and infrastructure design and appropriate remedial measures will adequately restore and enhance features and functions,

d) facilities are excavated with minimal berming, special policy areas and floodplain flow regimes for a range of rainfall events including the Regional Storm are maintained, and all excavated material is removed from the Riverine Flooding Hazard,

e) design and maintenance performance requirements as determined by the GRCA for the receiving watercourse are met and the effect of the floodplain flow regime on the intended function of the facility is incorporated into the siting and design.

8.4.15 Stormwater Management Facilities for water quality control will not be permitted within a wetland, but may be permitted in the area of interference where it can be demonstrated that:

a) all structural components and actively managed components of the stormwater management facility including constructed wetlands, are located outside of the wetland,

b) a detailed study demonstrates how the hydrologic and ecological functions of the wetland will be protected, restored and/or enhanced,

c) pollution and sedimentation during construction and post construction are minimized using best management practices including site and facility design, construction controls, and appropriate remedial measures,

d) design and maintenance requirements as determined by the GRCA are met, and

e) works are constructed, repaired or maintained according to accepted engineering principles and approved engineering standards or to the satisfaction of the GRCA, whichever is applicable based on the scale and scope of the project.

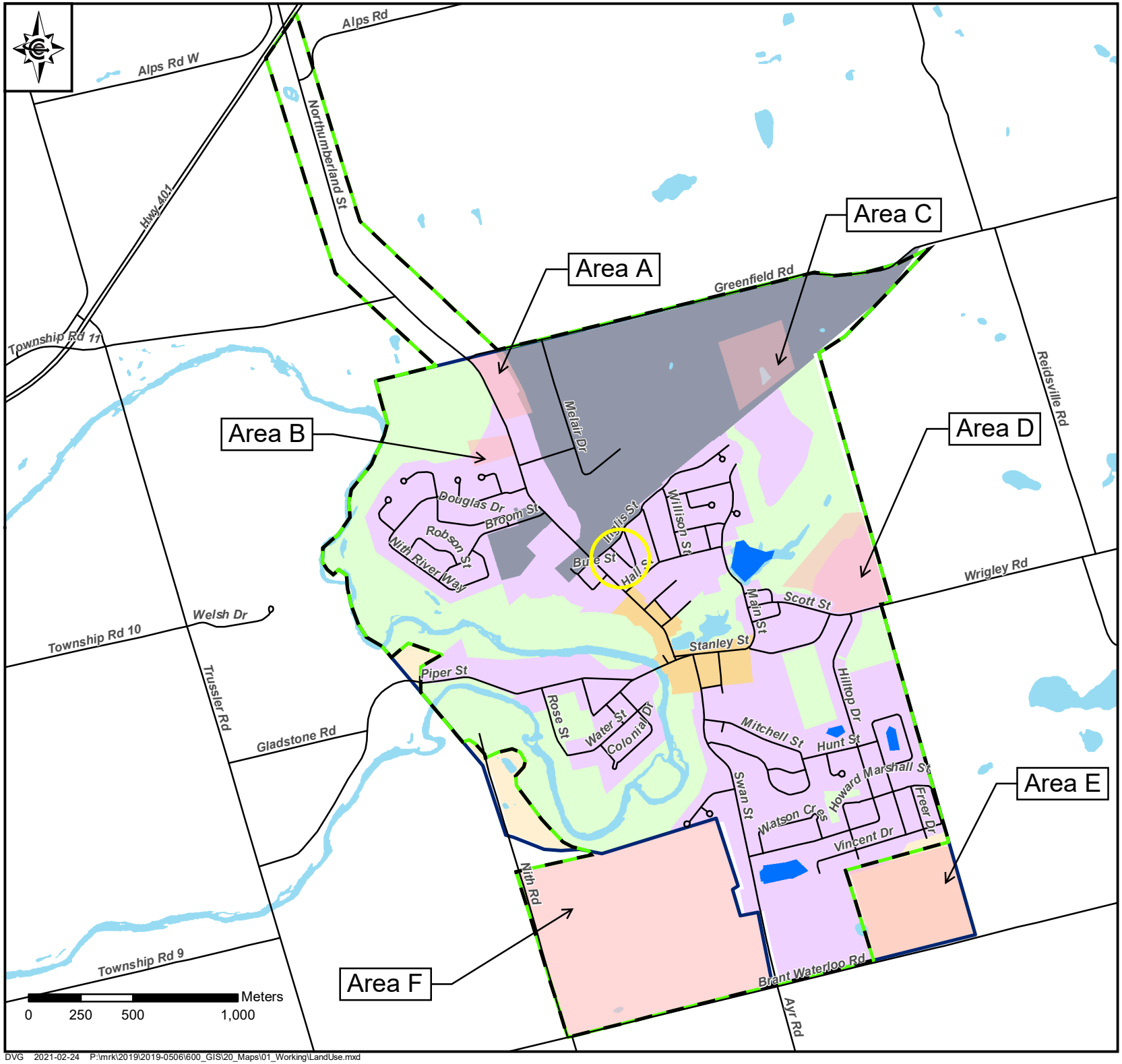
2.2.2.2 Special Policy Areas

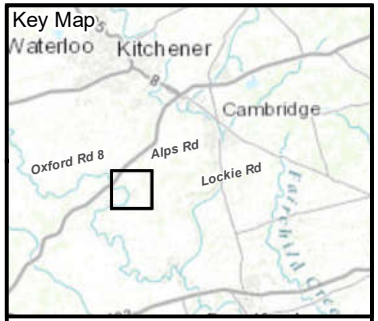
Various future development areas are in or partially in Township defined Special Policy Areas (SPAs) under OP Section 2.6.13. Special Policy Areas may be established by Council to designate areas subject to specific constraints to development, policy exceptions, or which would require the submission of specific studies prior to consideration of a development approval.

As noted by GRCA, these SPAs are not SPA floodplain policy areas. All the floodplains within the study area are designated one-zone policy areas.

The existing areas identified for future development are shown in **Figure 2-2**, below.

The areas which appear to be in within SPAs are Area A, B, C, and E. These will have to adhere to the policies outlined in the OP.





Legend

- Approximate Study Boundary
- Municipal Boundary
- Approximate Future Development
- SWM Facilities
- Watercourse

Landuse Type

- Agricultural
- Urban Growth Centre
- General Industrial
- Open Space
- Urban Residential and Ancillary
- Urban Growth Centre

Figure 2.2
Ayr Township Land Use

Township of North Dumfries Storm Water Management Guiding Principles

IBI

Project No.:	Date:
2019-0506	September 2022

DVG 2021-02-24 P:\mrk\2019\2019-0506\600_GIS\20_Maps\01_Working\LandUse.mxd

2.2.3 Waterloo Regional Official Plan

The Regional Official Plan (Plan) (published in 2015) is the Regional Municipality of Waterloo's guiding document for directing growth and change for the next 20 years. This Plan represents a fundamental shift in shaping Waterloo Region towards a more balanced community structure, building from a strong, long standing planning policy framework that has supported substantial historical growth and change. The Regional Official Plan is a legal document that contains goals, objectives and policies to manage and direct physical (land use) change and its effects on the cultural, social, economic and natural environment within the regional community. Once approved, the Planning Act requires that all Regional and Area Municipal public works, Area Municipal official plans and land use related by-laws, and all future development must conform to the Regional Official Plan.

2.2.3.1 The Greenlands Network

The Greenlands Network is defined as environmental features and the linkages among them. The Greenlands Network, and the ecological functions it provides, contributes to maintaining the environmental health of Waterloo Region and the Grand River watershed. This Plan contains policies to maintain, enhance or, wherever feasible, restore the Greenlands Network. Such action is necessary to counteract the negative effects of fragmentation which can result in a loss of ecological integrity and the degradation of natural biodiversity. Such action is also necessary to maintain biological and geological diversity, viable populations of native species and ecosystems, and make possible adaptation in response to actual or expected effects of climate change.

This Plan recognizes the importance of wetlands, watercourses, lakes and groundwater to the strength of the Greenland Network. These hydrological features and their associated functions provide a variety of environmental benefits and are fundamental components of the overall ecosystem.

Responsibility for the environment is shared among Federal and Provincial governments, the Region, Area Municipalities, the Grand River Conservation Authority and private landowners. All have an important role in enhancing the natural environment within the region, and all have the responsibility to be good stewards. As a result, establishing a Greenlands Network requires co-operation among agencies, private landholders and the wider community.

This section establishes a policy framework for a co-operative approach to the identification of the environmental features that comprise the Greenlands Network. It also outlines how provincially, and regionally significant features (termed Core Environmental Features) will be maintained, enhanced or, wherever feasible, restored.

The policies in this section also provide direction on how other environmental features (termed Supporting Environmental Features) will be maintained, enhanced or, wherever feasible, restored and encourages the establishment of linkages among elements of the Greenlands Network

Objectives:

1. Maintain, enhance or wherever feasible restore environmental features and the ecological and hydrological functions of the Greenlands Network including the Grand River and its tributaries and the landscape level linkages among environmental features.
2. Use watershed studies, community plans and development applications as opportunities not merely to maintain, but also to enhance and restore the Greenlands Network.
3. Regulate development within hazardous lands and hazardous sites to prevent or minimize hazards to life and property.
4. Develop partnerships, programs and policies to maintain, enhance and restore the ecological functions of the Greenlands Network, including the Grand River and its tributaries.

Where development or site alteration is proposed on lands within or contiguous to an Environmentally Sensitive Landscape, the owner/applicant will be required to submit an Environmental Impact Statement which addresses landscape impacts in addition to any other requirements in accordance with the policies in Section 7.G.

2.2.3.2 Regional Recharge Areas (Environmental Protection)

Regional Recharge Areas designation, which includes portions of the Waterloo Moraine, identifies a large environmental feature where considerable deposits of sand and gravel allow for the infiltration of large quantities of rainfall and snowmelt deep into the ground. This important hydrologic function sustains some of the richest sources of groundwater in the Grand River watershed.

Regional Recharge Areas serve two important functions. From an environmental perspective, groundwater discharge from the shallow aquifers located within Regional Recharge Areas sustains a wide range of aquatic habitats and ecosystems within the Greenlands Network. This groundwater discharge also provides a high percentage of the baseflow to the Grand River, its tributary rivers and cold-water streams and therefore is critical to maintaining the health of the Grand River to the benefit of the region and downstream communities.

The second function of Regional Recharge Areas is to replenish deep underground aquifers that serve as a source for a significant share of the municipal drinking-water supply. Specific polices related to this source water supply function are outlined in the policies in Chapter 8.

Expansions of the Urban Area, Township Urban Areas, Rural Settlement Areas or Rural Employment Areas will not be permitted onto lands designated as Regional Recharge Areas, except as provided for in Policy 7.B.24.

7.B.24 Minor expansions of Rural Settlement Areas located within Regional Recharge Areas may be permitted to facilitate the enlargement of an existing employment, recreational or institutional use subject to the provisions of Policies 6.G.8 and 7.B.25. Such expansions will not be permitted where the lands subject to the expansion proposal are also designated as Environmentally Sensitive Landscape.

7.B.25 Development applications within Regional Recharge Areas on lands already designated for urban development in this Plan, will comply with the following:

(a) Category ‘A’ uses, or an employment land use restricted by Policy 8.A.5, will not be permitted

(b) The development maintains, improves or restores the hydrogeologic and hydrologic functions of Regional Recharge Areas as established through watershed studies, community plans or through further study in accordance with Policy 8.A.4

(c) The development incorporates best management practices, where appropriate, developed in accordance with the provisions of the Regional Implementation Guideline for Source Water Protection Studies

(d) The development is in conformity with all other applicable policies of this Plan.

2.2.3.3 Source Water Protection

Chapter 8 of the Plan contains policies for the protection and conservation of the Region’s drinking-water resources. These policies form an important component of the Region’s Water Resource Protection Strategy and play a critical role in the Region’s multi-barrier approach to providing safe drinking-water. By safeguarding drinking-water at the source, this Plan seeks to prevent unnecessary environmental, economic, social and health costs associated with the loss and/or cleanup of drinking-water resources due to contamination or overuse.

Overall Goal – Protect, maintain and, wherever feasible, enhance surface water and groundwater resources to ensure that a municipal drinking-water supply system continues to provide a sufficient quantity and quality of drinking-water.

Objectives:

1. Protect existing and future sources of drinking-water from incompatible land uses.
2. Maintain and, wherever feasible, enhance the quantity and quality of water infiltration and recharge to groundwater aquifers.
3. Minimize the potential for contamination, including potential contamination from de-icing salts, on sources of municipal drinking water.
4. Promote informed stewardship of Source Water Protection Areas in collaboration with the Province, Area Municipalities and Grand River Conservation Authority.

Source Water Protection Areas

Source Water Protection Areas are identified in this Plan to protect the current and future municipal drinking-water supply system. These protection areas are significant in that they contribute water, or are in close proximity, to municipal drinking-water supply wells and surface water intakes that are vulnerable to contamination and or depletion from incompatible land uses. Source Water Protection Areas consist of: Wellhead Protection Sensitivity Areas; High Microbial Risk Management Zones; Surface Water Intake Protection Zones; and Regional Recharge Areas.

Development applications within all Source Water Protection Area designations will comply with the following:

(a) employment uses that would direct infiltration of stormwater run-off without pre-treatment through the use of drywells or artificial/enhanced recharge will not be permitted; and

(b) employment uses that would require new water taking for industrial/commercial purposes and/or for irrigation purposes, except for water taking associated with mineral aggregate operations will not be permitted.

Source Water Protection Land Use Categories

The quantity and quality of drinking-water is affected by land uses found within Source Water Protection Areas. Not all land uses pose the same level of risk to drinking-water; therefore, this Plan identifies four categories of land uses based on their associated level of risk.

Land uses that may pose a risk to the quantity and/or quality of municipal drinking-water supplies are divided into the following four categories according to the level of risk:

(a) Category ‘A’ (Very High Risk Uses)

(b) Category ‘B’ (High Risk Uses)

(c) Category ‘C’ (Moderate Risk Uses)

(d) Category ‘D’ (represents preferential pathways, or other land uses that involve soil excavation and/or the creation of subsurface facilities, that contribute to the risk to municipal drinking-water supplies by increasing vulnerability).

8.A.9 Land uses typically associated with each of the land use categories identified in Policy 8.A include, but are not limited to, the uses listed in Schedule ‘B’ to this Plan.

Wellhead Protection Areas

This Plan designates Wellhead Protection Areas around each municipal drinking-water supply well. Wellhead Protection Areas are the total area of land which contributes water to a municipal drinking-water supply well. Within each Wellhead Protection Area, one or more Wellhead

Protection Sensitivity Areas (WPSA) may be delineated. The purpose of these designations is to prevent land uses involving hazardous chemicals and/or substances, disease causing organisms and land uses that increase the vulnerability of groundwater from becoming water quantity and/or quality risks to municipal drinking-water supply wells.

Wellhead Protection Sensitivity Areas (WPSA) are classified from 1 to 8. This classification allows for varying degrees of management relative to the vulnerability of the underlying groundwater to contamination, the importance of the well to the capacity of the municipal drinking-water supply systems, as well as the length of time groundwater within the WPSA will take to reach the municipal drinking-water supply well.

Based on Map 4 Source Water Protection Areas, OP, there are three Municipal Wellheads in Ayr. Ayr is not located in a Regional Recharge Area. The downtown core, including the Urban Growth Centre is within WPSA-4, with the remainder of the northeast portions of Ayr located in WPSA-5. Refer to **Figure 2-3**.

Per the WROP, those areas are defined as:

- WSPA-4: delineates medium sensitivity areas found within the two-year time of travel to a municipal drinking-water supply well; and
- WSPA-5: delineates medium sensitivity areas found outside of the two year, but within the ten-year time of travel to a municipal drinking-water supply well.

Development applications within all Source Water Protection Area designations will comply with the following:

(a) Employment uses that would direct infiltration of stormwater run-off without pre-treatment using drywells or artificial/enhanced recharge will not be permitted

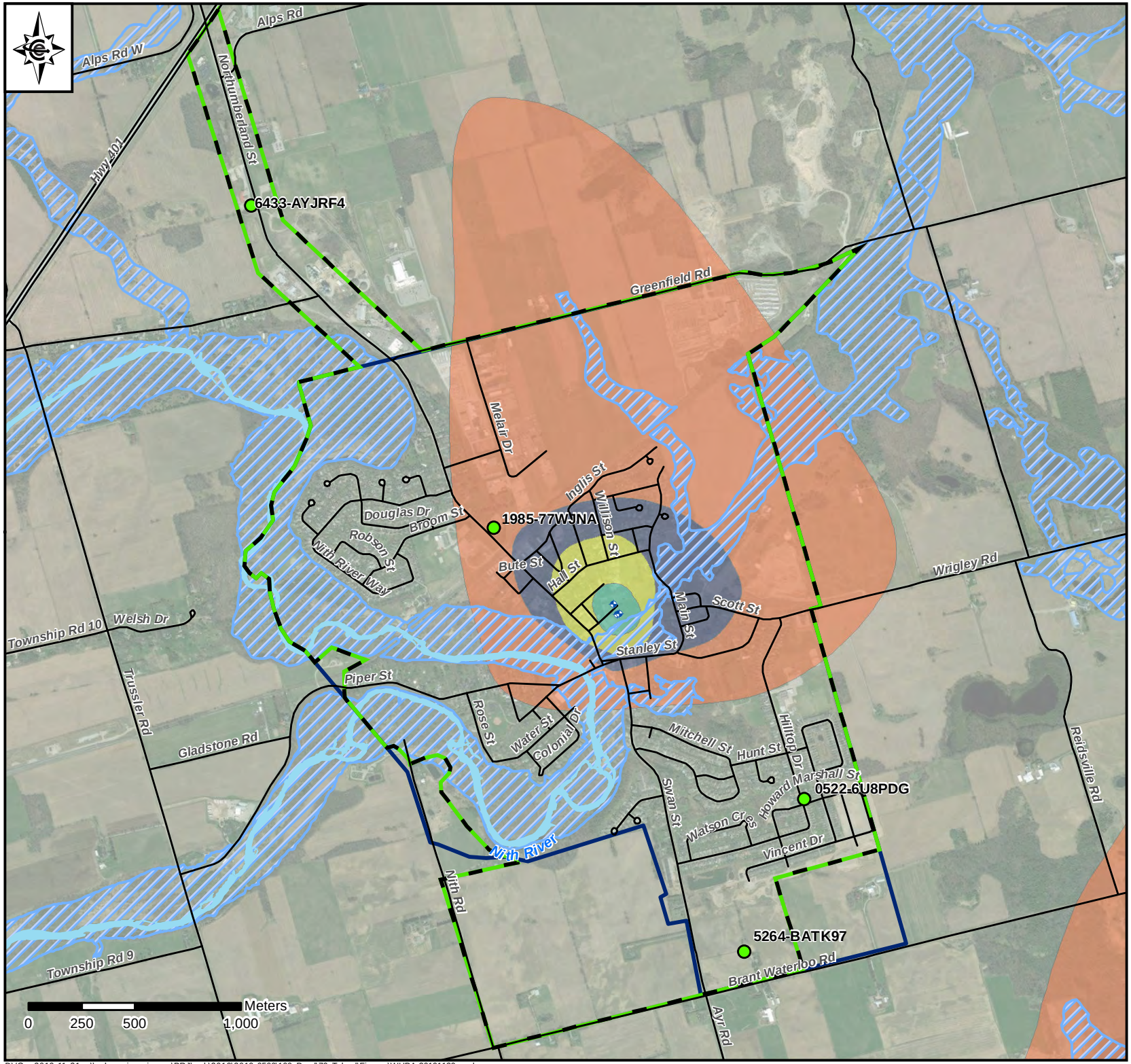
(b) Employment uses that would require new water taking for industrial/commercial purposes and/or for irrigation purposes, except for water taking associated with mineral aggregate operations will not be permitted.

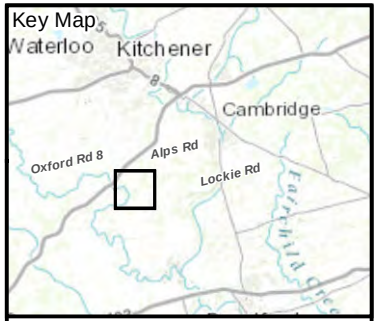
Development applications within the WPSA 4 designation will comply with the following: underground parking garages, individual wastewater treatment systems, private wells, pipelines, sewers, stormwater management ponds (or other ponds) and plans of subdivision or vacant land condominiums may be permitted subject to further study in accordance with Policy 8.A.4.

Development applications within the WPSA 5 designation will comply with the following: Category ‘D’ uses and plans of subdivision or vacant land condominiums may be permitted subject to further study in accordance with Policy 8.A.4.

Based on the foregoing, stormwater infiltration may not be allowed in some areas. SWM most comply with Policy 8.A.4. The studies requested will vary based on the location of the development application relative to the sensitivity of the Source Water Protection Area and its proximity to a municipal drinking-water supply well or surface water intake. Studies submitted by the owner/applicant will demonstrate that the proposed use will not negatively impact the quantity and/or quality of drinking-water resources in Source Water Protection Areas for the development application to receive approval.

Figure 2-3 below, shows the existing locations within the study area as described above.





Legend

- Monitoring Well
- Approximate Study Boundary
- Municipal Boundary
- Watercourse
- Regulatory Floodplain

Wellhead Protection Area

- A
- B
- C
- D
- E

Figure 2 3

Figure 2.3
Wellhead Protection Areas

Township of North Dumfries
Storm Water Management
Guiding Principles

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2019-0506	September 2022

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De-icing Salts

The use of de-icing salts is an important component of Regional and Area Municipal efforts to keep transportation corridors open and safe during icy and snowy conditions.

However, the impact of de-icing salts on the quality of municipal drinking-water supplies has become a concern. This Plan includes policies that encourage a more balanced approach to the use of de-icing salts through sound salt management practices and strategic urban design as methods to reduce the need for de-icing salt application to sidewalks, parking lots and roads.

8.B.1 Applications for a new plan of subdivision, or vacant land condominium, will only be approved where the owner/applicant has submitted a Salt Impact Assessment in accordance with the Regional Salt Impact Assessment Protocol Implementation Guideline to the satisfaction of the Region. This assessment is required to address the potential impacts of de-icing salts of the development on the Region's municipal drinking-water supply wells and to recommend ways to minimize such impacts.

8.B.2 Prior to the approval of any modifications to existing draft approved plans of subdivision, or vacant land condominiums, the Region may require the owner/applicant to submit a Salt Impact Assessment in accordance with Policy 8.B.1, where the scope of the modification would necessitate such an assessment.

8.B.3 The Region may require the owner/applicant to submit and implement Salt Management Plans in accordance with the Regional Salt Management Planning Implementation Guideline to the satisfaction of the Region for the following types of development applications:

(a) plans of subdivision and zoning by-laws proposing new employment land uses and multiple unit residential development

(b) plans of condominium for new development

(c) plans of condominium in previously constructed buildings or

(d) consent to create a lot for a multi-unit residential or employment land use.

2.2.3.4 Regional Guidelines

The primary purpose and benefit of creating a common set of design guidelines and contract specifications is to facilitate the design and construction of municipal services by consultants and contractors that work in more than one municipality.

Storm sewer design are covered in Section B.4 Storm (beginning on page B-24).

All storm sewers shall, as a minimum, be designed to a 5-year storm event, unless otherwise indicated. Rainfall intensity is to be determined using the following equation:

$$I\ (mm/hr) = 1593/(tc+11)^{0.8789}$$

Where tc = time of concentration

For a tc = 10 minutes, the intensity is

$$I\ (mm/hr) = 1593/(10+11)^{0.8789}$$

$$I = 109.7\ mm/hr$$

3 Study Area Characterization

3.1 Natural Environment

Desktop assessments of the natural environment will be completed by terrestrial and aquatic biologists. IBI Group's team includes the following sub-consultants who will be responsible for these reviews:

- **Myler Ecological Consulting**: Mr. Barry Myler is a fisheries specialist who will be primarily responsible for reviewing existing aquatic habitat conditions across the study area and commenting on how these conditions affect stormwater management planning.
- **LGL Limited**: LGL will review the existing terrestrial environment and ecology. LGL's effort will be led by Allison Featherstone. This review will help to identify existing natural areas and natural features that will affect siting opportunities for stormwater facilities, and which could affect requirements for maintaining local hydrologic water budgets.

3.1.1 Terrestrial Environment

A report containing LGL's findings can be found in **Appendix B**. A brief summary is presented below.

The study Area consists of several land use types, including agricultural, urban growth, industrial, residential and open space. Most notably, the Nith River and Cedar Creek, their tributaries and associated riparian habitat fall within the Study Area. There are also areas of wetlands, woodlands and aquatic features.

A site reconnaissance was conducted by LGL on April 24, 2020 to confirm the site conditions visible from public roads. A closer inspection may be required in advance of construction when the development areas are better known, but the description below provides an account of the current site conditions on that date.

Area A is a fallow field with mowed grass. It slopes from Northumberland Road towards the rail tracks. There is a fencerow of mature trees of mixed species between the mowed field and the houses.

Area B is currently under construction for a housing development. It is unclear whether any space will remain for stormwater management, or if this has already been incorporated into the development underway. West of the area, there are mature coniferous trees and then the landscape slopes steeply towards the Nith River.

Area C is not easily visible from the road but appears to be an agricultural field that was most recently used for corn. The area adjacent to the railroad appears to have been filled with some gravel and rock material.

Area D is an aggregate pit that appears to be in the process of reclamation. The entire area is barren soil, with some pooled water in the low points. There are some mature trees between Wrigley Road and the former pit.

Area E is mostly agricultural fields, but there are stockpiles of aggregate material and an old house with associated outbuildings. There is also a small-vegetated area just west of the house. The field to the west of the house was most recently in corn and the field to the east of the house was most recently in wheat, although the crop appears to be older and may not have been planted in 2019. The Charlie Creek is on the south side of Brant-Waterloo Road, flowing to the east.

Area F is a larger area which is made up of a few sections of agricultural land. Most of the fields were most recently in corn production. There is a fencerow of mature trees that splits the fields in a northerly direction and mature trees between the fields and the roads. There is a large house in the eastern field, surrounded by trees. Another old farmhouse is in the western field, where there is a small horse pasture, a small pond surrounded by wetland and a small wetland near Brant-Waterloo Road. Mature trees also line the drive up to the house and around the house and associated outbuildings.

The proposed future residential developments in the Study Area may intersect with several environmental constraints, including wetlands, woodlands, watercourses and habitat for SAR. However, the selection of Future Development Areas have focused on locations that are mostly outside of these habitat types and where there is existing human disturbance and rotational crop fields. In advance of development of infrastructure, site-specific inventories of these habitats and the habitat of SAR should be conducted to determine if permits are required. A summary of the environmental permits which could be required is provided in Table 2 of the Terrestrial Report.

3.1.2 Aquatic Environment

A report containing Myler's findings can be found in **Appendix B**. The Summary and Conclusions are below:

Fish habitat within the Ayr SWMGP study area includes portions of the warmwater Nith River and the coldwater Cedar Creek. Eden Creek fish habitat is outside of the study area, which includes only a small portion of land that drains towards Eden Creek but no segments of the creek itself.

The GRFMP identifies rural and land use impacts on the Nith River and its tributaries of impaired water quality (nutrients, turbidity, temperature) and sedimentation within streambeds, altered flow conditions due to water-taking and impoundments, and reduced extent of vegetated riparian habitats. Stormwater management can address impaired water quality, sedimentation and flow conditions. Where stormwater facilities and/or their outlets are constructed near watercourses, there may be opportunities to restore naturally vegetated riparian habitat.

Work and activities to create, retrofit, modify or maintain SWM facilities near water within the study area may trigger mitigation measures to protect fish and fish habitat (e.g., seasonal construction timing restrictions combined with appropriate physical measures such as erosion and sedimentation controls) and measures to protect aquatic SAR (i.e., individuals and general habitat of Threatened Black Redhorse and Silver Shiner in compliance with the provincial ESA and the federal SARA).

DFO describes seasonal mitigation measures as follows: "Restricted activity timing windows are applied to protect fish from impacts of works or undertakings in and around water during spawning migrations and other critical life history stages." In Ontario, the timing "windows", or more intuitively "restrictions", are based on fish community life history characteristics and are timed to respect a distinction between fish species that spawn in the spring and those that spawn in the fall. Eggs of spring spawners mature quickly and hatch soon afterward in that same spring or early summer. Eggs of fall spawners, of which the coldwater Brook Trout and the stocked Brown Trout are the only representatives in Ayr, overwinter in the streambed substrates where they are deposited during spawning and do not hatch until the following spring. The specific timing restrictions are applied regionally, to Ontario's Northwest, Northeast and Southern Regions, respectively, and reflect regional climatic and fish community differences. The Southern Region timing restrictions that apply to the watercourses in the Ayr SWMGP study area are:

- Spring spawning timing restriction applies to Nith River (March 15 – July 15).
- All spawning timing restriction applies to Cedar Creek and Eden Creek (October Study Area Characterization.

For SWM works and activities near water and within the general habitat of Threatened SAR Black Redhorse and/or Silver Shiner, the "Aquatic Species" exemption in Section 23.4 of O. Reg.

242/08 may apply if the type and extent of disturbance meets criteria and, if so, will guide the application of appropriate mitigation, monitoring and restoration measures. Otherwise, work and activities near water could require both ESA and SARA permits issued by the provincial Ministry of Environment, Conservation and Parks (MECP) and DFO respectively.

In summary, stormwater management represents an opportunity for local improvements to fish habitat through improved water quality and water quantity and possibly also through localized habitat restoration. Constraints to construction and operation of specific stormwater management facilities will need to be assessed on a site-specific basis that takes into account the watercourse involved and the local characteristics and sensitivities of its fish community and fish habitat.

3.2 Geologic and Hydrogeologic Setting

Stormwater management measures and best practices can be limited by restricting factors such as a shallow groundwater table, soil conditions and natural topography. The geologic and hydrogeologic setting of Ayr is generally conducive to infiltration measures, however natural variations throughout the area warrant more detailed site-level studies to confirm the local applicability of chosen SWM measures.

3.2.1 Topography

Topography varies from between approximately 280m above sea level (masl), in low valleys associated with the Nith River along the western boundary of the Study Area, to topographic highs of approximately 310masl, associated with moraine features to the north and south.

Topography within this area reflects glacial processes that deposited landforms such as channels (spillways), topographic ridges (moraines), and high-relief hummocky topography with closed depressions. Recharge within the subwatershed is relatively high, due to extensive highly permeable sediments, and is amplified in areas with hummocky topography compared to areas covered by relatively flat till plains.

3.2.2 Physiography

The majority of the Ayr lies within the physiographic region known as the Horseshoe Moraines. The Horseshoe Moraines covers much of southern Ontario, west of the Niagara Escarpment and include the Paris-Galt Moraines, a physiographic feature well known for its significance as a groundwater recharge area. Precipitation falling on the Moraine is rapidly transmitted through the overburden to the underlying water table, where it recharges deeper groundwater aquifers and/or discharges to the many creeks and wetlands located on the flanks of the moraine.

Portions of the northern half of the Study Area are spanned by the Waterloo Hills physiographic region. The Waterloo Hills are characterized by sand till ridges or kame moraines, with outwash sand in intervening low lying areas (Chapman and Putnam, 1984).

Available mapping from the Ontario Geological Survey shows the physiography of Ayr are the result of a series of glacial spillway channels, with till moraines present covering portions of the southern half of the Town, and scattered pockets of kame moraines in the adjacent landscape.

3.2.3 Soils

Soils can be generalized to be coarse-grained across much of the Study Area. While varied, soils generally consist of loams, sandy loams and organic muck and marl. The soil types are classified based on their physical soil characteristics.

Gravelly loam and sandy loam soils characterize much of the yet undeveloped northern half of the Ayr. Towards the southern extent of the Study Area, soils progress increasing towards various loams, including large pockets of Dumfries Loam and Mannheim Loam. The soils around Ayr suggest that infiltration measures are applicable and can be successful for managing

stormwater in much of the area. However, detailed site-level studies in the southwest portion of the Study area should confirm the applicability of infiltration as a stormwater management measure.

Soils are presented visually in **Figure 3-1**.

3.2.4 Geology

Surficial Geology

Surficial geology underlying Ayr consists primarily of gravelly and sandy glaciofluvial deposits, overlain along the Nith River by modern alluvium. These underlying areas are of high permeability and should be carefully managed for groundwater recharge.

Till units that are present within the Study Area include the Port Stanley Till and Wentworth Till.

The Wentworth Till is described predominantly as a sandy silt to silty sand till and displays variable thickness, with its thickest portion found within the Paris Moraine of the Horseshoe Moraine physiographic element. The sandy silt till results typically results in modest infiltration rates; however, recharge rates are enhanced, due to the hummocky topography and closed depressions common in the Horseshoe Moraine physiographic region.

The Port Stanley Till is a stoney sandy silt till with low pasticity that is commonly considered the basal till unit. Recent work by the OGS (2017) suggest that the Port Stanley Till is prevalent along the southern portion of the Study Area. This till is texturally similar to the Wentworth Till although it may have a greater total carbonate content. Similar to the Wentworth Till, the sandy silt till of the Port Stanley Till results in lower infiltration rates than the surrounding spillway deposits and may act as a confining unit along the south portion of the Study Area.

The mapped surficial geology is included in **Figure 3-2**.

Bedrock Geology

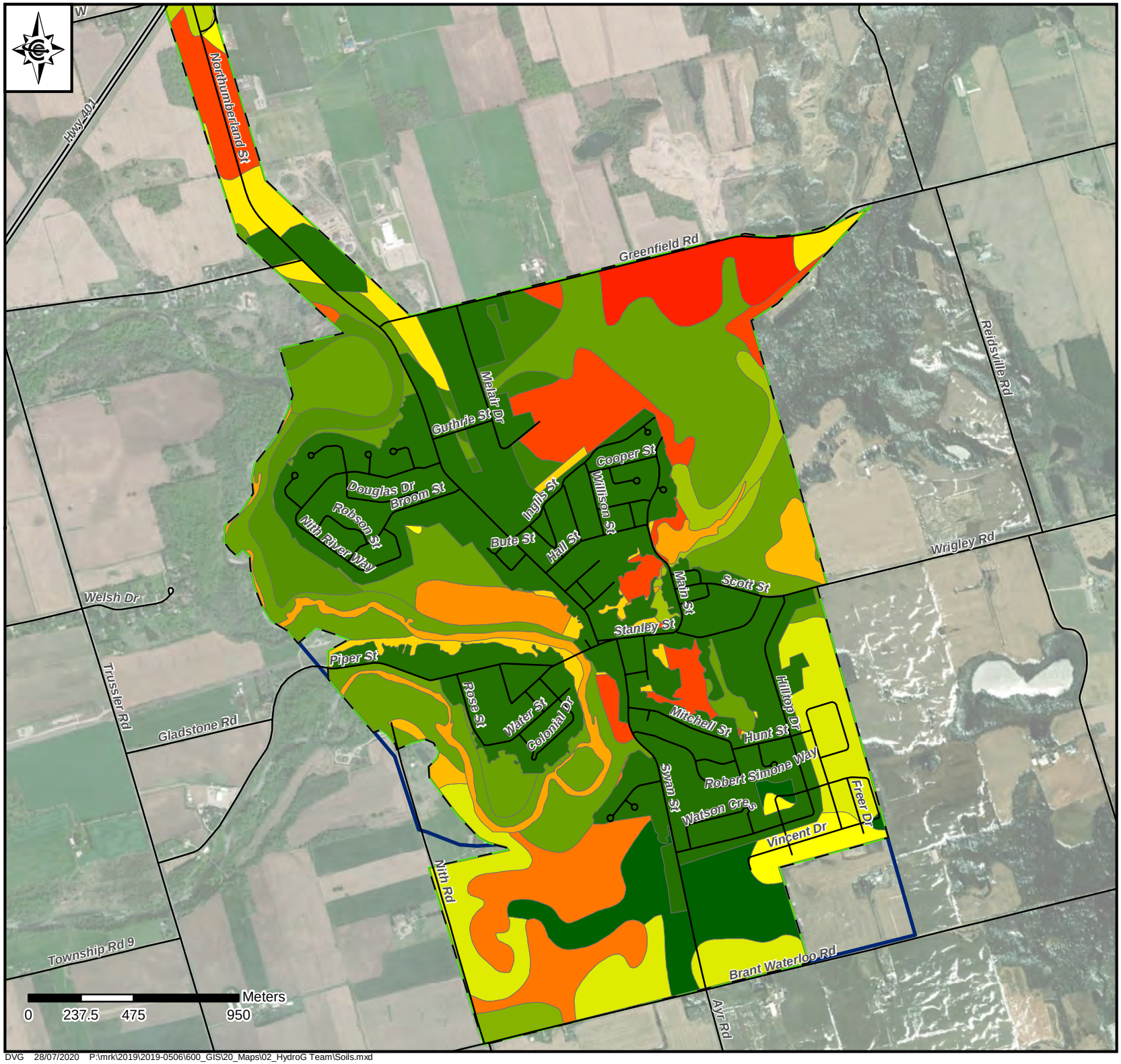
Bedrock underlying Ayr consists of Upper Silurian sedimentary rocks, which dip to the southwest. Bedrock Geology of Southern Ontario mapping indicates the upper bedrock across the Study Area is the Salina Formation, a grey-brown coloured, argillaceous dolostone and dolomitic shale, with beds and nodules of gypsum. At depth, the Salina Formation is underlain by beds of salt.

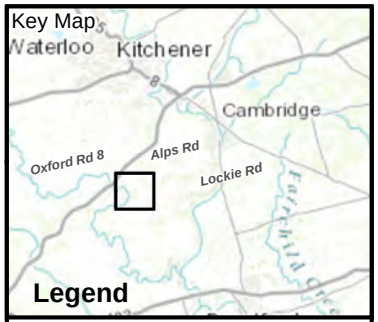
Karst features are formed from the dissolution of soluble rocks such as limestone, dolomite, and gypsum. It is characterized by underground drainage systems with sinkholes, caves, and disappearing streams and springs. Although Ayr is not recognized to lie in an area of mapped karstic bedrock features, Salina Formation dolostones are a candidate for possible dissolution over time. Areas of potential karst have been mapped by the OGS, associated with the neighboring Guelph Formation, approximately 4km east of Ayr.

Depth to bedrock near the Study Area has been mapped to be between approximately 17 metres below ground surface (mbgs) to 75mbgs.

3.2.5 Hydrogeology

The Salina Formation has been identified as one of the highest water-yielding hydrogeologic units within the bedrock of southern Ontario. Though generally yielding hard to very hard fresh water, with higher natural concentrations total iron and sulphate, a consequence of the presence of gypsum and other evaporites, very low natural concentrations of sodium and chloride result in very good to excellent water quality throughout the Formation (Singer, Cheng and Scafe, 2003). Development and the subsequent increased application of road salts should be carefully managed within the Study Area, in accordance with municipal and Regional Official Plan policies, to ensure the long-term sustainability of the Formation’s groundwater quality.





Legend

SOIL_NAME1

- AYR SANDY LOAM
- BUILT UP
- BURFORD GRAVELLY LOAM
- CALEDON SANDY LOAM
- DISTURBED LAND
- DUMFRIES LOAM
- FOX SANDY LOAM
- GRAVEL PIT
- HAYSVILLE SANDY LOAM
- KIRKLAND SANDY LOAM
- LISBON SANDY LOAM
- MANNHEIM LOAM
- MARTIN SAND AND
- ORGANIC SOIL - >36" DEEP
- ST. JACOBS LOAM
- TUSCOLA LOAM
- URBAN
- WATER - RIVER
- WATERLOO FINE SANDY LOAM
- Approximate Study Boundary
- Municipal Boundary

Figure 3 1

Ayr Township Soils Map

Township of North Dumfries
Storm Water Management
Guiding Principles

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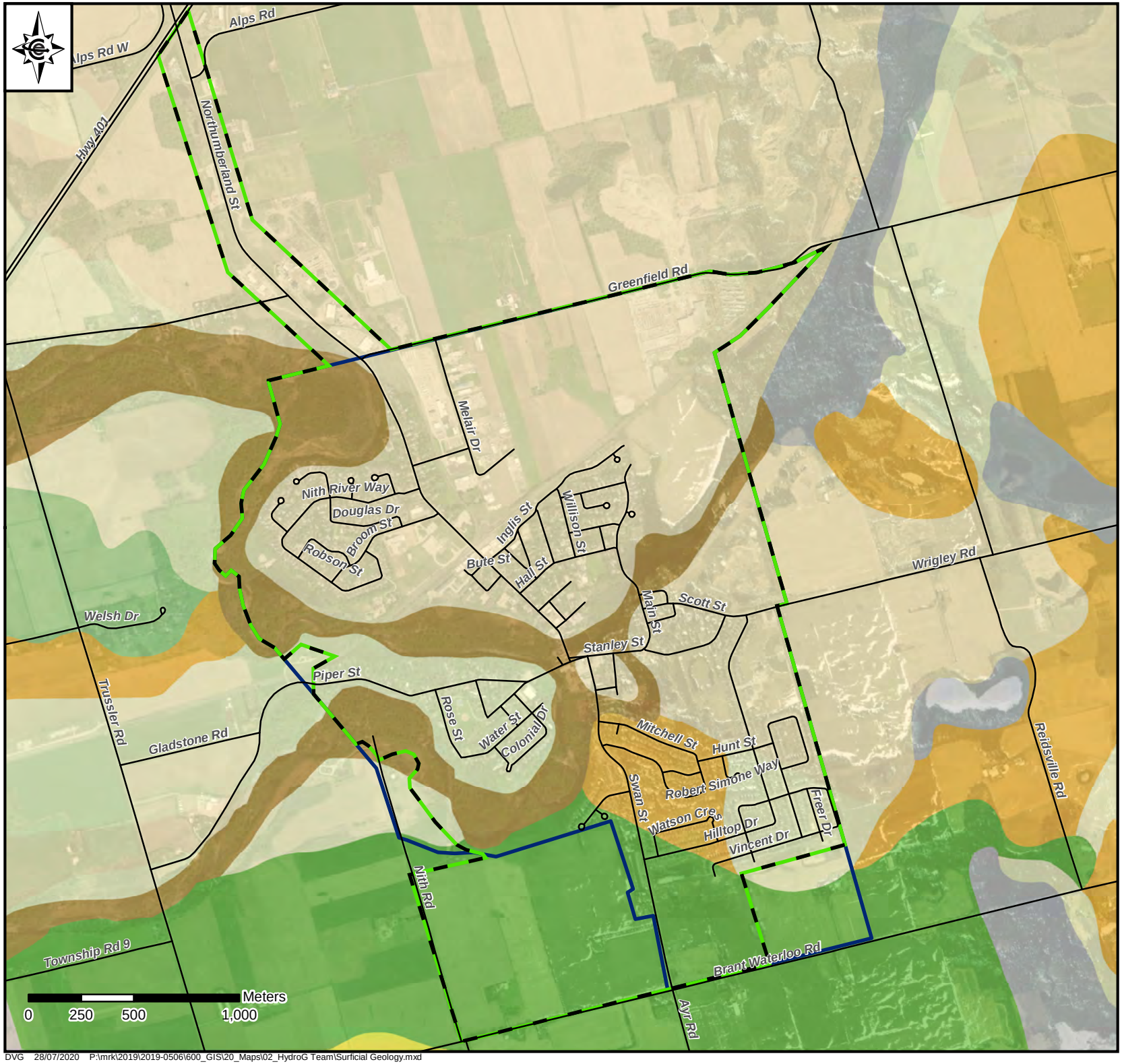

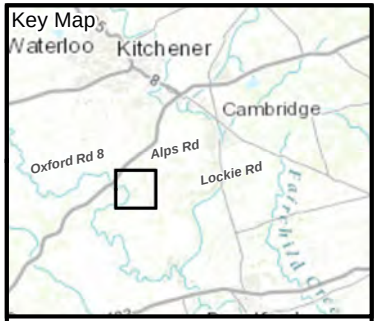

Legend

- Approximate Study Boundary
- Municipal Boundary

Surficial Geology

- 5b: Till (sandy silt to sily sand)
- 5d Till (clay to silt)
- 6: Ice-contact stratified deposits
- 7a: Glaciofluvial deposits (sandy)
- 7b: Glaciofluvial deposits (gravelly)
- 9: Coarse-textured galciolacustrine deposits
- 19: Modern alluvial deposits
- 20: Organic deposits

Figure 3.2
Ayr Township Surficial Geology Map

Township of North Dumfries
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Groundwater in the area is used for a number of purposes including municipal and domestic water supply, agricultural and industrial use. Shallow groundwater typically flows from areas of topographic highs to topographic lows (the Nith River). Other common discharge areas include creeks, streams, ponds and wetlands. Throughout much of Ayr, shallow groundwater flow generally flows west or southwest.

Based on available well records, the majority of shallow groundwater levels through the Study Area range between 2.6 mbgs and 10 mbgs.

A depth to groundwater map is included as **Figure 3-3**.

3.3 Watercourses/Waterbodies

3.3.1 Watercourses

The following watercourses exist within the Study Area.

Nith River: The Nith River drains the western part of the Grand River watershed in Waterloo Region as well as Brant and Oxford counties. In the northern part of the river, water runs off the land quickly so flows can rise and fall quickly. Demand for water is high in the southern part of the river where farm irrigation is common.

Cedar Creek: The Region of Waterloo and Grand River Conservation Authority (GRCA) have completed a study of the Cedar Creek subwatershed - partially located in the City of Kitchener and the Township of North Dumfries. This study is intended to guide and coordinate decision making by the Region, area municipalities, the GRCA and others involved in development planning, subwatershed stewardship and restoration.

Eden Creek: The RFP notes “potential urbanization of lands framing the Northumberland Street corridor, extending from Greenfield Road to Highway No. 401”. Some of these lands drain to Eden Creek which has been mapped as cold water. A subwatershed study has not been completed for Eden Creek.

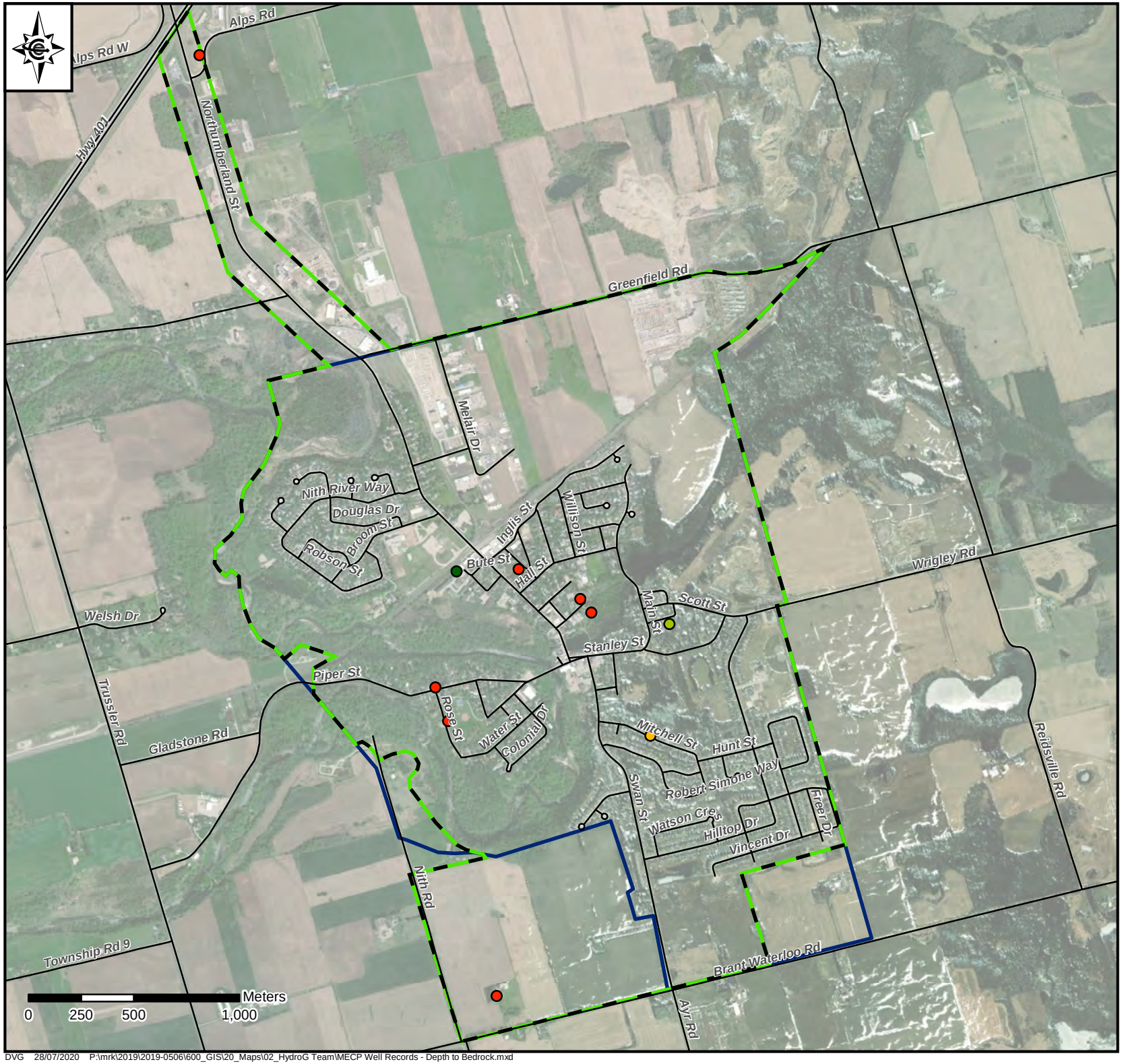
GRCA maintains a flow gauge on the Nith River at Ayr (see **Figure 3-4**).

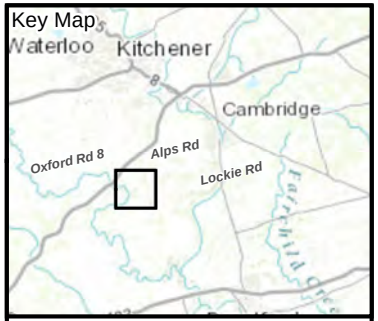
The **Table 3.1** identifies the critical flows in the Nith River at Ayr.

Table 3.1 Critical Flows in Nith River at Ayr

FLOW (M^3/S)	SIGNIFICANCE
2.6	Normal summer flow
110	Water at banks; low-lying areas flooded
142	Water on parking lots behind Northumberland St.
Up to 200	Warning Zone 1
226	Water at rear doors behind Northumberland St.
200-300	Warning Zone 2
300-400	Warning Zone 3
400-600	Warning Zone 4
600-800	Warning Zone 5

Source: https://apps.grandriver.ca/waterdata/kiwischarts/rf_nithriver.aspx





Legend

- Approximate Study Boundary
- Municipal Boundary

MWs - Depth to Bedrock (mbg)

- < 3
- 16.8
- 31.4
- > 50

Figure 3.3
Ayr Township Depth to Groundwater Map

Township of North Dumfries
Storm Water Management
Guiding Principles

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DVG 28/07/2020 P:\mrk\2019\2019-0506\600_GIS\20_Maps\02_HydroG Team\MECP Well Records - Depth to Bedrock.mxd

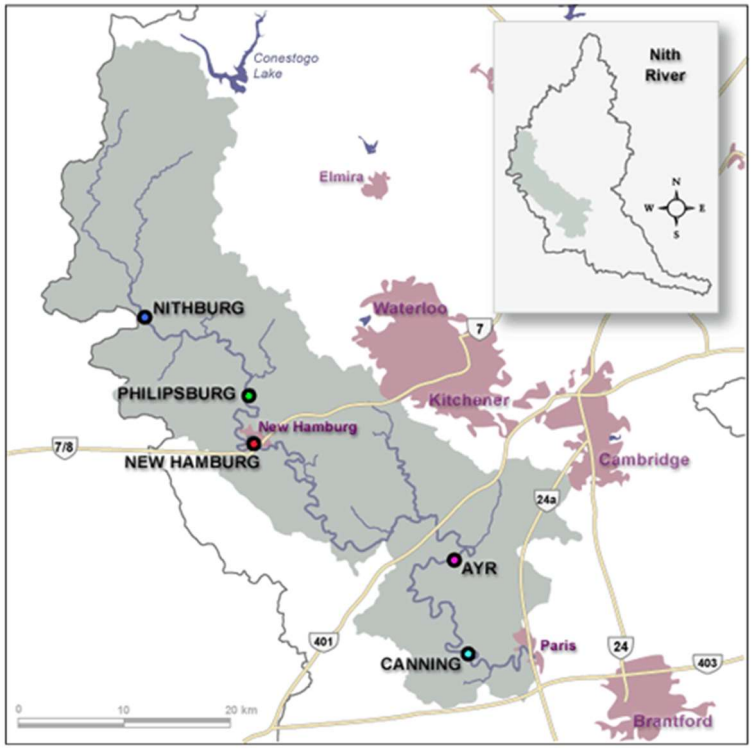


Figure 3-4 Location of Flow Gauges in the Nith River

3.3.2 Wetlands

The need for site visits with GRCA staff at detailed design will depend on the potential for direct impacts on regulated wetland features and the need to verify wetland boundaries. On-site delineation and verification of wetland boundaries at detailed design will be required.

The GRCA's wetland mapping layer should be reviewed in conjunction with the evaluated and unevaluated wetland layer maintained by the Province.

There is at least one minor wetland mapping discrepancy west of Northumberland Street and south of the RR Tracks. A site visit during the appropriate time of year may be needed to confirm the limits of this wetland. It also appears that a stormwater outlet/outfall has been constructed recently on the north edge of this wetland. It would be helpful to identify any wetlands that have been or could potentially be altered in any way for stormwater management purposes. Wetlands that are now considered to be part of the Township's stormwater management infrastructure should be identified as part of this EA.

The MNRF has mapped one unevaluated wetland, east of Swan Street and south of Hilltop Drive. This small wetland is not currently mapped by the GRCA but is considered a regulated wetland. Depending on the outcome of the EA, a site visit during the appropriate time of year may be needed to confirm the presence or absence of this wetland.

3.3.3 GRCA Context

In addition to the floodplains in the Village of Ayr, there are other areas within the study area that are regulated by the GRCA under Ontario Regulation 150/06. The study area is traversed by the Nith River and Cedar Creek and their associated floodplains and areas of steep valley/erosion hazard slopes. Other smaller tributaries of the Nith River are also located within the study area. Further, there are both Provincially Significant Wetlands and other wetlands and their regulated

allowances within the study area. Any future development/site alteration within these regulated areas would require the prior issuance of a GRCA permit pursuant to Ontario Regulation 150/06.

The GRCA owns several properties within the study area. The Reinhart, Rear, and Ayr Floodplain properties are 3 of the GRCA's larger landholdings within the study area. Jedburgh and Watson Ponds are part of the GRCA's Upper Mill Pond Property. The GRCA also owns and operates the dam structure on Jedburgh Pond. As such, GRCA property staff may have further comments as the study progresses.

3.4 Municipal Infrastructure

3.4.1 Inventory of Stormwater Management Facilities (SWMFs)

The existing SWMFs in the Township were inventoried by IBI Group as part of this study. The following **Table 3.2** provides information about each of the existing SWMFs, while **Figure 3-5** shows the locations.

There are two (2) oil and grit separator (OGS) systems located on Northumberland St, which are both privately owned. These were installed in 2007 and 2018, identified as SMWF #2 and SWMF #1, respectively. SWMF #2 discharges to the Nith River while SWMF #1 discharges to a low-lying area and ultimately a wetland. For the Porter OGS, the manufacturer recommended cleanout when the 3rd chamber starts to fill up. It is usually a minimum requirement that an OGS is cleaned every couple of years.

Of the six (6) ponds listed in **Table 3.2**, Robert Simone Pond/4/5 have been built in the last 15 year and are currently privately owned. Based on their respective ECA (refer to **Appendix C**), the design criteria are as follows:

- Robert Simone Pond – Enhanced Level of quality and quantity control of 2mm to Regional Storm events (including 100-year) post development flows to predevelopment flows
- Vincent Drive Pond – Enhanced Level of quality and quantity control of 2mm to Regional Storm events (including 100-year) post development flows to predevelopment flows
- Legacy Pond – Enhanced Level water quality protection and erosion control, and to attenuate port-development peak flows to pre-development peak flow for all storm events up to and including the 100-year storm event, discharging to Nith River

Only Robert Simone Pond was inspected and appeared in good condition. These three (3) ponds will be assumed by the Township.

Valley View Pond, Hunt Street Pond, and Main Street Pond are older ponds now assumed by the Township. There are similarities with these ponds as they do not appear to have been maintained much over their lifetime. All three (3) of these ponds have dense vegetation which appears to be growing wild.

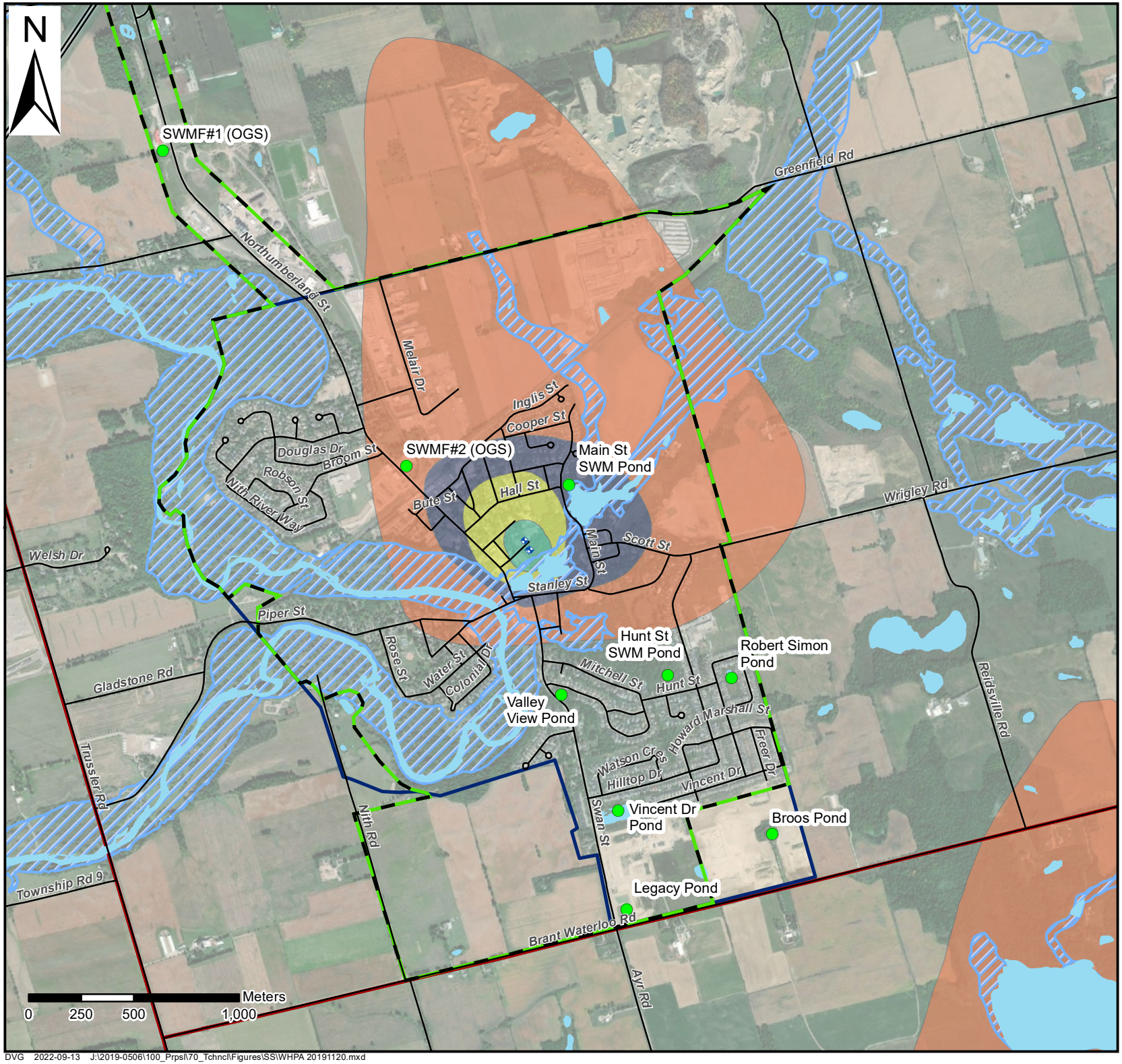
- Valley View Pond is an on-line pond which had a low flow channel running through it at the time of inspection. It appears to provide attenuation before being discharged through a long culvert and into the Nith River.
- Hunt Street Pond is a dry-pond which had no water in it at the time of inspection. There is mild sediment accumulation at outlet.
- Main Street Pond is a dry-pond which had no water in it at the time of inspection. There is mild sediment accumulation at outlet.
- Jedburgh and Watson Ponds are part of the GRCA's Upper Mill Pond Property.

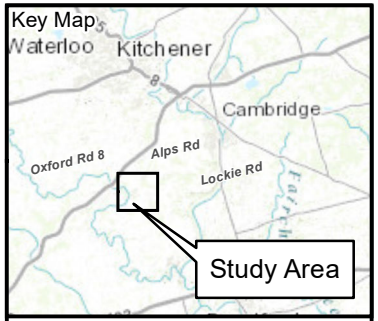
Further details of the inspections along with inlet/outlet conditions of these ponds can be found in **Sections 4.5.2** and **6.4.2.3**

Table 3.2 Existing SWMF Information

TOWNSHIP DESIGNATION	OGS OR POND	ECA, ISSUE DATE	LOCATION	OWNER/OPERATOR	TARGET VOLUMES / ID UNIT DESIGNATION
	OGS	6433-AYjRF4 June 6, 2018	1202 Northumberland Street	Grand Castle Corp. 18 Adelaide St Maxville PO Box 100 North Glengarry, ON K0C 1T0	Porter's 4090 Litres, three chamber, pre-cast concrete inceptor
	OGS	1985-77WJNA October 23, 2007	Northumberland Street Reconstruction, 173 to 1107 Northumberland Street, Waterloo City Owned by Region of Waterloo	The Regional Municipality of Waterloo 150Frederick St 6th Floor Kitchener, ON N2G 4J3	sediment capacity of 26945 litres; oil capacity of 3930 litres; a total holding capacity of 31285 litres and a maximum treatment flow rate of 70 litres per second
Robert Simone Pond	Pond	0522-6U8PDG November 15, 2006 4689-A8ZLNZ June 29, 2016	Hilltop Subdivision, Stage 3 Lot 33/34, Concession 7 North Dumfries Township Inside Robert Simone Way (all four sides)	828543 Ontario Inc. 1919 Albian Rd Toronto, ON M9Q 6J9	- 8.6ha - a constructed wetland located on Block 106, east of Marten Crescent, complete with a forebay with approximately 1,042cu.m. in permanent, 447cu.m. of extended detention and a total storage volume of 9,324cu.m., complete with, - one (1) 110mm and one (1) 400mm diameter vertical orifices located in a 1500mm diameter perforated riser to discharge into a 600mm diameter outlet pipe to drain into Municipal storm drainage manhole MH61 on Hunt Street, - a 2.4m. wide by 2.0m deep, 300m long infiltration gallery around the periphery of the wetland complete with 300mm diameter perforated pipe and 20mm to 50mm diameter clear stone, - a 4m wide by 150mm deep overflow spillway, protected with rip-rap to discharge stormwater flow west onto the Hilltop Drive, in case of blockage of all outlets during severe storms, - 1.0m deep, varying width, approximately 465m long infiltration galleries located at the backyard of the residential area as shown on drawings, complete with 150mm diameter perforated pipe and 20mm to 50mm diameter clear stone,
Vincent Drive SWM Pond	Pond	0522-6U8PDG November 15, 2006	Hilltop Subdivision, Stage 3 Lot 33/34, Concession 7 North Dumfries Township	828543 Ontario Inc. 1919 Albian Rd Toronto, ON M9Q 6J9	- 38.72 ha - a constructed wetland located on Blocks 39 and 33, located at east of Swan Street, complete with two forebays with approximately 4,840cu.m. in permanent, 6,800cu.m. of extended detention and a total storage volume of 74,541cu.m., complete with, - one (1) 195mm and one (1) 250mm diameter vertical orifices located in a 1800mm diameter perforated riser to discharge into a 525mm diameter outlet pipe to drain into the existing Valleyview Stormwater Management Facility ultimately discharging to the Nith River, - one (1) 10m wide 750mm deep trapezoidal overflow spillway to discharge to Swan Street side ditch to Nith River,
Vincent Drive Pond	Pond	4689-A8ZLNZ June 29, 2016 Amendment to ECA 0522-6U8PDG	Broos Property Phase 1 Lot 32 and 33, Concession 7 Township of North Dumfries, County of Wellington	2081788 Ontario Corporation 2 Prince Edward Rd Woodstock, ON M4V 1G7	Expansion of Storm Water Management Works to service Hilltop Community Subdivision and Broos Property for enhanced level of quality and quantity control of 25 millimetres to Regional Storm events (including 100-year) post development flows to pre-development flow rates consisting of the following: Proposed Works Facility 'B' (catchment area of 29.8 hectares (interim) 30.3 hectares (ultimate) of development and 39.1 hectares (interim), 30.8 hectares (ultimate) external undeveloped area): a constructed wetland located on Blocks 39 and 77, located at east of Swan Street, complete with two (2) forebays with approximately 3055 cubic metres in permanent, 4926 cubic metres (interim) and 2763 cubic metres (ultimate) of extended detention and a total storage volume of 76118 cubic metres (interim) and 60216 cubic metres (ultimate), complete with: one (1) 195 millimetre, one (1) 250 millimetre, one (1) 450 millimetre diameter vertical orifices located in a 1800 millimetre diameter perforated riser to discharge into a 525 millimetre diameter outlet pipe to drain into the existing Valleyview Stormwater Management Facility ultimately discharging to the Nith River, one (1) 10 metre wide 500 millimetre deep trapezoidal overflow spillway to discharge to Swan Street side ditch to Nith River, 0.7 metre deep, 1.5 metre wide, approximately 445 metre long infiltration gallery located along the lots 1-28, complete with 150 millimetre diameter perforated pipe and 50 millimetre diameter clear stone, 0.7 metre deep, 1.5 metre wide, approximately 172.7 metre long infiltration gallery located along the rear yards of blocks 32-46, complete with 150 millimetre diameter perforated pipe and 50 millimetre diameter clear stone; 0.7 metre deep, 1.5 metre wide, approximately 172.7 metre long infiltration gallery located along the rear yards of blocks 47-58 and 78-85, complete with 150 millimetre diameter perforated pipe and 50 millimetre diameter clear stone;
Legacy Pond	Pond	5264-BATK97 May 2, 2019 5264 BATK97	Legacy Estates Subdivision (Previously Hilltop Estate Subdivision Stage 4) 895 Brant-Waterloo Rd Township of North Dumfries, Regional Municipality of Waterloo, Ontario N0B 1E0	839658 Ontario Inc. 1919 Albion Road Toronto, ON M9W 5S8	Establishment of stormwater management works to serve the proposed Legacy Estates Subdivision development, located at 895 Brant-Waterloo Rd, in the Township of North Dumfries, Regional Municipality of Waterloo, for the collection, transmission, treatment and disposal of stormwater runoff from a total catchment area of 25.4 hectares, to provide Enhanced Level water quality protection and erosion control, and to attenuate post-development peak flows to pre-development peak flows for all storm events up to and including the 100-year storm event, discharging to Nith River. Facility consisting of the following: stormwater management facility (catchment area 25.4 hectares): one (1) constructed wetland with a 1.5 metre deep sediment forebay, located immediately adjacent to the intersection of Swan Street and Brant-Waterloo Road, having a permanent storage volume of approximately 2,035 cubic metres, an extended detention volume of approximately 1,016 cubic metres, and a total active storage volume of approximately 19,775 cubic metres at an active storage depth of 2.0 metres (elevation 296.0 metres), complete with one (1) inlet structure at the northwest corner, consisting of a 1200 millimetre storm inlet pipe and a concrete headwall, one (1) 20.0 metre wide emergency overflow weir, one (1) 3.0 meter wide access road, and one (1) outlet structure at the southwest corner, consisting of a 1,200 millimetre diameter perforated CSP riser, a 150 millimetre diameter orifice and a 600 millimetre outlet pipe, discharging to the Mitchell Drain via the orifice and a cooling trench along the perimeter of the constructed wetland during low flows and the outlet pipe/orifice during higher flows, allowing a maximum discharge of 0.81 cubic metres per second under the 100-year storm event to the Mitchell Drain;
Valley View Pond	Pond	Unknown	Intersection of Swan Street and Mitchell Street	Ayr	Directly upstream of the Mitchell Drain.
Hunt Street Pond	Pond	Unknown	Northwest of Hunt Street and Hilltop Drive	Ayr	Large dry pond capturing water from surrounding rear lots. Outlet is corrugated vertical perforated pipe in the direction of Nith River. Vegetation is overgrown and very dense is some places. The concrete inlet with flow dispersion blocks presumable receives stormwater from Hunt Street. There is erosional scarring directly downstream of the invert.
Main Street Pond	Pond	Unknown	Northeast of Main St and Hall St	Ayr	Dry pond provides some flood and erosion control with inputs from Main Street CBs. Likely outlets to Jedburgh Pond through hickenbottom device.
Broos Pond	Pond	1549-C73QUT	Free Drive	n/a	Future pond. stormwater management facility (catchment area 23.29 hectares, 60.5% imperviousness): one (1) constructed wetland with a rip-rap lined inlet micropool at the northwest end and two (2) dividing berms for extending the flow path, located at the southeast corner of the site, having a permanent pool volume of 2,088 cubic metres, an extended detention volume of 4,360 cubic metres and total storage volume of 13,411 cubic metres for the 100- year storm, including two (2) inlet pipes located

TOWNSHIP DESIGNATION	OGS OR POND	ECA, ISSUE DATE	LOCATION	OWNER/OPERATOR	TARGET VOLUMES / ID UNIT DESIGNATION
Broos Pond (cont'd)					at the northwest end of the wetland having diameters of 1,050 millimetres and 750 millimetres each within a concrete headwall, an outlet micropool at the southeast end, a water quality/ extended detention outlet consisting of a 300 millimetre diameter reverse sloped pipe with a 90 millimetre diameter orifice and storm sewers approximately 30 metres in length, discharging to the proposed storm sewers on Brant-Waterloo Road, a water quantity outlet consisting of twin 600 millimetre diameter pipes within a concrete headwall and a 1.8 metre wide concrete emergency overflow weir, discharging to the proposed drainage channel along the north side of Brant-Waterloo Road;





Legend

- SWM_Facility
- Monitoring Well
- Approximate Study Boundary
- Municipal Boundary
- Watercourse
- Regulatory Floodplain

Wellhead Protection Area

- A
- B
- C
- D
- E

Figure 3.5
SWM Facilities Locations

Township of North Dumfries
Storm Water Management
Guiding Principles

IBI

Project No.:	Date:
2019-0506	September 2022

DVG 2022-09-13 J:\2019-0506\100_Prpsl\70_Tchncl\Figures\SS\WHPA 20191120.mxd

3.4.2 Catch Basins/Roadside Ditches

Typically, to assess the existing capacity of a municipal storm drainage system, IBI Group would develop a hydrologic model using PCSWMM or Rational Method. Given that no storm sewer documentation is available, and, instead, local drainage is handled by pervious catchbasins, this approach is not feasible.

However, the following tasks could be completed:

- Overland flow pathways and conduits will be developed based on review and processing of the available LiDAR dataset obtained from Region of Waterloo.
- Inlet capture capacities will be based on available information sources such as MTO's Drainage Manual; supplemented by field reconnaissance by IBI Group staff to confirm the catchbasin grate types currently in place.
- Surface runoff catchment areas draining onto roadways or into specific inlets will be delineated within the available mapping and LiDAR information, with catchment imperviousness based on available land-use mapping supplemented by sampling of selected representative areas using the available aerial photography.

The critical limitation on outflow from the catchbasin is the percolation rate of the underlying soils. Sandy soils tend to have high percolation rates while clay soils have the lowest. The hydraulic properties of the soil determine how well it will drain, however as runoff carries particulates into the catchbasin, this can further impede the flow. Once the soil reaches saturation and the catchbasin exceeds capacity, local flooding can occur.

For comparison, for a Single OPSD 400.01, 400.03 CB, the inlet capacity at 0.30m depth is $0.2m^3/s$; for a double, $0.4m^3/s$. The typical interior dimensions of a single CB is 600mm x 600mm = $0.36m^2$. Utilizing an infiltration rate of 210mm/hr (0.21m/hr), which is typically associated with well-draining sand, yields a maximum infiltration rate of:

$$0.21m/hr \div 3600\ s/hr = 6x10^{-5}m/s.$$
$$6x10^{-5}m/s \times 0.36m^2 = 0.000021m^3/s = 0.021\ l/s.$$

Consequently, IBI Group would recommend that infiltration systems be explored to provide sufficient storage to allow for drawdown of the design storm over 24-48 hours.

Five (5) areas were identified by the Township as having issues with flooding. See **Appendix D** for maps showing these locations.

3.5 Summary of Future Development Areas and Constraints

The following **Table 3.3** summarizes the existing condition of the Future Development Areas.

Table 3 3 Summary of Future Development Areas

DEVELOPMENT AREA	TERRESTRIAL HABITAT	SWM POND/OUTLET FEASIBLE?	SPECIAL POLICY AREA?	OTHER CONSTRAINTS
A	fallow field with mowed grass. It slopes from Northumberland Road towards the rail tracks. There is a fencerow of mature trees of mixed species between the mowed field and the houses.	Could either be sent to Northumberland St. sewer system, if available. Also an option to discharge to oxbow lake of Nith River west of Northumberland St.	SPA 2.7.11	
B	currently under construction for a housing development. It is unclear whether any space will remain for stormwater management, or if this has already been incorporated into the development underway. West of the area, there are mature coniferous trees and then the landscape slopes steeply towards the Nith River	Potential to discharge at oxbow lake of Nith River directly north of development area.	SPA 2.7.9	
C	not easily visible from the road but appears to be an agricultural field that was most recently used for corn. The area adjacent to the railroad appears to have been filled with some gravel and rock material.	There could be space for a pond or other infiltration measures.	SPA 2.7.7	
D	an aggregate pit that appears to be in the process of reclamation. The entire area is barren soil, with some pooled water in the low points. There are some mature trees between Wrigley Road and the former pit.	Potential to discharge into Cedar Creek.		
E	mostly agricultural fields, but there are stockpiles of aggregate material and an old house with associated outbuildings. There is also a small vegetated area just west of the house. The field to the west of the house was most recently in corn and the field to the east of the house was most recently in wheat, although the crop appears to be older and may not have been planted in 2019. The Charlie Creek is on the south side of Brant-Waterloo Road, flowing to the east.	There could be space for a pond or other infiltration measures. Potential outlet to Charlie Creek to the east.	SPA 2.7.9	
F	larger area which is made up of a few sections of agricultural land. Most of the fields were most recently in corn production. There is a fencerow of mature trees that splits the fields in a northerly direction and mature trees between the fields and the roads. There is a large house in the eastern field, surrounded by trees. Another old farmhouse is in the western field, where there is a small horse pasture, a small pond surrounded by wetland and a small wetland near Brant-Waterloo Road. Mature trees also line the drive up to the house and around the house and associated outbuildings.	Nith River is directly north of the development area.		

4 Analysis and Assessment of SWM System

4.1 Land Use Changes

A description of existing land use can be found in **Section 3**. It is anticipated that low to medium density residential development will occur in the future development areas.

4.2 Phosphorus Loading

The GRCA doesn't have a tool for assessing pre and post development TP. GRCA recommends using well-established modeling tools in conjunction with a robust monitoring program to identify changes from pre-development conditions. A detailed assessment of future development is beyond the scope of this document, but IBI Group recommends that detailed assessments be carried out during the detailed design phase.

At present, GRCA does not have specific, approved phosphorus loading coefficients. In our sample analysis, we have utilized average values from the NVCA P Tool, Appendix A, Table 6 Phosphorus (P) Export for Nottawasaga River Subwatersheds Derived from CANWET Modeled Phosphorus Loads and Land Use Areas (refer to **Appendix E**). GRCA should be contacted to determine applicable targets, etc.

At detailed design, pre- and post-development P loadings should be calculated using a similar method, along with the required Best Management Practices (BMPs) to meet GRCA targets. In the example, a zero net increase in P loadings target has been assumed for illustrative purposes.

For example, for a 10ha hay/pasture redeveloped into a High Intensity Residential use, the existing P load is 1.15kg/year, while unmitigated post development P load is 13.2kg/year. Therefore, BMPs are required to removed 13.20 – 1.15 = 12.05kg/year of P.

In the sample calculations provided, three BMPs in series (bioretention system, infiltration system, and a wet pond) provide for 12.01kg/year, leaving 1.19kg/year total P loading. Additional measures, or potentially higher removal rates than assumed could achieve the balance.

4.3 Water Budget

4.3.1 Site Water Balance

A water balance provides for an accounting of water transfers across a defined system's boundaries over a defined time period. Any difference between the inflows to the system and the outflows from the system during this time period must be balanced by a change of storage within the system. In designing infiltration targets for a defined area, the approach is modified through the introduction of mitigation measures, best practices or Low Impact Development tools to maintain align inputs and outputs to pre-development levels.

4.3.1.1 General

Natural consequences of urban development include a reduction in groundwater infiltration, diversion of this infiltration towards surface water bodies as runoff, altered flow regimes and channel erosion. Infiltrating rainwater also plays an important role in the protection of surface water and groundwater quality, as the percolation through soil pores acts as a natural filter to contaminants. An increased volume of runoff impacts erosion potential of receiving streams and an increased contaminant load to surface water bodies are common hydrologic consequences in the urban water cycle.

Development within the identified settlement areas in Ayr will organically increase the impervious cover across the Community. Impervious cover consists of pavements in the form of roadways,

sidewalks, driveways and parking lots, as well as building rooftops. For the purposes of the SWMGP, impervious cover has been assumed to be 75% in a post-development scenario in all of the settlement areas.

4.3.1.2 Background

Ayr is a Community that is bisected by two (2) distinct physiological settings. Much of the southern half of the municipal and Study Area boundaries lie on finer-grained till moraines, while the northern half of the Community lies with coarse-grained sediments deposited by glacial spillways. Due to the distinct differences in the resulting surficial geology, stormwater management considerations should be adjusted to best suit the area.

An underlying soils map can be found in **Figure 3-1**.

4.3.1.3 Methodology

A site scale water balance analysis for each area was completed following the Thornthwaite and Mather water balance method outlined in *Chapter 3* of the Ministry of Environment's ("MOE"s) *Stormwater Management Planning and Design Manual* (MOE, 2003). The water balance method estimates evapotranspiration, infiltration, and runoff volumes based on soil type, vegetation cover, topography, and precipitation.

The Roseville station (ID# 6147188) is the closest meteorological station to the Site. Therefore, the climate normal data from this station in the most recent year with complete data, 2018, and the 30-year climate normal data between 1981 and 2010 were obtained from Environment Canada and used in the water balance analysis.

The 2018 data was compared with the climate normal data from this station between 1981 and 2010 and the differences were minor. An 8 degree average daily temperature and 904.9mm of total annual precipitation in 2018 compared with a 7.3 degree average daily temperature and 918.8mm of total annual precipitation using the 30-year climate normal. The 2018 data was selected to better represent the effects of climate change moving forward.

The monthly mean temperature and monthly precipitation data were used in the Thornthwaite and Mather Equation to estimate the monthly potential evapotranspiration. The estimated monthly potential evapotranspiration was adjusted using a daylight correction value to account for varying length of daylight throughout the year.

The precipitation surplus (amount of water available to infiltrate or runoff) was estimated by calculating the difference of the yearly precipitation and potential evapotranspiration. Infiltration was estimated by multiplying a set of infiltration factors (dependent on the topography, soil type and land cover) to the estimated precipitation surplus.

Impervious percentages for the pre-development and post-development scenarios were estimated by measuring the total impervious areas (including surface parking, concrete surfaces, walkways and road surfaces) across the Site. The estimations of pre-development pervious area are based on readily available aerial photographs and mapping, while the post-development pervious area has been assumed and held constant at 25%. The water balance will need to be refined at individual site-level when site plan designs are available. In the post-development scenario, evapotranspiration has been assumed to be 20% of precipitation.

The infiltration factor for each area was selected from Table 3.1 in the MOE's *Stormwater Management Planning and Design Manual* (MOE, 2003) based on the summation of various factors (topography, soil type and land cover).

4.3.1.4 Results Summary

A summary of the key water balance elements for each area is presented in **Table 4.1** through **Table 4.6** below.

A reduction in infiltration is observed in all scenarios in the post-development scenario, resulting in significant increased runoff to the Nith River and other surrounding surface water bodies. Based on the calculations, the largest impact is observed in Area C with the smallest anticipated impact occurring in Area B.

Area A

Table 4.1 Area A – Water Balance

ELEMENT (M^3/YEAR)	PRE-DEVELOPMENT (M^3/YEAR)	POST-DEVELOPMENT (M^3/YEAR)	CHANGE (M^3/YEAR)	CHANGE (%)
Precipitation	37,553	37,553	-	-
Evapotranspiration	20,801	11,548	-9,253	-44.5
Infiltration	11,383	2,779	-8,604	-75.6
Runoff	5,369	23,227	17,857	332.6

Area B

Table 4.2 Area B – Water Balance

ELEMENT (M^3/YEAR)	PRE-DEVELOPMENT (M^3/YEAR)	POST-DEVELOPMENT (M^3/YEAR)	CHANGE (M^3/YEAR)	CHANGE (%)
Precipitation	14,338	14,338	-	-
Evapotranspiration	6,986	4,113	-2,873	-41.1
Infiltration	3,550	1,314	-2,236	-63.0
Runoff	3,852	8,961	5,110	132.7

Area C

Table 4.3 Area C – Water Balance

ELEMENT (M^3/YEAR)	PRE-DEVELOPMENT (M^3/YEAR)	POST-DEVELOPMENT (M^3/YEAR)	CHANGE (M^3/YEAR)	CHANGE (%)
Precipitation	84,156	84,156	-	-
Evapotranspiration	46,065	25,879	-20,186	-43.8
Infiltration	26,891	6,227	-20,664	-76.8
Runoff	8,414	52,050	43,636	518.6

Area D

Table 4.4 Area D – Water Balance

ELEMENT (M^3/YEAR)	PRE-DEVELOPMENT (M^3/YEAR)	POST-DEVELOPMENT (M^3/YEAR)	CHANGE (M^3/YEAR)	CHANGE (%)
Precipitation	120,985	120,985	-	-
Evapotranspiration	68,778	36,437	-32,341	-47.0
Infiltration	36,433	8,229	-28,204	-77.4
Runoff	15,124	74,648	59,524	393.6

Area E

Table 4.5 Area E – Water Balance

ELEMENT (M^3/YEAR)	PRE-DEVELOPMENT (M^3/YEAR)	POST-DEVELOPMENT (M^3/YEAR)	CHANGE (M^3/YEAR)	CHANGE (%)
Precipitation	210,118	210,118	-	-
Evapotranspiration	127,053	63,281	-63,772	-50.2
Infiltration	35,302	9,760	-25,542	-72.4
Runoff	47,762	137,077	89,315	187.0

Area F

Table 4.6 Area F – Water Balance

ELEMENT (M^3/YEAR)	PRE-DEVELOPMENT (M^3/YEAR)	POST-DEVELOPMENT (M^3/YEAR)	CHANGE (M^3/YEAR)	CHANGE (%)
Precipitation	752,243	752,243	-	-
Evapotranspiration	454,864	226,552	-228,311	-50.2
Infiltration	89,214	33,455	-55,759	-62.5
Runoff	208,166	492,236	284,070	136.5

The detailed inputs and calculations for each area are included as part of **Appendix F**.

4.3.1.5 Infiltration Deficit Summary

Based on the results of the water balance exercises presented above, the following targets should be met at site-level with regards to future development within each area:

COMMUNITY	AREA (HA)	INFILTRATION DEFICIT (M^3/YEAR)
Area A	4.15	8,604
Area B	1.59	2,236
Area C	9.30	20,664
Area D	13.37	28,204
Area E	23.22	25,542
Area F	83.13	33,455

Based on the analysis, a general increase in runoff will occur during the post-development condition with a reduction in infiltration. These areas will require the implementation of BMPs in an integrated treatment approach to mitigate the loss of infiltration from the proposed changes in land use. It should be noted that specific mitigation measures are to be confirmed on a site-specific basis at the functional design stage.

4.3.2 Natural Features Water Balance

GRCA recommends that potential net change on hydrologic water balance and pollutant loadings to natural features such as watercourses and wetlands be assessed. Similar to the Community of Ayr itself, parts of the Grand River watershed require 100% infiltration and others are entirely underlain with clay soils with limited to negligible infiltration.

A priority for GRCA is to identify the hydrologic nature of its natural features and how each feature is supported by the hydrologic cycle, that is whether it is supported through infiltration and groundwater-fed or a runoff depression. A stormwater management solution that works backward from this is often the preferred approach for GRCA, with the goal to ultimately maintain the existing function of the natural feature in a post-development scenario.

A detailed water balance is outside of the scope of this SWMGP, however detailed assessments should be made at site-level as part of the development process for all identified natural features that may be impacted by development, as determined through an Environmental Impact Study. At minimum, an existing conditions monitoring program should be completed at a monthly resolution to understand the natural hydrologic inputs and outputs for each feature.

In consultation with GRCA, individual watercourse and wetland goals and targets should be established, consistent with other targets and objectives determined through watershed studies, subwatershed studies and other relevant studies.

The effectiveness of a SWM Facilities is measured against the criteria that it was designed to achieve. Regular maintenance is also necessary to provide continued effectiveness throughout its lifetime. A SWMF which will have the greatest chance of maintaining successful levels of effectiveness when the design has accounted for climate change. This section discusses the effects of climate change and investigates areas of concern.

4.4 Climate Change

Climate change refers to the long-term trend in the change of the world's weather patterns, including changes in average temperature and rainfall distribution. Stormwater runoff is intrinsically a function of rainfall, therefore change in the intensity, duration, and frequency of rainfall events has an impact on runoff, and the response of stormwater systems. Aquatic habitat health is also linked to temperature. The impacts of unmitigated climate change on storm infrastructure will be assessed.

For this Study, Station G6140954 (in the Grand River Region) was used as a basis for comparison, then modified the existing Ayr IDF curves by applying the percent change in rainfall intensities used in Sta G6140954. These were used to develop updated IDF curves for the 5-year and 100-year return periods for future conditions. Then, the effects of climate change on conveyance systems were assessed by comparing future rainfall intensities to existing, specifically, comparing the 5-year intensities with an inlet time of 10 minutes, as these are representative of minor system conveyance structure requirements.

The potential effects of climate change on rainfall intensity-duration-frequency (IDF) statistics across southern Ontario have been explored by various researchers. The MECP has created the Ontario Climate Change Data Portal (http://ontarioccdp.ca/) that provides project changes in air temperature statistics and rainfall IDF curves for a set of 25km x 25km map grid squares that cover the Province. This provides a valuable resource of information that can be used to assess the potential impacts of increased frequency or intensity of heavy rainfall within and around Ayr. The future IDF curves were extracted from the OCCDP and applied using the Modified Rational Method. One issue is what change might be expected in the magnitude of the 100-year rain event and resulting impact on local flooding issues and stormwater system capacity.

Based on the Final MTO Report, Station G6140954 (Brantford) the IDF curves (Figure A9 and Figure A10 in **Appendix G**) are for the two periods 1961-1980 and 1981-2000 respectively. It appears from the results in Table A1 and Table A2 (in **Appendix G**) that for the same duration and return periods, the precipitation intensity has increased from the 1961-1980 to the 1981-2000 time period.

A comparison of the 24-hour duration precipitation at the station G6140954 is shown in **Table 4.7**, below, and Figure 5 (in **Appendix G**) for the two time periods 1961-1980 and 1981-2000. The

4.7% increase in the 2-year precipitation and the 20.1 % increase in the 100-year precipitation between the two periods show how the intensity of observed precipitation increased in the recent years.

Table 4.7 Observed 24-Hour Precipitation (mm) Comparison for 1961-1980 and 1981-2000 at Station G6140954

RETURN PERIOD (YEARS)	2	5	10	20	50	100
1961-1980	50.7	62.1	69.7	77.0	86.4	93.5
1981-2000	53.0	68.9	79.4	89.5	102.5	112.3
Change	4.7	10.9	13.9	16.2	18.6	20.1

Source: Final MTO Report

In this case, only the meteorological station G6140954 (Brantford) is used. By applying the rational method and the Manning equation, the changes in the estimated pipe diameter as compared with the current pipe diameter (see MTO report Figure 23 in **Appendix G**). Table 16 (in **Appendix G**) summarizes the changes (in percentage) in the pipe diameter by 2050s and 2080s as compared to current design standards. It appears that for the commonly used 10-year drainage system, the pipe diameter should be increased by about 9% and 14.5% by 2050s and 2080s respectively in order to maintain the present level of operational capability. In comparison to the Ayr analysis using the existing IDF curve, a similar increase in pipe diameter was found relative to future years of 2050 and 2080. This is an important consideration when replacing old, or installing new, conveyance systems.

Table 4.8 shows an example comparison of current pipe sizes with what is needed for future pipes to convey the anticipated flows of 2050 and 2080.

Table 4.8 Comparison of Pipe Size with Future Flows

EXAMPLE CURRENT PIPE DIAMETER (MM)	2050 PIPE DIAMETER (MM)	2080 PIPE DIAMETER (MM)
450	500	525

The anticipated increase in rainfall due to climate change also means a greater probability that flooding will occur in areas with outdated drainage systems. One example of an area that has already experienced flooding is at Newel St and Willison St. An analysis of the drainage area found it to be 8.4 acres. A general rule is that there should be 1 catch basin (CB) per acre of drainage. There are currently 4 CBs in the area which means there is less than half the CBs generally required for a drainage area of this size.

The photograph below in **Figure 4-1**, taken by a local resident, shows the intersection completely inundated after a storm in August of 2016.

Figure 4-1 Photograph of Flood Event from August 25, 2016

Figure 4-2 Photograph of Erosional Scour at Inlet of Hunt Street Pond

4.5 Erosion Areas of Concern and Recommendations

The RFP set out clear requirements about identifying existing erosion sites (by creek reach). This will feed into evaluating level of risk to public health and safety and environment, and alternatives for restoration. Refer to **Appendix H** for Erosion Inventory and Assessment information.

4.5.1 By Creek Reach

As per the RFP, this task consists of identifying erosion sites (by creek reach), evaluate risk to public health and safety and environment, identify alternatives for restoration, and provide estimates of associated costs. Identify priority erosion sites along Township watercourses which may pose a risk to public health and safety and environment and develop a restoration plan to address the erosion sites.

Based on the field work, IBI Group has identified the following as potential safety hazards that should receive the highest priority in repairs.

Table 4.9 Erosion Assessment Safety Hazard Ratings

PTID	SECTION	SEVERITY RATING	EROSION TYPE	NORTH	EAST	ELEV
1	NITH 1-1	4 - Safety Hazard	Bank undercutting	4793696.068	543169.087	284.412
8	NITH 2-1	4 - Safety Hazard	Bank undercutting	4793006.950	543027.407	282.014
21	TRIB 2-2	4 - Safety Hazard	Active erosion	4793083.084	544818.674	287.175
23	TRIB1-2	4 - Safety Hazard	Bank undercutting	4792734.464	544681.583	282.356
25	TRIB1-2	4 - Safety Hazard	Bank undercutting	4792718.808	544461.634	279.964
31	TRIB1-1	4 - Safety Hazard	Structural damage-bridge	4793476.175	545293.981	287.849
37	NITH 4-1	4 - Safety Hazard	Bank undercutting, Log debris jam	4792178.583	544501.532	278.906
38	NITH 4-1	4 - Safety Hazard	Bank undercutting, Log debris jam	4792248.911	544508.290	278.879
39	TRIB 1-2	4 - Safety Hazard	Bank undercutting	4792717.157	544638.685	283.670
48	NITH 5-1	4 - Safety Hazard	Active bank erosion	4792369.472	543892.977	n/a*
50	NITH 5-1	4 - Safety Hazard	Structural damage-bridge	4792503.588	543594.352	n/a*

4.5.2 By Pond Outlet

During IBI Group's site walks, a few areas of erosion concern were noted. One of the most significant was the inlet to Hunt Street Pond where scouring has dug out a plunge pool as water enters the pond. As time goes on, the erosional scarring is only expected to worsen.

The outlet at Valley View Pond also shows some signs of deteriorating, particularly at the invert. It also does not have a proper headwall as shown in the image below.

Figure 4-3 Photograph of Erosional Scour at Inlet of Valley View Pond

4.5.3 Inlet Erosion

Another common issue is around CBs where sediment is being carried into the grate.

Figure 4-4 Photograph of Catch Basin Surrounded by Loose Sediment, at Thompson St and Inglis St.

The CB below is likely experiencing blockages as water can enter through an open hole in the size along with any debris.

Figure 4-5 Photograph of Drain Connection Near East Corner of Arena Parking Lot off Church St.

5 Examination of Stormwater Retrofit Opportunities

5.1 General

Through inspections by IBI Group, it was found that 2 ponds could be considered for retrofit opportunities. These are identified as Hunt Street Pond and #8 in **Figure 3-5, Section 3.4.1**. From their appearance, it is assumed that these ponds have had little to no maintenance since their construction. They appear to be quantity control only ponds and could, in theory, be retrofitted to provide quality control.

5.2 Examination of Existing Retrofit Strategy

Currently, the Township does not have an existing retrofit strategy. A retrofit strategy is recommended as more SWMF are assumed.

5.3 Retrofit Strategy Development

Further investigation is needed to improve retrofit strategy development. Potential strategies could include:

- Surveys and ‘reverse engineering’ of Ponds 7 and 8 to determine retrofit opportunities to provide quality control
- Replacement or repairs to pond features such as inlets and outlets
- Adding a permanent pool/forebay to increase effluent quality
- Changing capacity of existing pond to correspond to changes in drainage area

6 SWM Maintenance Program

6.1 Introduction

A main component of the Project included an assessment of the Township's current stormwater infrastructure. This assessment required a visual inspection of stormwater ponds. The objective of this stage was to produce all necessary field data to be used in subsequent stages of the project.

Using data gathered from the background review and field investigations, the needs of each stormwater management facility were assessed. Obvious maintenance requirements such as deteriorated structures, eroded slopes or outlets and adverse sediment accumulation were determined and reported below.

6.2 Background

The Township is currently responsible for the operation and management of the following assumed ponds: Valley View Pond, Hunt Street Pond, and Main Street Pond. Several future ponds will also be assumed by the Township over the next 20 years.

6.3 Function and Maintenance of SWMFs

SWMFs have been introduced to mitigate the impacts of urban runoff from existing and new development areas.

Depending on their design, SWMFs can provide:

- Flood protection
- Water quality treatment
- Erosion control
- Base flow augmentation
- Infiltration
- Spill management
- Aesthetics
- Buffer between urbanized areas and/or natural areas

The following sections describe the basic functions, along with related maintenance activities, that can keep SWMFs operating as intended.

6.4 Results

6.4.1 Inventory

For an inventory of all SWMF, see **Section 3.4.1**.

6.4.2 Inspections

All field work was completed by IBI Group staff. Access requirements (keys, arranging field meetings with Township staff, etc.) were arranged Township staff. Once each pond was accessed, a visual inspection of the general condition of the pond, access roads, vegetation, overland flow routes, inlet/outlet headwalls was performed.

The facilities condition were documented using the field forms as well as dated digital photographs. Digital geo-referenced photos were also be taken of the periphery land use and general facility layout for inclusion into the SWM facility database. The initial conditions

assessment includes a condition rating of all assets as documented during the field inspection and confirmed by our Project Engineer and Project Manager.

Inspection information was stored after each inspection of the facility. This data includes the inspector, condition of the component, comments by the inspector, date of inspection, condition ranking and photo.

Components assessed include:

- General facility appearance
- Inlet and outlet structures
- Low flow channels
- Emergency overland spillway
- Vegetation
- Access road and walkways
- Perimeter fencing
- Any unusual situations within the facility such as the presence of erosion, unsafe conditions, nuisance issues, encroachments, poor water quality, etc.
- Sediment accumulation
- Public safety.

The condition ranking system is the basis for the maintenance assessment of the facilities and components. A condition ranking between 1 and 6 was given, where:

1 = Excellent (the component has no deterioration)

2 = Satisfactory (some wear is noticed, but does not affect the functionality of the component)

3 = Attention Required (the component is still functioning but has minor problems that may prevent the component from functioning properly during extreme events – some simple upkeep is required)

4 = Non-Functional (the component is no longer functioning as designed)

5 = Non-functional and deterioration, but not causing a safety hazard

6 = Safety Hazard (the component presents a safety hazard either because it allows access to restricted areas, e.g. a grate on a pipe is not secure, or the component is structurally unsound e.g. erosion of the access road).

6.4.2.1 Frequency of Inspection

A typical SWMF will require more attention in the first few years of operation, with inspections being more frequent. In general, visual inspections should take place, particularly after heavy rainfalls (>10mm) in the first 2 years and a minimum of 4 times per year (seasonally) thereafter. Long term observation should take place every 10 years as needed.

6.4.2.2 Checklist

A sample checklist is provided in **Appendix I**. This checklist can be filled out each visit with a copy provided to the Owner for ongoing record keeping.

6.4.2.3 Inspection of SWMF Features

Based on the checklist referenced above, general information about the pond are recorded. A visual inspection of water levels and quality, followed by a thorough inspection of inlet and outlets.

The condition of the structures noted in terms of severity, as well as if a grate is secure and if any seepage is evident. The inspection continues with a look at outlet swales or emergency overflow if applicable. A visual inspection of vegetation is reported followed by overall conditions of the pond including features such as access roads, fences, gates etc. Any presence of beaver dams, fish, and waterfowl are also noted. Pictures of all pond features should also be included with the inspection. This always maintenance practices/schedules to be updated and adjusted as needed. The following **Table 6-1** shows results of the inspections in a Pond Evaluation Matrix using the ranking system described in **Section 6.4.2**.

Table 6-1 SWMF Conditions Evaluation Matrix

CRITERIA	ROBERT SIMONE POND RANKING	VINCENT DRIVE POND RANKING	LEGACY POND RANKING	VALLEY VIEW POND RANKING	HUNT STREET POND RANKING	MAIN STREET POND RANKING
General facility appearance	2	N/A	N/A	1	2	2
Inlet and outlet structures	3	N/A	N/A	1	3	2
Low flow channels	1	N/A	N/A	1	N/A	N/A
Emergency overland spillway	N/A	N/A	N/A	1	N/A	2
Vegetation	2	N/A	N/A	2	2	2
Access road and walkway	N/A	N/A	N/A	3	N/A	N/A
Perimeter fencing	N/A	N/A	N/A	N/A	2	2
Unusual situations within the facility such as presence of erosion, unsafe conditions, nuisance issues, encroachments, poor water quality, etc.	3	N/A	N/A	1	2	2
Sediment accumulation	2	N/A	N/A	1	2	2
Public safety	2	N/A	N/A	3	2	2
Total	15	n/a	n/a	14	15	16

The scoring system evaluates each pond with the lower score indicative of fewer issues. For example, Valley View Pond had the lowest score, but still requires some maintenance around the access / walkway. The N/A (ie Not Applicable) signifies that the criteria was not observed in the inspection or does not exist. Inspections have yet to be made on Vincent Drive Pond and #5.

6.5 Sediment Removal Process

Although SWMFs are designed for similar purposes, site specific constraints make each pond unique. As such, it is important to obtain and review background data for each pond, including design drawings, reports, and bathymetric surveys.

6.5.1 Background Review

A detailed condition survey for all ponds (including bathymetric surveys) will need to be completed and all available data, drawings, photographs, etc. will have to be analyzed to confirm the extent of the anticipated sediment cleanout operations. Sediment surveys, sediment volumetric analysis, design, erosion and sediment control planning, and preparing complete contract tender documents that are all encompassing to facilitate contract administration and inspection services, all are paramount to a successful project.

Pond cleanouts will also involve dealing with important aspects such as, access restrictions, tree protection, bank stabilization, construction adjacent to private property, and minimizing noise, air, traffic and other environmental disruptions and inconvenience to residents. Township staff will need to be kept aware of the project and it is imperative that the work be monitored continuously to ensure no complaints arise due to public inconveniences. The proposed SWM facility

maintenance plans and construction documents must be practical and efficient and identify and account for constraints that add risk to the project that may impact sediment removal methodology and pricing.

6.5.2 Applicable Legislation Regulations and Guidance Documents

Several key issues must be addressed to successfully manage the challenges of the sediment removal from SWMFs:

i. Understanding regulatory compliance with the various agency review/approval processes as it relates to sediment removal from SWM facilities and working in/around environmentally sensitive areas

ii. Sediment sampling in advance of tender to understand the types of materials and the appropriate means for disposal and potential costs

iii. Identifying all remedial work required in each pond to ensure its healthy function over the long term

iv. Developing a suitable restoration plan to ensure that any vegetation impacted by the cleanout operations will be restored to the satisfaction of the Township, GRCA, and general public

v. Ensuring effective communication with Township staff, regulatory agencies, residents, and other stakeholders.

Regulatory compliance requirements for SWMF cleanouts are generally outlined in the following:

Stormwater management ponds are considered 'Sewage Works' under the Ontario Water Resources Act. … stormwater management ponds are considered to be "Ontario" waters. Due to these connections, and accessibility by the public, stormwater management ponds may become inhabited by fish from adjacent natural sources or through unlawful introductions. Stormwater management ponds may also attract and become inhabited by wildlife such as turtles and frogs. While it may not be known if a stormwater management pond is inhabited by fish and/or wildlife prior to clean-out activities being carried out, it is best to anticipate the need to handle or remove these species prior to operations which may require a licence or authorization under the Fish and Wildlife Conservation Act, 1997 (FWCA).

- *Stormwater Management Pond Clean-out Best Management Practices*, Ministry of Natural Resources and Forestry [MNRF] Aurora District (May 2016).

Based on the foregoing document, the following **Table 6-2** outlines the potential work requirements, explanations, and associated timing windows related to SWMF sediment cleanout operations.

Table 6-2 SWMF Approvals Required for Cleanout

WORKS/APPROVAL	EXPLANATION	TIMING WINDOW
Bird Nest Surveys	Migratory Birds Convention Act regulates activities that disturb migratory birds and/or the nests of migratory birds. The Canadian Wildlife Service (CWS) has established guidelines for the timing of vegetation clearing activities that may affect migratory birds and these guidelines should be followed during the construction and operation of SWM facilities.	If the sediment cleanout operations occur during bird nesting periods (April 1st through July 31st), then nest surveys are recommended prior to starting cleanout operations. The recommended month for cleanout is **September** wherever possible, to avoid the breeding season of birds.

Table 6-2 SWMF Approvals Required for Cleanout

WORKS/APPROVAL	EXPLANATION	TIMING WINDOW
Endangered Species Act, 2007 (ESA)	If aquatic or terrestrial Species at Risk (SAR) are known to occur in the area of the SWMF or if surveys within and around the pond have confirmed the presence of SAR, additional information and/or an authorization may be required.	
Licence to Collect Fish for Scientific Purposes under O. Reg. 664/98 of the Fish and Wildlife Conservation Act (FWCA)	If fish are confirmed to exist within a SWMF, then a Fish Rescue plan and associated permit request may be required from the MNRF.	If Redside Dave are present in the receiving watercourse, work should occur within the MNRF's recommended construction timing window for Redside Dace (**July 1 – September 15**). Any proposals to work outside of this window must be discussed with the MNRF.
Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Water Courses Permit	If SWMF is within an area regulated by the Conservation Authority.	
Sediment Testing	To adequately characterize the sediment for proper disposal, the appropriate number of soil samples needs to be determined. This determination is based on the sampling frequency prescribed in the amended O. Reg. 153/04 of the Environmental Protection Act (EPA).	
Wildlife Scientific Collector's Authorization (WSCA) under the FWCA	May be required for SWMFs clean-outs where there will be intentional or anticipated incidental capture, handling and/or relocation of herpetofauna (e.g. frogs, turtles). It should be noted that most SWMFs support amphibians and reptiles. This is assessed by MNRF staff based on the likelihood of suitable habitat in the immediate area and the likelihood of the SWMF being used by herpetofauna. In some cases, a site visit and/or herpetofauna surveys will be required in support of an application.	Clean-out will likely need to be completed during the active season for these species, which is generally **April 15 to September 30**.
Recommended Timing Window July-September		

Sediment Testing and Disposal

To adequately characterize the sediment for proper disposal, the appropriate number of soil samples needs to be determined. This determination is based on the sampling frequency prescribed in the amended Ontario Regulation 153/04 of the Environmental Protection Act (EPA) that states in *Soil Excavated at or Brought to the Phase II Property*, Section 34 (2) "at least one soil sample shall be analyzed for each 160 cubic metres of soil for the first 5,000 cubic metres to be assessed at each source from which soil is being brought to the phase two property, following which at least one sample for each additional 300 cubic metres of soil which is to remain on, in or under the phase two property shall be analyzed."

Sediment sampling procedures should generally conform to the requirements of the amended O.Reg.153/04 and the MOECP Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario (December 1996).

Sediment sampling locations should include, as a minimum, the inlet and outflow areas of the SWM pond. The sediment should be analyzed for a variety of contaminants-of-concern including the parameters listed below:

- Sediment Characteristic samples should be analyzed for volatile organic compounds (VOCs), petroleum hydrocarbons in the F1-F4 fractions, selected metals, electrical conductivity, sodium adsorption ratio, and polycyclic aromatic hydrocarbons.
- One (1) representative sediment sample should also be analyzed using the toxicity characteristic leachate procedure (TCLP) for inorganics, VOCs, semi-VOCs, and ignitibility to ensure that any contaminated sediment would be classified as a non-hazardous waste suitable for offsite disposal at an MOECP approved facility, if required.

Tenders should be requested from several reputable waste management companies that operate landfill sites or treatment facilities approved by the MOECP to accept non-hazardous waste in Ontario. If the contract administrator, primary contractor, or excavation subcontractor is responsible for the selection of a waste disposal company, the Township should approve that company prior to finalization of the contract documents. The Township's involvement will ensure that contaminated soils are handled and disposed of in accordance with the requirements of O.Reg.558/00.

The contractor should provide the name, address, and acceptance criteria for a soil disposal site that will receive any non-contaminated surplus soils. The Township should require written acceptance from the receiver site stating they will accept the soils based on the chemical analysis provided. Again, the receiver site should be specified in the contract documents. An industrial/commercial fill receiver site is preferred over a residential fill receiver site.

If the sediment does not meet the most stringent O.Reg.153/04 Table 1 Site Condition Standards (SCS), then the sediment may stay on-site if it meets the applicable SCS for the property or it should be disposed of at an MOECP approved facility.

Although consultants are able to investigate methodology for sediment removal (and there are various methods such as excavate/mix with dry material and haul, excavate, store and mix with "drying agents", vacuum or suction and removal), we believe that the "open market" will often be the best at deciding on the best methodology which will be based on any one contractor's past experience, ability and equipment, environmental considerations for each pond, minimizing neighbourhood inconvenience, approvability, and price.

Based on previous work completed by IBI Group on similar projects, we believe that having a consultant work with the Township as they prepare a Bidder Prequalification Tender (public process) from which the available methods/technologies are brought to the Township by prospective bidders. The Township could pre-select bidders for each pond. In this manner, the best methodology for each specific pond can be identified, as each pond will have different opportunities and constraints.

Based on the success of this approach with other municipalities, we highly recommend this process to be followed on this project. This work will require detailed sequencing by the contractor with advance notifications to affected residents or Township Park/Works Department Staff.

6.5.3 Design and Tender

Once a SWMF requires cleanout it is important that it is performed by a qualified professional who can address several key issues. The following section provides details on some of the deliverables to be expected.

6.5.3.1 Deliverables

The Contractor or Consultant will prepare a report in support of obtaining agency approvals. The report may include additional background memorandums from various disciplines (e.g. terrestrial, soil quality, survey, etc.), as appropriate.

Approvals/Permits

The Contractor or Consultant will coordinate with approval agencies to obtain the required permits to support the proposed maintenance activities and remedial works is also required.

Drawings

The Contractor or Consultant will prepare drawings to illustrate the recommended plan and provided to the Township with details of the proposed maintenance/cleanout strategies for review, discussion and a decision on the preferred scheme. This will be discussed at meetings with the Township staff, as appropriate.

Engineering drawings and site restoration drawings will be prepared to illustrate the following information:

- 1:1000 General Location plan
- 1:500 Base plans with
  - Depiction of additional remedial works, as determined in the field, with appropriate details.
  - Construction access route(s) and identification of tree protection, removal and restoration plans as necessary.
  - Erosion and sediment control measures with details to describe temporary flow diversion methods and related monitoring requirements.
- Typical Sections and Details depicting sediment depths and areas, existing and proposed cross-section profile(s), as appropriate.
- General Notes related to construction sequences, practices, and general site considerations.

Tender Documents

Tender documents should include all forms of tender, contract price schedules and contractual schedules such as, “General and Supplementary Conditions”, “Special Provisions”. It should address project specific items such as:

- Location plan
- Site access routes
- Construction area restriction plans showing staging and storage areas
- Erosion and silt protection
- Excavation volumes
- Bathymetric surveys
- Existing and proposed typical cross-sections
- Sediment quality
- Dewatering techniques
- Disposal methodologies
- Material specifications and sundry construction
- Retrofit / repairs to the existing components of the pond structure
- Rehabilitation of eroded banks

Construction methodology plans and details:

- Erosion and sediment control plans and project schedule and sequencing details
- Site restoration plans (including seeding / sodding, erosion control matting, etc.)
- Landscaping (including bioengineering and habitat features) plans and details

- Restoration Plans, Details and Specifications for hard and soft site elements
- Detailed Cost Estimate, this includes for each pond site the accessibility of site, location of disposal, volume of sediment and quality of sediment
- Flow bypass measures for period with rainfall

Deliverables

- Short and long-term monitoring requirement
- Operations and Maintenance Manual
- Detailed Design Report (including all documentation of calculations and recommendations)

Tender documents will also be provided to the Township.

Public Consultation / Liaison

In order to effectively implement sediment removal of SWMF(s) the local community will need to be notified about the workplan. The following information are key aspects that should be provided to the affected property owners:

- When and where the construction activities would be taking place
- Any required easement and construction access through private property
- The method of sediment removal and dewatering
- Odour, dust and noise generation during operations
- The duration of dewatering and sediment removal

6.5.4 Construction Supervision and Contract Administration

Tender and Award

The Tender and award process may involve Pre-Tender bidders meetings, responding to questions, preparing addenda, and contractor selection. Evaluation of construction bids should consider the ability of the contractor to complete the work within the specified timeframe, the cost, and the contractor's experience with pond projects and innovative or value-added knowledge or technologies offered.

Pre-Construction

A Pre-Construction meeting should be held on-site to identify site specific constraints, work areas, staging areas and no disturbance areas. A detailed Pre-Construction survey, including digital pictures and videos, should be completed to document existing conditions. A Health and Safety audit should be conducted, with the results of the survey and audit should be included in the Pre-Construction Report.

Contract Administration and Construction Inspection Services

After a construction phasing and staging plan has been developed and a qualified contractor retained, it is important to develop and maintain a working construction scheduling document to track the progress of the construction and ensure that possible delays are minimized or avoided entirely. Environmental monitoring also plays an important role in managing risk to the Township during the construction period. Sediment removal projects are often high public profile projects and communication between the field staff, contract administrators, project manager and the Township is critical. Periodic formal environmental inspections will occur during landscaping and at other times throughout the construction stages. Various specialists including a site inspector, environmental inspector and ecological specialists need to work together during the different stages of the program. Contract administration and site inspections should include:

- Scheduling, co-ordinating and attending project review meetings including a pre-construction review meeting.
- Regular on-site inspections which include reporting.
- Liaising with the contractor and evaluating any out-of-scope requests.
- Ensuring that all environmental protection measures are acceptable and functioning as designed and identifying deficiencies to be corrected by the contractor.
- Maintaining a daily diary of construction events documenting the progress of the work and to substantiate the quality and quantity of the work performed.
- Providing comments to the contractor's proposed procedures, methods and construction phasing to ensure compliance with design and contract requirements.
- Managing claims, notices of intent to claim, disputes and questions relating to contractor performance, quality of the work and interpretation of the contract documents.
- Addressing inquires and request for information from external Agencies, adjacent landowners and members of the public.
- Reviewing and processing payment certification of Substantial and Total Performance for Construction Lien Act purposes.

Record Drawings and Project Completion

During the close-out period, close attention must be paid to the project documentation. In particular, any deficiencies must be identified, defined and the contractor notified. The deficiency must ultimately be rectified prior to the release of securities or other bonds supplied by the contractor. A final thorough review of the contract documents and the constructed works is required at this time. As-built conditions will be surveyed and design drawings updated to reflect the current conditions.

6.6 Maintenance

Prior to the Township assuming a SWMF, the Consultant should provide an Operation & Maintenance Report along with forecasted costs of maintenance and cleanout. For reference, a sample O&M Report is in **Appendix J**.

6.7 Costs

Based on the foregoing, the following **Table 6-3** outlines the consultant costs per discipline, as well as cost of deliverables:

Table 6-3 Typical Consultant Costs Associated with Pond Cleanouts

CONSULTANT	RESPONSIBILITY/ DELIVERABLE	BASIS FOR FEES	FEE ($)
IBI Group	Water Resources	Fixed fee	XXX
IBI Group	Report	Fixed fee	XXX
IBI Group	Tender Drawings	Fixed fee	XXX
		TOTAL	**XXX**

Table 6-4 Typical Costs Associated with Pond Cleanouts

RESOURCE	DESCRIPTION	COST PER UNIT*	UNIT
General Inspector	City staff to perform seasonal inspections.	250	Use
Fencing	Black vinyl covered fence	16.4	m
Riprap	8 inch stone used around inlet / outlet	150	Cu. Metre
Weeping tile	Weeping tile with sock	15	Metre
General Contractor	Non-specific contractor to do simple repairs outside scope of city labourers	1	Dollar
General Consultant	Non-specific consultant to assess various problems outside of city expertise	1	Dollar
City Official	Non-specific city employee to consult with local residents	1	Dollar
2 Person Crew	2 Person City Work Crew (8 Hours)	800	Day
3 Person Contract Crew	3 Person Contract Work Crew (10 hours)	3000	Day
Site Inspector	Performs advanced inspections	600	Use
Water Sampling	Generic company for testing water samples	700	Use
Front-end Loader	Standard Front-end loader for use with 2 Person City Work Crew	800	Day
Miscellaneous	Undefined materials to be allocated to task	1	Dollar
Engineer	City Engineer	50	Hour
Lock	A padlock	25	Use
Paint	Paint	13.2	L
Soil	Soil to use as fill	353	Cu. m.
Erosion Fabric	Erosion fabric	10	Metre
Grass Seed	Grass seed	50	Kilogram
Fence Repair Contractor	A contractor to perform structural repairs on fences	250	Use
Buoy Rope	Rope to attach the buoy to the emergency station, as well as safety rope around the buoy	50	Use
Plastic Pipe Cap	A cap to cover plastic riser pipes	50	Use
Buoy	Red floating buoy	50	Use
Hazard Sign	A sign	100	Use
Pest Control [Beaver]	A pest control company	1000	Use
Plastic Pipe	Plastic piping	32.8	m
Hoop	Emergency equipment hoop	100	Use
Pest control	Removal of problem animals	1	Dollar
Grate	A grate to cover a large outlet pipe	1000	Use
Aeration Equipment	A sub-surface aerator powered by a windmill	2500	Use

* The unit costs listed are an estimated cost for the resources. It is recommended that the Township update the unit rates.

It should be noted that costs are determined by the size and condition of pond and amount of sediment being required for cleanout.

7 Evaluation of Alternatives

Several alternative solutions were generated for SWM measures for the existing and future land uses within the Township that consist mainly of urban areas. The approach for developing and evaluating alternatives is consistent with the requirements of the planning and design process for Master Planning projects described in the Municipal Class EA (Municipal Engineers Association, June 2000; amended 2007, 2011). It involves reviewing Phase 1 work (i.e. Identification of the Problem) and undertaking Phase 2 (i.e. Establishing Existing Conditions, Identification of Long List of Alternatives, Development and Assessment of Alternative Management Strategies and Selection of a Preferred Strategy). In addition, consultation with stakeholders is a necessary step in this process.

7.1 General

In order to identify the solution that best encompasses the study's principles, goals and objectives a long list of alternatives was generated. The alternatives consider both existing and future land uses within the Township that consists of rural and urban areas.

7.2 Overview of Alternatives

The MECP divides SWM measures into three broad categories:

1. Source/lot level controls
2. Conveyance controls
3. End of pipe controls

The preferred SWM strategy is to provide an integrated treatment train approach to water management based on providing control at the lot level and in conveyance (to the extent feasible) followed by end-of-pipe controls. This combination of controls is typically the only means of meeting the multiple criteria for water balance, water quality, erosion control, and water quantity.

The reasoning behind that approach is to maximize the benefits from the combination of those elements, including:

- More effective SWM.
- Reduction in land area required to implement end-of-pipe solutions.
- Enhanced opportunities to integrate SWMPs effectively as amenities.
- Decreased total cost when land value is factored in.
- Increased level of public awareness and involvement in the implementation and management of SWM initiatives.

7.2.1 Source Controls

Currently, the MECP has not released a document for Low Impact Development planning and design. The standard typically used in Ontario is the Credit Valley Conservation (CVC) and Toronto Region Conservation Authority (TRCA) Low Impact Development Stormwater Management Planning and Design Guide, created as "a tool to help developers, consultants, municipalities and landowners understand and implement sustainable stormwater planning and practices in the CVC and TRCA watersheds. The use of sustainable stormwater planning and practices will help ensure the continued health of the streams, rivers, lakes, fisheries and terrestrial habitats in our watersheds."

"The guide is intended to provide engineers, ecologists and planners with up-to-date information and direction on landscape-based SWM planning and low impact development SWM practices

such as rainwater harvesting, green roofs, bioretention, permeable pavement, soakaways and swales. The information contained in the guide will help practitioners adopt landscape-based SWM approaches, and will help select, design, construct and monitor more sustainable SWM practices."

Although developed for use in the CVC and TRCA watersheds, the underlying principles have been adopted for use by engineers for applying LID in other jurisdictions. The GRCA has included this document in the *Water Sustainability Planning Key Resource List* and it is generally the case that effort should be made to follow the LID approach by incorporating lot level and conveyance controls as recommended in the MECP's "Stormwater Management Planning and Design Manual" (2003) or most current version.

The LID Manual notes that "Effective stormwater management strategies employ a treatment train approach that combines a suite of lot level, conveyance and end-of-pipe controls to treat runoff efficiently and effectively. At the present time, reliance on larger end-of-pipe detention pond facilities as the primary component of a stormwater management strategy is the norm. This compromises opportunities to implement low impact development practices that enhance the performance of stormwater management systems and provide ecological sustainability benefits."

For new development areas, potential opportunities to integrate SWMPs at the site level stage in the planning process include:

- Harvesting of rainwater from rooftops for non-potable uses (e.g., irrigation, toilet flushing) using rain barrels or cisterns.
- Installation of green roofs.
- Drainage of runoff from rooftops to pervious or depression storage areas.
- Integration of soakaways (e.g., infiltration trenches or chambers) below landscaped areas, parking areas, parks, sports fields, etc.
- Incorporation of bioretention areas, rain gardens, biofilters or constructed wetlands into the landscape design for the site.
- Use of permeable pavement in low and medium traffic areas.
- Incorporation of bioretention areas, vegetated filter strips, and swales to intercept and treat parking lot and road runoff.
- Incorporation of woodland restoration in upstream areas to reduce runoff rates.
- Integration of detention ponds and wetlands as large aesthetic and recreational features within the landscape.

For infill and redevelopment sites, application of LID SWM measures needs to consider context and the limits of both landscape and built form. SWM opportunities that should be explored for infill and retrofit developments include:

- Rooftop storage
- Green roofs
- Rainwater harvesting
- Bioretention areas
- Biofilters
- Grassed swales
- Permeable pavement
- Rain gardens
- Stormwater planters and fountains
- Depression storage
- Soakaways

- Constructed wetlands
- Enhanced urban tree canopy

Source controls are applied at the individual lot level, typically serving small drainage areas (approximately 2 hectares). Typically, they take the form of either storage or infiltration controls.

Source: Left – CWP; Right – Low Impact Development Center

Figure 7-1 Example of Inline and Offline Bioretention [6]

Storage controls are for the temporary detention of stormwater to attenuate peak flows to a desired level. They could include such mechanisms as:

- Roof storage – control flow roof drains and temporary detention storage on flat roofs.
- Parking lot storage – detention storage on top of parking lots, using an underground orifice control.
- Rear lot storage – using catchbasin restrictors to create temporary ponding in rear yards.
- Underground storage – consisting of either upsized pipes (used for detention instead of merely conveyance of flows) or specialized tank structures (like modified box culverts, or plastic storage units) in combination with an orifice control.

Given the high permeability of the underlying soils in the area, infiltration measures are an important option in achieving SWM criteria.

Infiltration controls are typically designed to provide for water balance opportunity; that is, offsetting the increase in impervious cover associated with urban development by providing a mechanism to infiltrate water back into the soil. Typical mechanisms include:

- Reduced grading to allow greater ponding of stormwater and natural infiltration.
- Directing roof leaders to rear yard ponding areas, soakaway pits, or to cisterns or rain barrels.
- Sump pumping foundation drains to rear yard ponding areas.
- Infiltration trenches
- Grassed swales
- Vegetated filter strips
- Stream and valley corridor buffer strips

[6] Source: Low Impact Development LID SWM Guide

The primary function of infiltration controls is to mitigate the impacts that urbanization normally has on the water balance (i.e., increased surface runoff, reduced soil moisture replenishment and groundwater recharge). Concentrated infiltration of stormwater collected from larger areas (e.g., infiltration basins, an end-of-pipe infiltration type control) will not match the characteristics of distributed infiltration which occurred under predevelopment conditions. The natural hydrologic cycle can be maintained to the greatest extent possible by lot level infiltration controls.

Infiltration technologies can achieve water quality enhancement; however, stormwater containing high concentrations of suspended solids will tend to clog these controls. Further, infiltration of contaminated water can impair groundwater quality. Therefore, these measures are ideally suited to the infiltration of relatively clear stormwater, such as stormwater from rooftops which contains only atmospheric contaminants (i.e., contaminants deposited on the rooftop by precipitation or dry fall) or foundation drainage.

7.2.1.1 Pervious Catchbasin

Pervious catchbasins are simply normal catchbasins with a larger sump which are physically connected to an exfiltration storage medium. In some designs, the storage medium is connected to the catchbasin located directly above via a hole or series of holes in the catchbasin floor. Although this design is convenient and conserves land, it is more susceptible to clogging and compaction as a result of the lack of pre-treatment and the weight of the water in the catchbasin. There are manufacturers which offer catchbasin filters for pre-treatment in this type of design. These filters are expensive, however, and need frequent replacement. A second design uses the catchbasin sump for pre-treatment of runoff and discharges low flows through the wall of the catchbasin to the adjacent exfiltration storage medium.

Pre-Treatment

Pervious catchbasins are intended to infiltrate road drainage which has high levels of suspended sediment. Exfiltration of stormwater without pre-treatment will result in poor longevity of the exfiltration system. Large catchbasins with deep sumps will help pre-treat the runoff before it is conveyed to the infiltration trench. However, the amount of pre-treatment will be small even for large manholes, and other pre-treatment measures should be incorporated, if possible, before the stormwater enters the sewer system. Pre-treatment is best achieved by the incorporation of grassed boulevards as discussed in the previous section on pervious pipes.

Technologies for treating runoff from small areas include CB Shield (**Figure 7-2)**. CB Shield is a catch basin insert. As the name suggests, it shields the sediment and grit found in the sump of the catchbasin from being washed out. CB Shield inserts are placed into catchbasins to prevent scour with the top slope of the shield deflecting the flow of water to the back wall of the catchbasin while the grates allow water to flow over the top and exit the outlet pipe. Sediment falls between the slots. CB Shield is easily installed in an existing catchbasin in less than two minutes, which results in saving on retrofitting established infrastructure. CB Shield can capture 50% TSS on an average site (ETV fine Particle Size Distribution, 0.2ha and 50% impervious).

CB shield can help pre-treat an LID system or a filter system. Adding a CB Shield to the treatment train can help to achieve 80% TSS removal.

CB Shield would not provide quality pre-treatment on open bottom catchbasins and would be more suitable on the type of pervious catch basin outlined in the figure below, which has a solid bottom and overflow pipe.

Figure 7-2 Example CB Shield[7]

Technical Effectiveness

Pervious catchbasins have been used in both the Cambridge and the Ottawa areas (**Figure 7-3**). As with the pervious pipe systems, varying results have been reported. The Regional Municipality of Ottawa-Carleton has reported success with pervious catchbasins. Where difficulties have been observed, it has usually been due to:

- Poor design (storage media, filter cloth, lack of pre-treatment)
- Poor construction practices
- Inadequate stabilization of development before construction (construction timing)
- Poor site physical conditions (soils, water table)

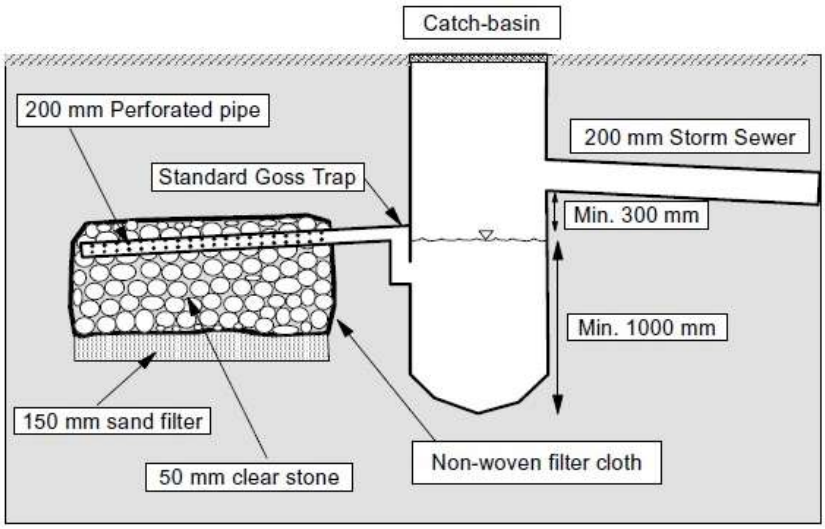


Figure 7-3 Cross-section of Typical Pervious Catch-basin[8]

As a retrofit solution, existing pervious CBs could be replaced with a standard CB, equipped with a CB Shield and goss trap (for oil capture), with overflow to a retention chamber system.

[7] Source: https://www.cbshield.com/about_us
[8] Source: MECP Stormwater Management Planning and Design Manual

7.2.1.2 Stormwater Retention Systems

Infiltration chambers are another design variation on soakaways (**Figure 7-4**). They include a range of proprietary manufactured modular structures installed underground, typically under parking or landscaped areas that create large void spaces for temporary storage of stormwater runoff and allow it to infiltrate into the underlying native soil.

Structures typically have open bottoms, perforated side walls and optional underlying granular stone reservoirs. They can be installed individually or in series in trench or bed configurations. They can infiltrate roof, walkway, parking lot and road runoff with adequate pretreatment. Due to the large volume of underground void space they create in comparison to a soakaway of the same dimensions, and the modular nature of their design, they are well suited to sites where available space for other types of BMPs is limited, or where it is desirable for the facility to have little or no surface footprint (e.g., high density development contexts). They can also be referred to as infiltration tanks.

Used in conjunction with quality pre-treatment devices, retention systems can provide sufficient volume for various levels of service as required.

Source: StormTech (left); Cultech (right)

Figure 7-4 Example Stormwater Retention Systems [9]

7.2.1.3 Bioretention Areas

Bioretention areas are shallow excavated surface depressions containing mulch and a prepared soil mix and planted with specially selected native vegetation that captures and treats runoff (see **Section 4.5** of the LID Manual for detailed design guidance). During storms, runoff ponds in the depression and gradually filters through the mulch, prepared soil mix and root zone. The filtered runoff can either infiltrate into the native soil or be collected in a perforated underdrain and discharged to the storm sewer system. They remove pollutants from runoff through filtration in the soil and uptake by plant roots and can help to reduce runoff volume through evapotranspiration and full or partial infiltration. They can also provide wildlife habitat and enhance local aesthetics.

Bioretention areas can be integrated into a range of landscape areas including medians and cul-de-sac islands, parking lot medians and boulevards. A variety of planting and landscape treatments can be employed to integrate them into the character of the landscape. Biofilters are a design variation that feature an impermeable liner and underdrain due to site constraints and are typically applied as pretreatment to another stormwater control although they can be effective as standalone filtration facilities.

[9] Source: Low Impact Development LID SWM Guide

7.2.1.4 Rain Gardens

A variation on depression storage and bioretention areas, the rain garden is a deliberately designed landscape, with specific plant species and soil media to receive and detain, infiltrate and filter runoff discharged from roof leaders (**Figure 7-5**). Rain gardens are effective in both new and retrofit situations and can be designed to complement the landscape of most properties. The successful design and application of lot level controls begins with the design of the subdivision and requires private owners to maintain such systems.

Left and Right - front yard rain gardens that takes runoff from the residential lot and street (Source: City of Maplewood, Minnesota)

Figure 7-5 Example Rain Gardens[10]

7.2.1.5 Soakaways

Soakaways, which can also be referred to as infiltration trenches, galleries or chambers, are constructed below grade and therefore take up little or no space at the surface (**Figure 7-6**). Such facilities can be installed below a broad range of land uses including residential yards, parking areas, walkways, pedestrian plazas, parks and sports fields.

Source: Lanark Consultants (left); Cahill Associates (centre); North Dakota State University (right)

Figure 7-6 Example Soakaways[11]

7.2.1.6 Permeable Pavement

Permeable pavement is a variation on traditional pavement design that utilizes pervious paving material underlain by a uniformly graded stone reservoir (**Figure 7-7**). The pavement surface may consist of permeable asphalt, permeable concrete, permeable interlocking concrete pavers, concrete grid pavers and plastic grid pavers. Openings in permeable interlocking concrete pavers, concrete grid pavers and plastic grid pavers are typically filled with pea gravel, sand or topsoil and grass. Permeable pavements prevent the generation of runoff by allowing precipitation falling on the surface to infiltrate into the stone reservoir and, where suitable

[10] Source: Low Impact Development LID SWM Guide
[11] Source: Low Impact Development LID SWM Guide

conditions exist, into the underlying soil. They are most appropriately applied in low to medium traffic areas (*e.g.,* residential roads, low traffic parking lots, driveways, walkways, plazas, playgrounds, boat ramps etc.) that typically receive low levels of contaminants. In addition to the stormwater management benefits, permeable pavements can be more aesthetically attractive than conventional, impermeable pavements.

Permeable interlocking concrete pavers (block pavers): Concrete pavers are designed with gaps between them that allow stormwater to infiltrate into the aggregate reservoir. The gaps are approximately 10% of the surface area and are filled with small stone.

Permeable paver parking lot in Mississauga, ON (Source: CVC)

Plastic or concrete grid systems are concrete or durable plastic grids filled with gravel or a pervious planting mix for grass or low ground cover. The grids provide support for vehicles or foot t*raffic while preven*ting compaction and rutting of the fill material. Grid systems are appropriate for applications such as walkways, overflow parking, firelanes, maintenance and utility acccess lanes, or driveways.

Residential driveway (Source: R. Bannerman); Plastic grid filled with gravel (Source: Gravelpave©)

Pervious Concrete and Porous Asphalt have pavement mixes with reduced or no fines which creates stable void spaces. The void spaces allow stormwater to drain through to the underlying stone reservoir. They require different pouring and setting procedures than their impervious versions.

Pervious concrete(Source: Hunt and Collins, 2008); Porous asphalt parking lot (Source: University of New Hampshire Stormwater Center)

Figure 7-7 Example Permeable Pavement Types[12]

[12] Source: Low Impact Development LID SWM Guide

7.2.1.7 Vegetated Filter Strips

Gently sloping, densely vegetated areas that are designed to treat runoff as sheet flow from adjacent impervious surfaces (see LID Manual for detailed design guidance) (**Figure 7-8**). Filter strips function by slowing runoff velocities and filtering out sediment and other pollutants, and by providing some infiltration into underlying soils. Filter strips may be comprised of a variety of trees, shrubs, and native vegetation to add aesthetic value as well as water quality benefits. They are best suited to treating runoff from roads and highways, roof downspouts and low traffic parking lots. They are also ideal as pretreatment to another lot level or conveyance practice. Filter strips also provide a convenient area for snow storage and treatment.

Source: Trinkaus Engineering (left), Seattle Public Utilities (right)

Figure 7-8 Example Filter Strips Along Residential Road and as Pretreatment for Dry Swale[13]

7.2.2 Conveyance Controls

Conveyance controls are mechanisms like pervious pipes, grassed swales, or vegetated filter strips designed to provide for water balance (infiltration) or water quality benefits to tradition conveyance measures. Above ground features like swales and strips are relatively easy to inspect and maintain, while pervious pipes require a greater investment of time and money, and may become clogged, resulting in reduced function.

7.2.2.1 Perforated Pipe Systems

A stormwater conveyance system that features pipe that is perforated along its length and installed in a granular bedding which allows infiltration of water into the native soil through the pipe wall as it is conveyed (**Figure 7-9**). They can also be referred to as pervious pipes, percolation drainage systems or exfiltration systems. Design variations can also include catch basins that are connected to granular stone reservoirs by pervious pipes or where the catch basin sumps are perforated, allowing runoff to gradually infiltrate into the native soil. They are best suited to treat drainage from low to medium traffic areas with relatively flat or gentle slope.

7.2.2.1 Grassed Swale

Grassed swales are vegetated open channels designed to convey, treat and attenuate stormwater runoff (also referred to as enhanced vegetated swales) (**Figure 7-10**). Check dams and vegetation in the swale slows the water to allow sedimentation, filtration through the root zone and soil matrix, evapotranspiration, and infiltration into the underlying native soil. Simple

[13] Source: Low Impact Development LID SWM Guide

grassed channels or ditches have long been used for stormwater conveyance, particularly for roadway drainage.

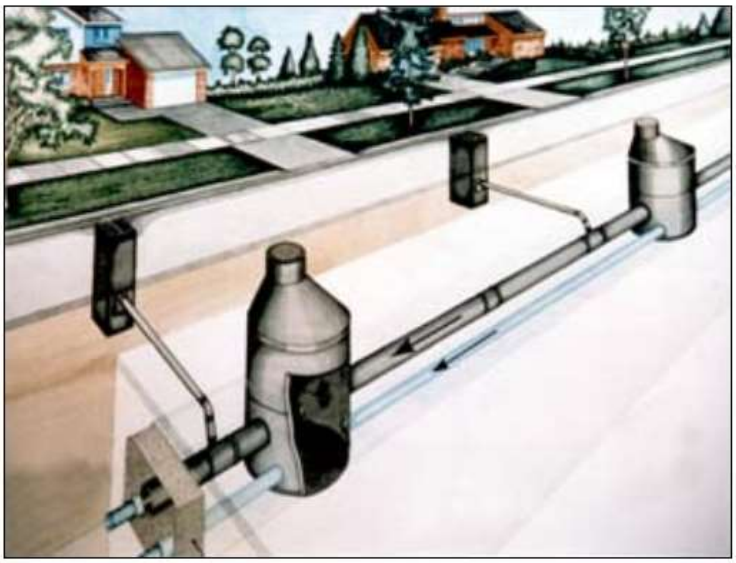


Figure 7-9 Example Perforated Pipe System[14]

Source: Delaware Department of Transportation (left); Center for Watershed Protection (right)

Figure 7-10 Example of Grassed Drainage Swale w/ Rock Check Dams[15]

Grassed swales incorporate design features such as modified geometry and check dams that improve the contaminant removal and runoff reduction functions of simple grassed channel and roadside ditch designs. A dry swale is a design variation that incorporates an engineered soil media bed and optional perforated pipe underdrain system. Grassed swales are not capable of providing the same water balance and water quality benefits as dry swales, as they lack the engineered soil media and storage capacity of that best management practice.

Lot level and conveyance controls are often lumped together as lot level/conveyance controls.

[14] Source: Low Impact Development LID SWM Guide
[15] Source: Low Impact Development LID SWM Guide

Due to the presence of lot level controls on private lands, landowner education is key to ensuring that systems remain effective over time. The successful application of lot level landscape solutions therefore requires the commitment of the municipality and the establishment of creative partnerships between the developer, municipality and landowner to realize consistent benefits over the long term.

7.2.3 End of Pipe Measures

Historically, end-of-pipe measures have been the predominant means of providing for water quality, water quantity, and erosion control. They typically take the form of SWM facilities which receive stormwater runoff from large areas via conveyance measures like sewers or ditches and discharge treated water to watercourses. Typical end of pipe measures include:

- Wet ponds
- Wetlands
- Dry ponds
- Infiltration basins

Except for infiltration basins, they may consist of any of the following components, alone or in combination:

- Permanent pool – a volume of stormwater that does not drain, designed to provide for settling and dilution of settlement (Quality Control).
- Extended detention – temporary (24-72 hour) storage of relatively small, frequent stormwater runoff volumes to reduce erosion in the receiving system (Erosion Control).
- Active storage – stormwater detention for larger, less frequent events to attenuate peak flows (Quantity Control).

Infiltration basins are designed without a traditional outlet, instead capturing, storing, and infiltrating stormwater into the ground, which replenishes the groundwater table, increases baseflow, decreases erosion, and eliminate peak flows (up to design storage volumes events) (**Figure 7-11**).

7.2.4 Restoration Measures

These would consist of direct restoration/enhancement of existing habitats in the Township as opposed to improvements to SWMFs. Examples include stream restoration, aquatic/terrestrial habitat enhancement.

7.3 Identification/Description of Alternative Solutions

As an initial step, the Project Team identified and described alternative solutions, or functionally different ways of addressing the problem / opportunity statement, as described in **Section 1.7**. Any “reasonable” alternative was included initially. All alternatives were considered equally for discussion purposes and evaluation as seen in **Section 7.**

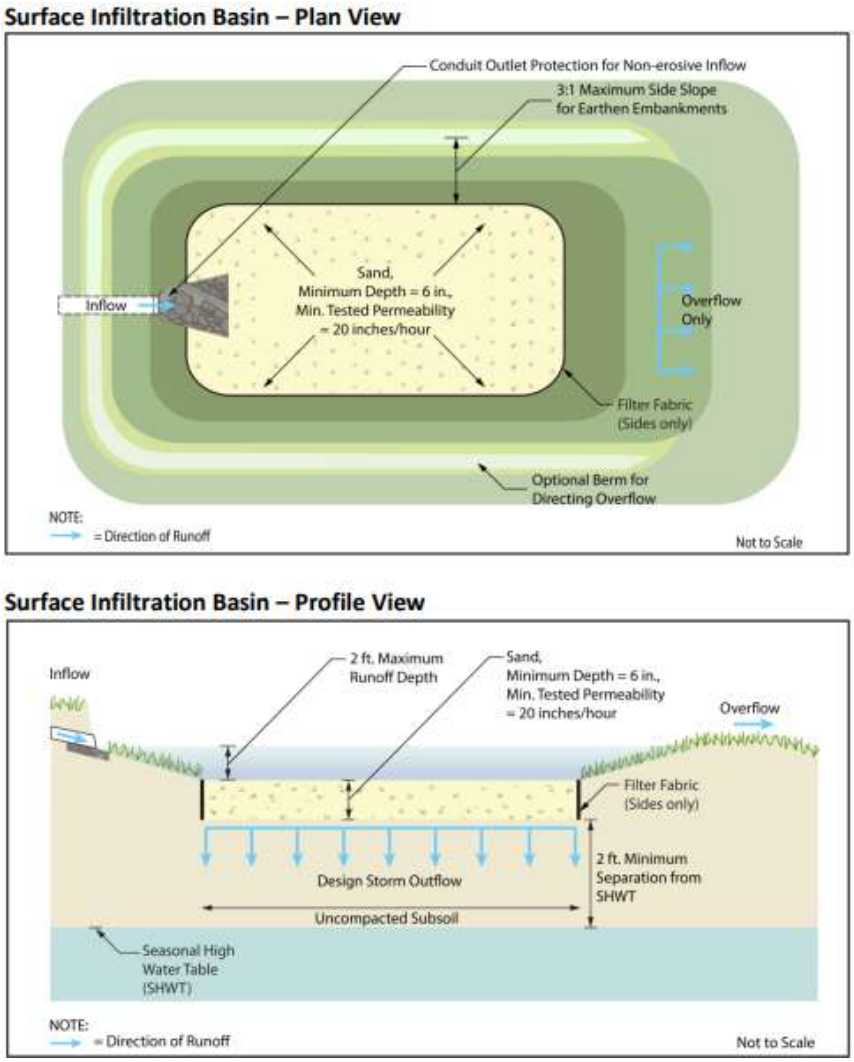


Figure 7-11 Infiltration Basin[16]

7.4 General

The development of Alternative SWM Strategies is necessary in order to determine the effectiveness of each strategy with respect to protecting, enhancing and restoring the natural resources of the watersheds located within the Township under existing and planned land use changes.

For the purposes of the SWMGP, a SWM Strategy was defined as a set of BMPs which, when implemented collectively, will attempt to address impacts associated with change in land uses within the watersheds. The land uses under consideration include existing urban and rural land uses and proposed development within the settlement areas.

The assessment was undertaken using results from the modelling as well as taking into account various factors such as social, economic and environmental criteria which are defined to further develop specific components of the Alternative Strategies. In addition, the assessment will look to find an alternative which minimizes, to the extent possible, the impact on the community, natural environment and the economy.

[16] Source: New Jersey Stormwater Best Management Practices Manual

The approach used for developing and evaluating alternatives is, where appropriate, consistent with the planning and design process for Master Planning projects as described in the Class EA document. The approach has been used for measures which are located outside proposed development areas (i.e. stream restoration works, stormwater pond retrofit works).

For other measures, such as the construction of SWM measures for proposed developments, or the implementation of a Township wide program (i.e. disconnection of roof downspouts) general direction as to the types of measure, or proposed programs will be provided in each alternative.

7.5 Development of Alternative SWM Strategies

The Township is comprised of agriculture, urban growth, industrial, residential, and open space. Most notably, the Nith River and Cedar Creek, their tributaries and associated riparian habitat fall within the Study Area. There are also areas of wetlands, woodlands, and aquatic features.

Results from the Existing Conditions as assessed in **Section 3** indicate the existing environmental conditions provide opportunity of the development and implication of alternative SWM strategies.

A total of five (5) Alternative Management Strategies have been brought forward for assessment. The five strategies are defined as:

1. Do Nothing
2. Traditional SWM Strategy
3. Traditional SWM with BMP Implementation Strategy
4. Traditional SWM with BMP and Urban Retrofits Strategy
5. Traditional SWM with BMP and Rural Retrofits Strategy

Table 7-1 below has been developed to summarize the potential effects of each alternative with respect to flow volume, phosphorus loadings, infiltration reduction and erosion potential. These impacts would occur within the Township because of the proposed land use change.

7.5.1 Do Nothing

The “Do Nothing” alternative would involve leaving the Township as is. No SWM works are carried out in any of the proposed development or redevelopment areas. An assessment to the impacts associated with the implementation of this strategy is required as part of undertaking a Municipal Class Environmental Assessment Study.

As seen in **Table 7-1**, this strategy would result in higher flow volumes, increased flooding, increased production of phosphorus, increased erosion potential, and infiltration reduction.

7.5.2 Traditional SWM Strategy

The Traditional SWM Strategy is the implementation of SWM in proposed development or redevelopment areas. The SWM works would consist of the construction of SWM ponds for quantity, quality and erosion control as per MECP guidelines demonstrate. Proposed developments would be serviced by conventional storm sewer systems and limited source control measures would be implemented such as downspout disconnection. This alternative would result in higher flow volumes, an increase in erosion potential, and an increase in production of phosphorus and infiltration reduction.

7.5.3 Traditional SWM with BMP Implementation Strategy

This Strategy is consistent with the Traditional SWM Strategy as it will apply to proposed development and redevelopment areas. A variety of BMP source controls, conveyance controls and end-of-pipe measures will be implemented for all proposed areas of development. Alternative

developments (i.e. LEED certified developments, Low Impact Developments) would also be considered.

A series of assumptions for the types of Best Management Practices to be implemented with this Strategy were made to include this Strategy as an Alternative. The types of BMP measures to be implemented are further explained in **Section 7.2**.

7.5.3.1 Quality Control

Oil-Grit Separators [OGS]

Traditional quality control BMPs include oil-grit separators for both oil retention and reduction in Total Suspended Solids [TSS]. As requested by the Township, IBI Group has reviewed available OGS units to determine their suitability for use in the Township and has reviewed the Canadian Environmental Testing Verification [CETV] program.

Environmental Technology Verification (ETV) provides an independent evaluation of new technologies with a view to validate environmental claims so that users, developers, regulators, and other parties can make informed decisions about purchasing, applying and regulating innovative technologies. ETV is not a certification scheme; instead, it ensures that a product's environmental claims are true and verified and presents a clear assessment of the technology's environmental potential and value.

With ETV, each technology is assessed against its own characteristics, based on performance claims, with tests defined on a case-by-case basis. This differentiates ETV from certification and labeling schemes, which are based on pre-defined criteria or specifications.

ETV offers a mechanism to develop references in a market where no standard currently exists, especially for new technologies; therefore, ETV is applicable in particular for technologies whose innovative features or performance are not fully reflected in existing product standards.

Based on input from the GRCA, ETV does not approve OGSs; it only verifies claims on the ability to remove TSS, and that so far none of the tested OGSs would meet the Enhanced (80% TSS Removal) criterion, with the exception of filter type units (i.e. Jellyfish).

ETV Canada maintains Technology Fact Sheets [TFS] on their website, until the verification is deemed no longer valid, at which point it is removed; therefore, IBI recommends that any guidelines reference the site as opposed to listing the current TFSs. Currently, the list of verified technologies can be found on their website at https://etvcanada.ca/home/verify-your-technology/current-verified-technologies.

7.5.4 Traditional SWM with BMP and Urban Retrofits Strategy

This strategy is consistent with the Traditional SWM Strategy in that conventional SWM strategies would be implemented within proposed development or redevelopment areas. In addition to traditional SWM, a variety of source, conveyance and end-of-pipe measures will be implemented in existing urban areas.

This strategy is highly based on the amount of participating landowners to implement the proposed retrofits at the source level. The types of urban retrofits to be implemented in this strategy are further explained in **Section 8.1**.

7.5.5 Traditional SWM with BMP and Rural Retrofits Strategy

This strategy is consistent with the Traditional SWM Strategy in that conventional SWM strategies would be implemented within proposed development or redevelopment areas. In addition to traditional SWM, a variety of source, conveyance and end-of-pipe measures will be implemented in existing rural areas. Like the Traditional SWM with Urban Retrofit Strategy, rural retrofit implementation is also based on the amount of participating rural landowners to implement the

proposed retrofits at the source level. The types of rural retrofits to be implemented in this strategy are further explained in **Section 8.1**.

Table 7-1 SWM Strategy Alternatives

PRELIMINARY CRITERIA	SWM STRATEGY ALTERNATIVES				
	DO NOTHING	TRADITIONAL	TRAD W/ BMPS	TRAD W/ URBAN RETROFITS	TRAD. W/ RURAL RETROFITS
Land Uses Where Strategy is to be Applied	None	Proposed Development and Redevelopment Areas	Proposed Development and Redevelopment Areas	Proposed Development and Redevelopment Areas and Existing Urban Areas	Proposed Development and Redevelopment Areas and Existing Rural Areas
Flows	Increase in Runoff Rates and Volumes	Increase in Flow Volume	Reduction in Flow Volume	Reduction in Urban Areas	Reduction in Rural Areas
Phosphorus Loading	Current Condition	Increase	Reduction	Reduction in Urban Areas	Current Condition in Urban Areas, Reduction in Rural Areas
Infiltration	Current Condition	Reduction	Increase	Increase in Urban Areas	Current Condition
Erosion Potential	Current Condition	Increase	Reduction	Reduction in Urban Areas	Current Condition

7.6 Development of Evaluation Categories and Criteria

A preferred SWM Strategy will be developed by the synthesis of the inter-disciplinary inputs to the project, including computer modeling, terrestrial and aquatic habitat assessments, water balance and hydrogeology, social, cultural, and economic considerations. The approach in developing and evaluating the alternative is generally consistent with the Class EA planning/design process for Master Planning project.

Using the initial set of developed evaluation criteria, and incorporating public comments as appropriate, a net effects analysis is applied to the preliminary list of alternative solutions which involves the following steps:

- Identification of potential effects.
- Develop and apply mitigation/compensation/enhancement measures.
- Determine net effects after mitigation measures have been applied.

The Township would like to explore the opportunities for innovative approaches such as Low Impact Development (LID) and green infrastructure for lot level controls, conveyance controls and end of pipe facilities. To assess the most applicable alternatives, IBI reviewed available information regarding Site setting that could influence the infiltration capacity of each area. This will include a review of the surficial geology, topography, depth to groundwater, depth to overburden, soil cover etc. In addition, available Source Water Protection (“SWP”) mapping and SWP plans will be reviewed to understand if there are any constraints regarding LIDs within Wellhead Protection Areas (WHPAs) or other SWP vulnerable areas.

In addition, a water balance will be completed using the Thornthwaite and Mather methodology to compare pre-development and post-development hydrologic recharge of groundwater. This information will aid in assessing the list of alternatives and assess the suitability of various LID measures that could be completed.

The comparative evaluation of the alternative solutions will be carried out using a systematic approach that fulfills the intent of the Class EA process. The evaluation process will be presented in the form of an evaluation matrix in which alternative is scored or ranked against the other alternatives, with respect to a number of criteria that fall into the following categories:

- Environmental criteria: These include potential impacts on natural terrestrial features and aquatic habitat and will include consideration of net change on hydrologic water balance and pollutant loadings to natural watercourses.
- Financial criteria: Includes initial capital cost including consideration of any need for property acquisition; expected life-cycle costs; and implications for future financing of centralized stormwater facilities that may serve more than one development property.
- Public safety and public acceptability: This category will address potential concerns regarding public safety and health; and how ell proposed facilities may fit into existing or future built-up areas.
- Implementation: Includes consideration of how easily implementation can occur as new land development occurs; and how well the SWM plan integrates with current land-use planning and the development approval process.

Evaluation of the alternatives will be undertaken in consultation with the Project Team and the Township's Project Manager. Our Project Ecologist will also contribute to the evaluation of alternatives, particularly about potential impacts to the environment both during and after construction. A list of possible criteria is presented in **Table 7-2**.

Table 7-2 Criteria for Evaluating Alternatives

TECHNICAL
Opportunity to reduce peak flows to Nith River
Opportunity to decrease erosion of watercourses
Opportunity to improve water quality
Opportunity to reduce phosphorus loading in Nith River
Opportunity to mitigate changes in water balance
NATURAL HERITAGE FEATURES
Provisions of direct and indirect fish habitat
Potential to improve terrestrial habitat
Impacts to natural hazard features
SOCIAL ENVIRONMENT
Ability to improve public health and safety
Impacts to private property
Impacts to public property
CULTURAL ENVIRONMENT
Impacts to built and cultural heritage landscape
Impacts to archeological resources
ECONOMIC ENVIRONMENT
Capital costs
Operation and Maintenance costs
Risk Management
Impact on agricultural land use

The evaluation criteria were applied on an individual development area basis where the key implementations of the alternative SWM strategies could be effectively applied. The preferred alternatives for each settlement area are based on existing site constraints and the feasibility of implementing SWM improvements to each area. The preferred alternative strategy is outlined in **Section 8**.

The following table evaluates the various SWM strategies outlined above.

Table 7-3 SWM Alternatives Evaluation

	Evaluation Criteria	Do Nothing	Traditional SWM Strategy	Traditional SWM with BMP	Traditional SWM w/ Retrofit Strategy
TECHNICAL	Opportunity to reduce peak flows to Nith River	0	1	1	1
	Opportunity to decrease erosion of watercourses	0	1	2	3
	Opportunity to improve water quality	0	1	1	2
	Opportunity to reduce phosphorus loading in Nith River	0	1	2	2
	Opportunity to mitigate changes in water balance	0	0	1	1
NATURAL HERITAGE FEATURES	Provisions of direct and indirect fish habitat	0	0	0	1
	Potential to improve terrestrial habitat	0	1	1	1
	Impacts to natural hazard features	0	0	0	0
SOCIAL ENVIRONMENT	Ability to improve public health and safety	0	1	1	1
	Impacts to private property	-1	1	1	1
	Impacts to public property	-1	1	1	1
CULTURAL ENVIRONMENT	Impacts to built and cultural heritage landscape	0	0	0	0
	Impacts to archeological resources	0	-1	-1	-1
ECONOMIC ENVIRONMENT	Capital costs	0	-1	-1	-2
	Operation and Maintenance costs	0	-1	-1	-1
	Risk Management	0	0	0	0
	Impact on agricultural land use	0	0	0	0
	TOTAL SCORE	**-2**	**5**	**8**	**10**

Scoring System

-2 = great negative impact

-1 = net negative impact

0 = no impact

1 = positive impact

2 = great positive impact

The preferred SWM strategy will be comprised of several elements. These may include replacement of existing storm pipes and culverts; erosion abatement projects; construction of new storm pond/wetland facilities or other types of centralized stormwater management such as infiltration facilities; and recommendations regarding stormwater design practices within new developments to minimize stormwater volume at the source and achieve objectives for preserving existing local hydrology.

We will clearly define each separate component of the preferred strategy and identify what the implementation sequence needs to be. We will identify all projects that are to be the responsibility of the Township, and identify what future Class EA requirements may apply, and what the regulatory approval requirements are, for each component project. As noted in the RFP, for those projects identified as Class EA “Schedule B” projects, the Master Plan document will demonstrate that the Schedule B requirements have been fulfilled, as we will have followed Approach 2 in completing the Master Plan.

The preferred strategy will include recommendations regarding existing municipal drainage infrastructure assets, to provide the Township with a prioritized list of needs.

Existing data incorporated into the database and each component will be categorized into one of the following groups:

1. Excellent: Component is in a "new" condition without any visible deficiencies
2. Satisfactory: Component is functioning within normal parameters but visible signs of wear are present
3. Attention Required: Component is no longer working as designed and requires maintenance however, maintenance actions are minor (e.g. cleaning or debris removal)
4. Non-Functional: Component is not functioning and requires more immediate maintenance (e.g. pond is full of sediment, inlet is blocked, spillway is eroded, etc.)
5. Safety Hazard: Component presents a safety hazard to the public and should be repaired immediately (e.g. grate on large inlet pipe is open or missing allowing ingress, manhole cover missing, etc.).

Once each component has been entered into the system, any components with a rating of three (3), ie “Attention Required” or higher will be given maintenance tasks as well as tasks added for inspection, as deemed appropriate. This will form the basis for the maintenance and budget needs for each facility, helping to evaluate and prioritize implementation requirements.

8 Preferred SWM Strategy

Based on the scoring per Table 7-3 SWM Alternatives Evaluation, the preferred alternative is Traditional SWM w/ BMP and Retrofits.

8.1 Site Specific Recommendations

Recommendations for the following future development areas are provided in the following sections. As mentioned in **Section 4.3.1.1**, the cover was assumed to be 75% imperviousness in post-development scenarios for all settlement areas. There appear to be no foreseen soil or geological constraints within the study area.

For each Area listed, the developer and consulting engineer are responsible for meeting the stormwater management objectives in their design submission. That would typically be completed as part of the Plan of Subdivision/Draft Plan approvals process and would, therefore, not fall under a Class EA Schedule of work.

8.1.1 Area A

A development of 4.15ha is proposed which would result in an infiltration deficit of 8,604m^3/year, which should be mitigated. This area will need to consider SPA 2.7.11. Stormwater could discharge to the oxbow lake of the Nith River, west of Northumberland St. BMP source/lot level controls and conveyance controls outlined in **Section 7** could be applied. The largest challenge to be overcome appears to be getting the stormwater under the road and overcoming the mild slope towards the train tracks to the west.

This Area is being dealt with under existing policies, through the Site Plan Process.

8.1.2 Area B

A development of 1.59ha is proposed which would result in an infiltration deficit of 2,236m^3/year, which should be mitigated. This area will need to consider SPA 2.7.9. Stormwater could be discharged directly to the oxbow lake of the Nith River directly North. BMP source/lot level controls and conveyance controls outlined in **Section 7** could be applied. The largest challenge to be overcome will be ensuring quality measures are in place with the development located adjacent to the watercourse.

This Area is being dealt with under existing policies, through the Site Plan Process.

8.1.3 Area C

A development of 9.30ha is proposed which would result in an infiltration deficit of 20,664 m^3/year, which should be mitigated. This area will need to consider SPA 2.7.7. The area is not adjacent to a watercourse, but there is space for a pond and potential to convey water under the train tracks to the south and into the Jedburgh Pond. From there water moves to the Watson Pond eventually making its way into the Nith River. This area will need to focus on BMP end of pipe controls as outlined in **Section 7**. The largest challenge to be overcome will be ensuring quantity control measures are in place with the development not in close proximity to a watercourse.

Applications shall require a plan consistent with SWM Pond in the floodplain and be consistent with GRCA policies in this Area. The GRCA owns several properties within the study area. Jedburgh and Watson Ponds are part of the GRCA's Upper Mill Pond Property. For further clarity and reference, a map of the Upper Mill Pond property is enclosed. Any future infrastructure projects, such as SWM outlets on GRCA-owned property would require the review and approval

GRCA property staff, in addition to any approvals from the GRCA under Ontario Regulation 150/06.

8.1.4 Area D

A development of 13.37ha is proposed which would result in an infiltration deficit of 28,204m^3/year, which should be mitigated. There is space for a pond here and it is close enough to discharge into Cedar Creek. BMP source/lot level controls, conveyance controls and end of pipe controls outlined in **Section 7** could be applied. The largest challenge to be overcome will be incorporating these SWM controls during the apparent reclamation process from former aggregate pit.

Applications shall require a plan consistent with Township and GRCA policies in this Area.

8.1.5 Area E

A development of 23.22ha is proposed which would result in an infiltration deficit of 25,542m^3/year, which should be mitigated. This area will need to consider SPA 2.7.9. Due to the size of the area, there is potential for a SWM pond and outlet at Charlie Creek to the east. BMP source/lot level controls, conveyance controls and end of pipe controls outlined in **Section 7** could be applied. The largest challenge to be overcome will be providing quality and quantity measures required to outlet to natural watercourse.

Applications shall require a plan consistent with Township and GRCA policies in this Area.

8.1.6 Area F

A development of 83.13 ha is proposed which would result in an infiltration deficit of 33,455m^3/year, which should be mitigated. Due to the size of the area, there is potential for a SWM pond and potential to discharge to the Nith River to the north. BMP source/lot level controls, conveyance controls and end of pipe controls outlined in **Section 7** could be applied. The largest challenge to be overcome will be avoiding the wetlands and safely conveying any excess water to the Nith River.

Applications shall require a plan consistent with Township and GRCA policies in this Area. the north end of this area contains wetland areas along the Nith River, floodplain and steep valley/erosion hazard slopes. In addition to the challenges of avoiding any SWM outlets through the wetland area, the slopes will also present a significant challenge. Additional slope stability and environmental impact studies (EIS) may be required to support development in this area and be subject to approval from the GRCA under Ontario Regulation 150/06.

8.1.7 Northumberland Road

The stretch of Northumberland Road between Greenfield Road and Highway 401 is currently a rural cross-section with some curb and catch basins implemented to the south. At the north there is a pond and a wetland on the west side of the road which begins across from Alps Road and continues south for approximately 300m. The east side has a shallow ditch through this area. Continuing south, both the east and west sides are quite flat, but there appears to be room for a deepening of existing ditch or an infiltration trench. There is a high point south of the gas station, therefore depending on the capacity, all runoff to the north of this point could be directed to the pond and wetland. For the section of Northumberland Road to the south of the gas station, the distance to the closest waterbody is approximately 700m to the south with a natural slope of

0.3%. Conveying the water on the west side could be achieved through grass swale or infiltration trench with subdrain. There are areas with more defined ditches, but some areas face a steep slope at the edge of the ROW. Ultimately culverts would be required under driveways and ultimately the west intersection of Greenfield Road. The east side has sections that are flat while other sections slope away from the road. There is space to implement surface LIDs on this side.

Along the west side of Northumberland Street at Greenfield Road, there are steep valley/erosion hazards slopes, areas of wetland, floodplain and tributary of the Nith River. In addition, the GRCA owns the Reinhart Property in this area. Any new SWM infrastructure in this area may require the review and approval GRCA property staff, in addition to any approvals from the GRCA under Ontario Regulation 150/06. At the northern end of Northumberland Street on the west side near Alps Road, the GRCA has also identified two smaller wetland pockets. In general, the GRCA would not support development within the wetlands but may support development adjacent to these wetland areas with the support of an EIS, as part of a permit under Ontario Regulation 150/06.

9 Public Consultation

The following sections outlines the overall public consultation process.

9.1 Consultation Activities

9.1.1 Public Information Centre

Given the scope of the work (equivalent to a Schedule B Class EA) and the scheduling noted in Addendum #3, IBI Group recommended that only one PIC be held to provide the public with an opportunity to review the problem/opportunity statement, potential alternative solutions, our proposed evaluation criteria and, finally, our recommended preferred solution. It is anticipated that each of the PICs will be an “open house” come-and-go format, with a presentation at a scheduled time.

At the time of this writing, the COVID 19 Pandemic makes in-person meetings ill advised; therefore, IBI Group provided materials for the Township to host online in lieu of PICs.

PIC was held virtually on March 16, 2021. The PIC boards and comments can be found in **Appendices K** and **L**.

9.1.2 Notice of Commencement

A Notice of Commencement was published on the Township’s website and in local newspapers. The notice will also be directly mailed to the stakeholders list. A draft notice will be developed immediately after contract award and will be provided to the Township for review at the project kick-off meeting. The notice will contain the problem/opportunity statement for the project and invite the public to comment and/or join the project mailing list. See **Appendix M**.

9.1.3 Notice of Public Information Centre

One PIC was held online during the process.

9.2 Stakeholders List

Table 9-1Stakeholders List

AGENCY	CONTACT NAME	CONTACT EMAIL ADDRESS	CONTACT TELEPHONE NUMBER
Township of North Dumfries	Lee Robinson – Director of Public Works Andrew McNeely, Chief Administrative Officer	lrobinson@northdumfries.ca Amcneely@northdumfries.ca	519-616-0341 519-632-8800 ext. 121
Grand River Conservation Authority	John Brum, Resource Planner	jbrum@grandriver.ca	519-621-2763 x 2233
Ministry of the Environment, Conservation and Parks	West Central Region Joan Del Villar Cuicas – Regional Environmental Planner – West Central Region Katy Potter – Supervisor, Project Review Environmental Assessment Branch Aziz S. Ahmed, P. Eng. Manager, Municipal Water and Wastewater Permissions Section, Environmental Permissions Branch	eanotification.wcregion@ontario.ca Joan.DelVillarCuicas@ontario.ca Katy.Potter@ontario.ca Aziz.Ahmed@ontario.ca	Joan: 365-889-1180 Aziz: 416-314-4625 Cell: 416-712-7427
Ministry of Natural Resources and Forestry	Karina Černiavskaja, District Planner	karina.cerniavskaja@ontario.ca	519-200-2276
Six Nations of the Grand River Haudenosaunee Confederacy Chiefs Council	Lonny Bomberry/Dawn Laforme, Consultation Supervisor Lands and Resources DepartmentRobin Vanstone Raechelle Williams HDI Environmental Supervisor	lonnybomberry@sixnations.ca dlaforme@sixnations.ca rvanstone@sixnations.ca janicewilliams@hdi.land	Lonny: 519 445-2201 / Dawn: 519-753-0665 Robin: 519-753-0665x5433 519-802-9402
Mississaugas of the Credit First Nation	Mark LaForme Abby LaForme	MCFN.Consultation@mncfn.ca Abby.laforme@mncfn.ca	905-768-4260 289-527-6577

9.3 First Nations Consultation

GRCA has provided a list of First Nations contacts below:

- Lonny Bomberry/Dawn Laforme
  519 445-2201 / 519-753-0665
  lonnybomberry@sixnations.ca
  dlaforme@sixnations.ca
  Consultation Supervisor
  Lands and Resources Department
  Six Nations of the Grand River
- Fawn Sault
  Fawn.Sault@mncfn.ca
  Consultation Manager
  Department of Consultation and Accommodation
  Mississaugas of the Credit First Nation (MCFN)

- These First Nations were notified of the study in an email-letter April 14th, 2020 (refer to **Appendix J**). MCFN has no comments or concerns with the Township's proposed SWMGP.

9.4 Consultation with GRCA

As per IBI Group's email request of March 25, 2020, the Grand River Conservation Authority (GRCA) reviewed IBI Group's request to provide background information and input into this study. Refer to **Appendix K** for details.

9.5 Consultation with the Ministry of the Environment, Conservation, and Parks

IBI Group sent a letter via email to the Guelph MECP District Office (Amy Shaw) April 22, 2020, with copy to Aziz Ahmed, MECP Manager, Municipal Water and Wastewater Permissions at the Main Branch. Refer to **Appendix K** for details.

9.6 Consultation with the Ministry of Northern Development, Mines, Natural Resources and Forestry

Accessing natural heritage data and values should be obtained via reference to *Natural Heritage Information Request Guide*, prepared by Regional Operations Division, Ministry of Natural Resources & Forestry, update – April 1, 2019.

9.7 Consultation Outcomes

The Public Information Centres did not yield concerns that required addressing. Refer To **Appendix N** for agency correspondence.

MECP

Provided clarification on the EA process and Public Consultation requirements, specifically Indigenous Consultation.

GRCA

Overall, the GRCA did not have any significant concerns with the SWMGP. However, the GRCA offered various advisory comments and points of clarification on items that have been incorporated into the SWMGP

MCFN

MCFN has no comments or concerns with the Township's proposed SWMGP.

MNRF

MNRF provided the following comments (see also **Appendix K**):

> *It remains the proponent's responsibility to complete a preliminary screening for each project, to obtain available information from multiple sources, to conduct any necessary*

field studies, and to consider any potential environmental impacts that may result from an activity. We wish to emphasize the need for the proponents of development activities to complete screenings Heritage Information Centre, and ensuring this information is accessible through online resources.

Species at risk data is regularly being updated. To ensure access to reliable and up to date information, please contact the Ministry of the Environment, Conservation and Parks at SAROntario@ontario.ca.

Public Lands Act & Lakes and Rivers Improvement Act

Some projects may be subject to the provisions of the Public Lands Act or the Lakes and Rivers Improvement Act. Please review the information on NDMNRF's web pages provided below regarding when an approval is required or not. Please note that many of the authorizations issued under the Lakes and Rivers Improvement Act are administered by the local Conservation Authority.

- *For more information about the Public Lands Act: https://www.ontario.ca/page/crown-land-workpermits*
- *For more information about the Lakes and Rivers Improvement Act: https://www.ontario.ca/document/lakes-and-rivers-improvement-act-administrative-guide*

After reviewing the information provided, if you have not identified any of NDMNRF's interests stated above, there is no need to circulate any subsequent notices to our office.

10 Implementation Plan

10.1 Asset Monitoring, Management and Maintenance Program

A Town-wide stormwater asset database has been provided in **Table 10-1** and **Table 10-2** below, showing existing ponds and catch basins from IBI Group's field investigations, respectively. Both tables also identify any components that require maintenance.

As mentioned in **Section 7.6**, prior to a pond being assumed by the Township, the Consultant shall provide an Operation & Maintenance Report. This will provide a schedule of maintenance which can be used to update the asset database.

Upon analysis of the stormwater management facility assessment results, IBI Group will prepare a long-term stormwater asset maintenance program, which will help to guide Township Public Works staff in the overall operation of the stormwater infrastructure. The maintenance program will be incorporated into the Master Plan and will include cost estimates as well as relevant regulations and processes for operations and maintenance activities.

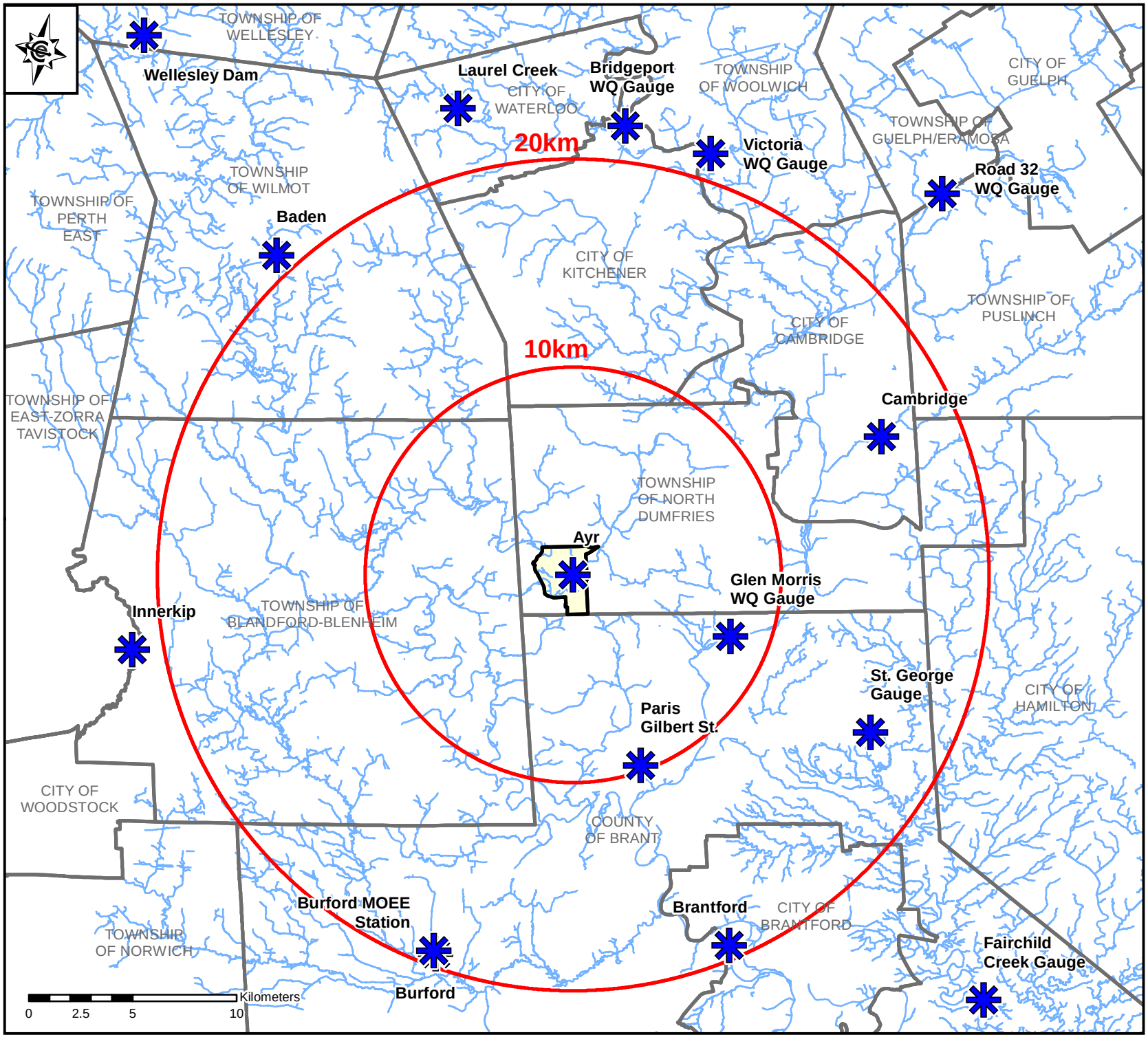
The deliverable for this stage of the project will include a complete database, along with an operation and maintenance standard operating procedure manual, which the Township may use to guide its Public Works staff.

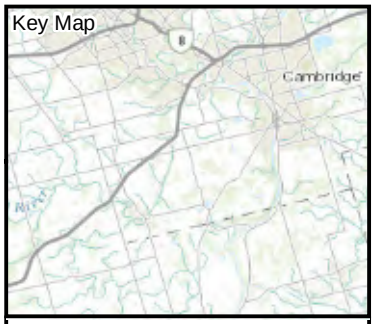
Table 10-1 Existing SWMF Database

SWM FACILITY ID	ECA, ISSUE DATE	LOCATION IN DECIMAL DEGREES		DRAINAGE AREA TO POND (HA)	OUTLET LOCATION	MAINTENANCE REQUIREMENTS
		LATITUDE	LONGITUDE			
Robert Simone Pond (Hilltop Community SWMF A)	0522-6U8PDG November 15, 2006	43.2826	-80.4385	8.6	- outlet pipe to drain into Municipal storm drainage manhole MH61 on Hunt Street, - overflow spillway, protected with rip-rap to discharge stormwater flow west onto the Hilltop Drive	- access road has trees and vegetation growing out of it which obstruct access - could be assumed by Township in 2021
Vincent Drive Pond (Hilltop Community SWMF B)	0522-6U8PDG November 15, 2006; 4689-A8ZLNZ June 29, 2016 Amended ECA 0522-6U8PDG	43.27586	-80.4448	30.3	-outlet pipe to drain into the existing Valleyview Stormwater Management Facility ultimately discharging to the Nith River, - overflow spillway to discharge to Swan Street side ditch to Nith River,	- not yet inspected - could be assumed by Township in 2031
Legacy Pond (Legacy Estates Subdivision SWMF)	5264-BATK97 May 2, 2019	43.27278	-80.4446	25.4	- outlet structure at the southwest corner, discharging to the Mitchell Drain	- not yet inspected - could be assumed by Township in 2034
Valley View Pond (Valley View SWMF)	Unknown	43.28172	-80.447	Unknown	- discharges directly to Mitchell Drain	- there is currently no fence surrounding pond or signage, but overgrown vegetation likely keeps outsiders out - the outlet headwall is a large boulder and pipe is starting to rust
Hunt Street Pond (Hilltop Estates Phase 1 SWMF)	Unknown	43.28221	-80.4415	Unknown	-outlet presumably discharges to Nith River	- vegetation is overgrown and very dense is some places. -erosional scarring directly downstream of the invert.
Main Street Pond	Unknown	43.29099	-80.4474	Unknown	-outlet likely discharges to Jedburgh Pond	- an access road is non-existent or overgrown - no signage

Table 10-2 Existing Catchbasin Database at Areas Experiencing Flooding

CATCH BASIN ID	LOCATION IN DECIMAL DEGREES		OPSD	TYPE DESCRIPTION	OBSERVATIONS	MAINTENANCE REQUIREMENTS
	LATITUDE	LONGITUDE				
1.1	44.22567	-80.6957	n/a	galvanized steel grate possibly stepcon	Stagnant water/apparent blockage	Clean out sediment
2.1	43.31133	-80.6623	400.02	herring bone square frame/cover	Stagnant water/apparent blockage	Clean out sediment
2.2	43.30233	-80.6665	400.02	herring bone square frame/cover	Stagnant water/apparent blockage	Clean out sediment
2.3	44.26017	-80.643	400.02	herring bone square frame/cover	No visible blockage	Monitor for sediment buildup
2.4	43.3085	-80.6405	400.02	herring bone square frame/cover	Stagnant water/apparent blockage	Clean out sediment
3.1	43.72619	-80.5047	n/a	Hopper Forest circular cover (straight grate no frame)	Visible blockage	Clean out sediment
3.2	43.7358	-80.4828	n/a	Circular cover (straight grate no frame)	Visible blockage	Clean out sediment
3.3	43.73466	-80.4974	n/a	Circular cover (straight grate no frame)	Visible blockage	Clean out sediment
3.4	43.73969	-80.5047	n/a	Circular cover (straight grate no frame)	Visible blockage	Clean out sediment
4.1	43.70422	-80.7263	400.02	herring bone square frame/cover	No visible blockage	Monitor for sediment buildup
4.2	43.70133	-80.7355	400.02	herring bone square frame/cover	No visible blockage	Monitor for sediment buildup
4.3	43.69598	-80.7441	400.02	herring bone square frame/cover	No visible blockage	Monitor for sediment buildup
4.4	43.7005	-80.7245	n/a	Circular cover (straight grate no frame)	No visible blockage	Monitor for sediment buildup
5.1	43.61518	-80.8279	n/a	Hopper Forest cover (straight grate no frame)	Stagnant water/apparent blockage	Pervious pipe running horizontal from CB should be flushed out.
5.2	43.61655	-80.8288	n/a	Hopper Forest cover (straight grate no frame)	Secondary pipe apparently clogged	Pervious pipe running horizontal from CB should be flushed out.





Legend

- Rain Gauge Stations
- Municipal Boundaries
- Watercourse
- Ayr Study Area

Figure 10.1
Locations of Rain Gauges

Township of North Dumfries
Storm Water Management Guiding Principles

IBI

Project No.: 2019-0506

Date: September 2022

LTS 4/8/2020 D:__Projects\x2019-0506\600_GIS\20_Maps\01_Working\RainGauge.mxd

10.2 Rain Gauge Network

There is one existing rain gauge within Ayr that is operated by the GRCA (**Figure 10-2**). It is located off of Main Street by the Cedar Creek outlet from Jedburgh Pond. It is currently installed on a permanent mount several meters above the ground. The location of this gauge is well situated within the center of the town, with the entirety of the township within a 2km radius of the gauge. Existing rain gauge locations in and around Ayr are shown on **Figure 10-1**.

Figure 10-2 Photograph Taken at the One-Way Bridge at Main Street

The data recorded by this station does not get posted to the GRCA's online data portal. Through coordination with the GRCA, they provided the following statement: "The rain gauge in Ayr is problematic and does not have a good enough period of record for IDF data. If you want still want this rain gauge data, please let us know and staff will provide this for you."

While access to this data is possible, it is not recommended to rely on data collected by this station as per the GRCA's advice that the gauge is problematic.

It is recommended for the Township to have their own source of rainfall data being collected directly, or that GRCA reactivate the current disused gauge. Proposed locations for possible gauge installs have been identified. Based on the size of the municipality, only one (1) location is recommended. Some of the features of an ideal monitoring location include:

- A flat rooftop with plenty of space from the edge
- Easy access to the location. For rooftops, access via a short ladder or internal hatch access
- No tall objects nearby or overhanging trees
- Owned and/or operated by the Municipality. Schools and other buildings may require additional coordination for access
- No access to the location from members of the public

The preferred location for gauge installation is on the utility building on the north side of Gibson Street. The utility building has all the characteristics listed above and is situated at a central location within the municipality. The recommended location on Gibson Street, along with some alternative locations are shown on **Figure 10-3**.

If the gauge operated by the GRCA becomes operational with reliable data, an additional rain gauge operated by the municipality may not be required. If having a rain gauge with municipal control is preferred, then it is recommended to install the gauge in a location that would increase the spatial

distribution of the monitored area. Some alternative proposed locations are the Ayr Water Pollution Control Plant, the North Dumfries Health and Community Centre, or St. Brigid Elementary School.

To ensure rain gauges are collecting accurate precipitation data throughout the monitoring period, regular maintenance is required. Regular maintenance tasks typically include the following:

- Calibration
- Cleaning (clearing any possible debris build up)
- Data download
- Assessment of site security

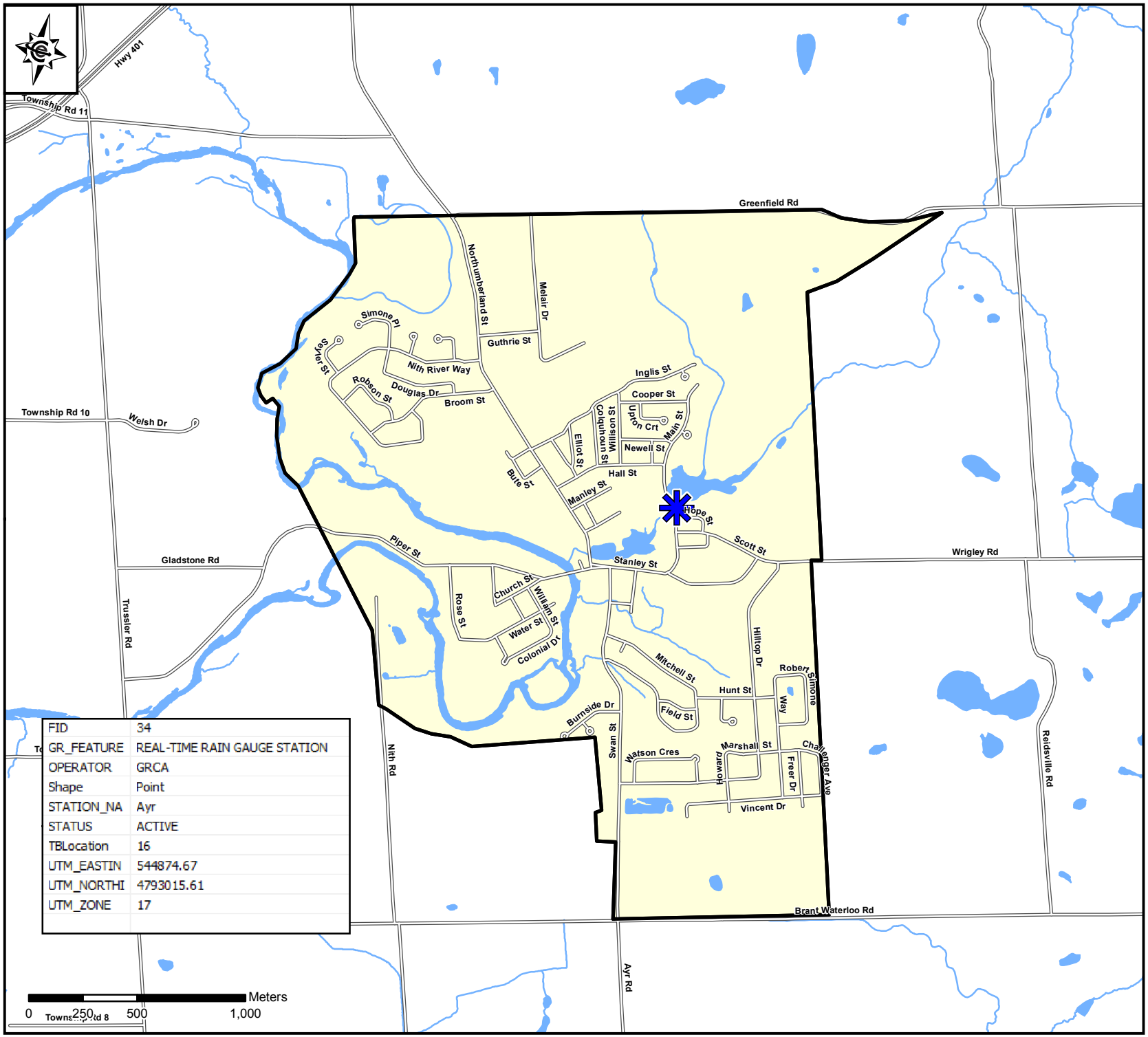
An effective rain gauge maintenance schedule will depend on the configuration and data logging and data transmission capabilities of the rain gauge installed.

A rain gauge that is equipped with remote data access or wireless data transmission capabilities would require fewer site visits to perform regular maintenance tasks and data downloads as the data quality and key indicators of equipment health could be tracked remotely on an hourly or daily basis (depending on the frequency of data transmission). In such a case, monthly or quarterly site visits for gauge calibration and site maintenance are likely sufficient to ensure high quality and reliable data is collected. Gauges should always be visited after the winter to re-calibrate the gauge, and to ensure that snow and ice buildup did not adjust or damage the gauge or sensors.

A rain gauge that is equipped with only a basic data logger without the ability to transmit data wirelessly will require more frequent site visits to retrieve data and ensure the equipment is maintained. In such a case, bi-weekly or monthly site visits for gauge calibration, site maintenance and data downloads are likely necessary to ensure high quality and reliable data is collected.

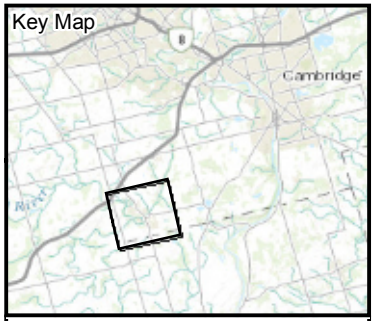
10.3 Operation and Maintenance Procedures

IBI Group has identified the operation and maintenance requirements of each SWM facility and its assets which will allow for forecasting future requirements in terms of capital costs, operation and maintenance costs, and resources required by the Township to maintain its SWM facilities. The life cycle costs of each SWM facility have been calculated based on the forecasted operations and maintenance requirements. This information is incorporated into the database, allowing Township staff to easily identify and plan yearly costs and resources required for each SWM facility and the overall program.



FID	34
GR_FEATURE	REAL-TIME RAIN GAUGE STATION
OPERATOR	GRCA
Shape	Point
STATION_NA	Ayr
STATUS	ACTIVE
TBLocation	16
UTM_EASTIN	544874.67
UTM_NORTHI	4793015.61
UTM_ZONE	17

Key Map



Legend

- Rain Gauge Stations
- Road
- Watercourse
- Waterbody
- Ayr Study Area

Figure 10.3
Proposed and Alternative Locations for a New Rain Gauge

Township of North Dumfries
Storm Water Management Guiding Principles

IBI

Project No.: 2019-0506

Date: September 2022

LTS 4/8/2020 D:__Projects\x2019-0506\600_GIS\20_Maps\01_Working\RainGauge.mxd

After completing an inventory of the SWM facilities and their assets within the Township, we were able to develop an inspection and maintenance approach. The approach will be documented with an operation and maintenance standard operating procedure manual that will outline how to monitor, inspect, and maintain the SWM facilities and their assets. See **Appendix J** for an example operation and maintenance manual. The manual specifies in detail the procedures Township staff will need to undertake when monitoring and inspecting the SWM facility and will include the following:

- Timelines for monitoring, inspections, and maintenance activities
- Monitoring and inspection checklist based on the timelines
- Guidance to interpret the monitoring data
- Recommendations for the various maintenance activities that may be undertaken for each SWM facility based on the monitoring data
- A standardized rating system to assess the priority of the maintenance needs for the various SWM facilities
- Procedures for sediment sampling, removal, and disposal
- Procedures for obtaining required approvals for removal and disposal of sediments.

The above helps the Township ensure that it remains in compliance with the ECAs for its municipal stormwater facilities.

In prioritizing the proposed solutions, considerations will be made for future implementation of the solutions, which is outside of the scope of this project. This may include the consideration of staging plans, property acquisition, easements, utility relocation, or any other timing or physical constraints the City may encounter. The Project Team will strive to present solutions capable of achieving the highest water quality results, while simultaneously thinking of the practical aspects the City will face beyond the life of Phases I and II of this Class EA project

10.4 Stormwater Quality Management Strategy

The Master Plan will include a stormwater quality management strategy.

The focus will be on promoting measures that reduce stormwater pollution at source. Measures that may be included are as follows:

- Encouragement of lot level improvements on public and private property, such as:
    - Soakaway pits
    - Roof leader splashpads
    - Oil / grit separators
    - Pervious pavement
    - Green roof technology
- Implementation of conveyance enhancements on municipal rights-of-way, such as:
    - Pervious piping
    - Bioswales
    - Dryswales

10.5 Policy Considerations

The recommendations of this Master Plan should be incorporated into the next Official Plan Update.

In addition to providing physical solutions in the stormwater quality management strategy, the Project Team will also recommend policies based on review of other local municipal, provincial, or other agency documents. The recommendations for incorporation to Township policies will be detailed in the Master Plan document. Policy recommendations will include, but not be limited to:

- Municipal standards, operations, maintenance and design practices
- Infill development SWM practices
- Disposal of material removed from municipal stormwater treatment facilities

10.5.1 Municipal Standards, Operations, Maintenance and Design Practices

Comparable municipal guidelines, such as the City of Barrie's Storm Drainage and Stormwater Management Policies and Guidelines, 2009, or the City of Toronto's Wet Weather Flow Management Guidelines, 2007, will be reviewed to ensure the Township maintains current standards in stormwater maintenance and design. Review of various municipal perspectives will allow for optimization of the Township own practices.

10.5.2 Infill Development SWM Practices

Comparable infill development guidelines, such as the City of Ottawa's Urban Design Guidelines for Low-Medium Density Infill Housing Update, 2009, will be reviewed to ensure the Township maintains current standards in infill stormwater management maintenance and design. Review of various municipal and provincial perspectives will allow for optimization of the Township's own practices.

10.5.3 Disposal of Materials Removed from Municipal Stormwater Facilities

IBI Group will provide the Township with advice on to how to deal with material that is occasionally removed from stormwater facilities such as storm ponds. Clean-out of accumulated sediments from storm ponds is needed from time to time, to maintain ECA compliance. Disposal of that material is an important cost consideration for pond clean-outs. We will review and summarize current regulatory requirements in this regard and provide the Township with a step-by-step procedure for designing a pond clean-out.

11 Notice of Study Completion

A Notice of Completion will be developed to provide the public with a final opportunity to comment on the project. The Notice will indicate the conclusions of the Master Planning/EA process, and will indicate where copies of the Master Plan can be reviewed. The Master Plan must be completed to document the Class EA process and must be filed for a 30 calendar-day public review.

As per the requirements spelled out in Section 2 and the Preferred Alternatives identified in Section 8, we have identified the applicable EA Schedules for each activity, and provided a brief summary table of general Schedule listings.

Table 11-1 Class EA Schedules

ACTIVITY	A/A+	B	C
Stormwater Management	**A11** Establish new or replace or expand existing stormwater detention / retention ponds or tanks and appurtenances including outfall to receiving water body provided all such facilities are in either an existing utility corridor or an existing road allowance where no additional property is required. (NOTE – Utility corridors are not always linear, therefore expansion of a stormwater management facility is a Schedule A activity provided no additional property is required.) **A17** Construction of stormwater management facilities which are required as a condition of approval on a consent, site plan, plan of subdivision or condominium which will come into effect under the Planning Act prior to the construction of the facility.	**B2** Establish new stormwater retention / detention ponds and appurtenances or infiltration systems including outfall to receiving water body where additional property is required. **B3** Enlarge stormwater retention / detention ponds / tanks or sanitary or combined sewage detention tanks by addition or replacement, at substantially the same location where additional property is required. **B21** Construct a stormwater control demonstration or pilot facility for the purpose of assessing new technology or procedures. **B24** Establish stormwater infiltration system for groundwater management.	**C7** Construct new or modify, retrofit, or improve existing retention / detention facility or infiltration system for the purpose of stormwater quality control where chemical or biological treatment or disinfection is included, including outfall to receiving water body.
Water Courses	**A12** Replace traditional materials in an existing watercourse or in slope stability works with material of equal or better properties, at substantially the same location and for the same purpose. **A13** Reconstruct an existing dam weir at the same location and for the same purpose, use and capacity. **A16** Roadside ditches, culverts and other such incidental stormwater works constructed solely for the purpose of servicing municipal road works.	**B14** Water crossing by a new or replacement sewage facility except for the use of Trenchless Technology for water crossings. **B15** Construct berms along a watercourse for purposes of flood control in areas subject to damage by flooding. **B16** Modify existing water crossings for the purposes of flood control. **B17** Works undertaken in a watercourse for the purposes of flood control or erosion control, which may include: • bank or slope regrading • deepening the watercourse • relocation, realignment or channelization of watercourse • revetment including soil bio-engineering techniques • reconstruction of a weir or dam **B18** Construction of a spillway facilities at existing outfalls for erosion or sedimentation control. **B19** Construct a fishway or fish ladder in a natural watercourse, expressly for the purpose of providing a fishway. **B20** Enclose a watercourse in a storm sewer. **B22** Reconstruct existing weir or dam at the same location where the purpose, use and capacity are changed. **B23** Removal of an existing weir or dam.	**C8** Construction of a diversion channel or sewer for the purpose of diverting flows from one watercourse to another. **C9** Construct new shore line works, such as off-shore breakwaters, shore-connected breakwaters, groynes and sea walls. **C10** Construct a new dam or weir in a watercourse.

Appendix A

Kickoff Meeting Minutes

Meeting Minutes

MEETING:	SWMMP Kickoff	DATE:	February 28 2020
LOCATION:	Township of North Dumfries Community Centre	TIME:	10:00-11:30 am
PROJECT NAME:	Ayr SWM Master Plan	PROJECT #:	2019-0506
PURPOSE:	Kickoff Meeting		

PRESENT:	REGRETS:
Roy Johnson, Water Resources, COLE (RJ)	n/a
Mark Smuck, Director of Community Services, Ayr (MS)	
Cyrus Rife, Operations Supervisor, Ayr (CR)	

ITEM	DESCRIPTION	ACTION BY
1.	Treasurer will want to pay bills quickly due to government funding; MS will send RJ contact info for Treasurer to facilitate coordination	MS
2.	MS indicates the Ayr does not have a great deal of background information, but may be available from Region of Waterloo and/or GRCA	Info
3.	Town is built on an old gravel pit. Instead of storm sewers, catchbasins are pervious to the fractured rock below; when they overflow, ponding occurs on streets or in people's yards. There are no sewer outlets, will need to assess ditches for conveyance capacity.	Info
4.	MS to provide information on immediate future development	MS
5.	COLE to provide Notice of Commencement of EA Study to Ayr	RJ
6.	KSmart Engineers provide technical review for the Town, in conjunction with GRCA. MS to provide contact info to COLE	MS
7.	Flooding and erosion locations were discussed.	Info
8.	Region of Waterloo has pumping stations and wells in town, MS to provide info to COLE	RJ
9.	MS retires end of April, replacement TBD.	Info
10.	Town uses GRCA rainfall data	Info
11.	Gibson Street appears to have a high groundwater level; ex. Inglis Street is 8' below surrounding grade.	Info

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2018 SME CANADA'S TOP SMALL & MEDIUM EMPLOYERS

Summary of Actions

ITEM	ACTION	LEAD	DUE DATE
1.	MS to provide COLE with available data for review	MS	
2.	COLE to provide Notice of Commencement	RJ	3/13/2020
3.	COLE to review available data, contact KSmart and GRCA, arrange meeting w/ Town staff to visit flooding and erosion locations	RJ	

Next Meeting: TBD
Minutes Recorded By: Roy Johnson
Distribution: All Invitees, Sub-Consultants

Appendix B

Environmental Reports

INTRODUCTION

The Ayr Stormwater Management Master Plan study area (Figure 1, below) is located within the lower Nith River subwatershed of the larger Grand River watershed.

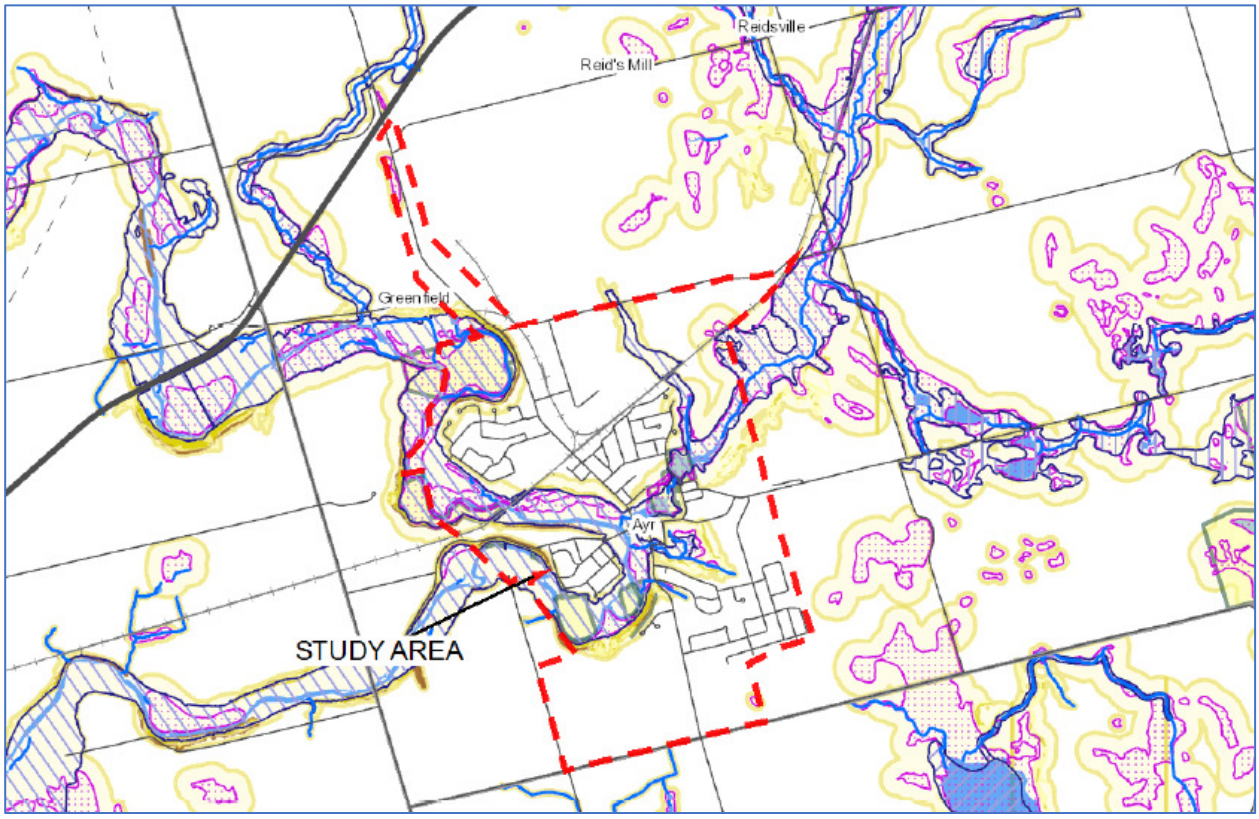

Figure 1: Ayr SWMMP Study Area (red dashed boundary), showing Nith River to the west of Ayr, Cedar Creek entering from the northeast, and Eden Creek entering the Nith River at Greenfield to the north.

The study area includes the segment of the Nith River that meanders through the Town of Ayr. Additionally, the study area includes the lowermost segment of the Nith River tributary Cedar Creek and its two historic Ayr mill ponds, Watson Pond and Jedburgh Pond, that are located just upstream of the confluence with the Nith River. The northernmost extension of the study area includes a small portion of the subwatershed drainage area of the Nith River tributary Eden Creek, but does not include any portion of the Eden Creek watercourse.

The fish habitat classification and fish community of each watercourse is described in the sections below, with reference to the occurrence of sensitive habitat conditions (e.g., groundwater-fed coldwater habitat), sensitive species (e.g., listed aquatic Species at Risk), fisheries objectives (e.g., fish community composition) and fisheries management challenges (e.g., nutrient inputs from agricultural sources, fish migration barriers, lack of riparian habitat).

The Grand River Conservation Authority (GRCA) provided key fisheries information in a 08 April 2020 letter in response to request for information. During subsequent consultation GRCA staff provided pertinent sections of the 2005 Grand River Fisheries Management Plan (GRFMP) and extracted available fish collection data from GRCA's GIS files.

Information on the occurrence and distribution of aquatic species at risk (SAR) with federal Species at Risk Act (SARA) and/or provincial Endangered Species Act (ESA) designations was obtained from on-line Department of Fisheries and Oceans (DFO) mapping.

NITH RIVER

The Nith River enters the study area from the northwest, meanders through Ayr and exits to the southwest. GRFMP identifies the segment of the Nith River within the Town of Ayr as part of the "Lower Nith River" that extends from the Town of Plattsville to the confluence with the Grand River at the Town of Paris. The main stem of the lower Nith River contains warmwater fish habitat and GRFMP fish community objectives include for the resident fish community "a diverse warmwater fish community dominated by top predators (e.g., walleye, smallmouth bass and pike)" and for seasonal migrants from Lake Erie via the Grand River "a seasonal coldwater fish community (i.e., migratory rainblow trout)".

The GRFMP identifies landscape-level issues and challenges involving both rural and urban landuse impacts resulting in "excess nutrients, sediment inputs, riparian zone destruction, increased water temperatures, land drainage with related effects on summer baseflows, water treatment plant effluents, stormwater discharge". Immediately upstream of the study area, the GRFMP identifies the remains of the former Greenfield Dam as a seasonal barrier to upstream fish migration in the Nith River during low flow periods.

GRCA provided the following list of fish species (Table 1) comprising the Nith River fish community in the vicinity of Ayr as reflected by MNRF survey point records comprising sampling efforts over the years by GRCA, MNRF and ROM:

Table 1: Nith River Fish Species

SUCKER FAMILY	**CATOSTOMIDAE**	
white sucker	*Catostomus commersonii*	
northern hog sucker	*Hypentelium nigricans*	
black redhorse	*Moxostoma duquesnei*	Threatened (SARA, ESA)
golden redhorse	*Moxostoma erythrurum*	
shorthead redhorse	*Moxostoma macrolepidotum*	
greater redhorse	*Moxostoma valenciennesi*	
MINNOW FAMILY	**CYPRINIDAE**	
common carp	*Cyprinus carpio*	non-native
striped shiner	*Luxilus chrysocephalus*	
common shiner	*Luxilus cornutus*	
hornyhead chub	*Nocomis biguttatus*	
river chub	*Nocomis micropogon*	
blacknose shiner	*Notropis heterolepis*	
silver shiner	*Notropis photogenis*	Threatened (SARA, ESA)
rosyface shiner	*Notropis rubellus*	
mimic shiner	*Notropis volucellus*	

bluntnose minnow	*Pimephales notatus*	
longnose dace	*Rhinichthys cataractae*	
CATFISH FAMILY	**ICTALURIDAE**	
stonecat	*Noturus flavus*	
SALMON FAMILY	**SALMONIDAE**	
rainbow trout	*Oncorhynchus mykiss*	non-native coldwater sportfish; seasonal migrant
PIKE FAMILY	ESOCIDAE	
northern pike	*Esox lucius*	top predator, sportfish
SUNFISH FAMILY	**CENTRARCHIDAE**	
rock bass	*Ambloplites rupestris*	
smallmouth bass	*Micropterus dolomieu*	top predator, sportfish
black crappie	*Pomoxis nigromaculatus*	
PERCH FAMILY	**PERCIDAE**	
greenside darter	*Etheostoma blennioides*	
rainbow darter	*Etheostoma caeruleum*	
johnny darter	*Etheostoma nigrum*	
blackside darter	*Percina shumardi*	
STICKLEBACK FAMILY	**GASTEROSTEIDAE**	
brook stickleback	*Culaea inconstans*	

The Nith River fish community is dominated by native species, and the fish collection records reveal a diverse assemblage of species within the sucker, minnow and perch families. Highlights of the local Nith River fish community include the occurrence of resident top predator sportfish Smallmouth Bass and Northern Pike and the migratory Rainbow Trout. The Nith River is a migratory route for Rainbow Trout and, at Ayr, Rainbow Trout are known to leave the Nith and migrate up into Cedar Creek and Eden Creek, although passage within Cedar Creek is limited to Watson Pond, the lower of the two mill ponds.

The Nith River fish species are all spring spawners, with relatively short egg incubation periods in the spring or very early summer such that young-of-the year fish hatch shortly after eggs are deposited and disperse into rearing/nursery habitats.

DFO online aquatic SAR mapping (purple-coloured watercourse segments on Figure 2, below) indicates the presence in the Nith River of two federally and provincially Threatened species (Black Redhorse and Silver Shiner) and one federally and provincially designated Special Concern species (Rainbow Mussel). None of these species has federally defined Critical Habitat and no Critical Habitat of aquatic SAR is mapped within this segment of the Nith River. The provincial Endangered Species Act (ESA) protects the general habitat of the two Threatened fish species, which includes the Nith River channel and adjacent riparian and floodplain areas.

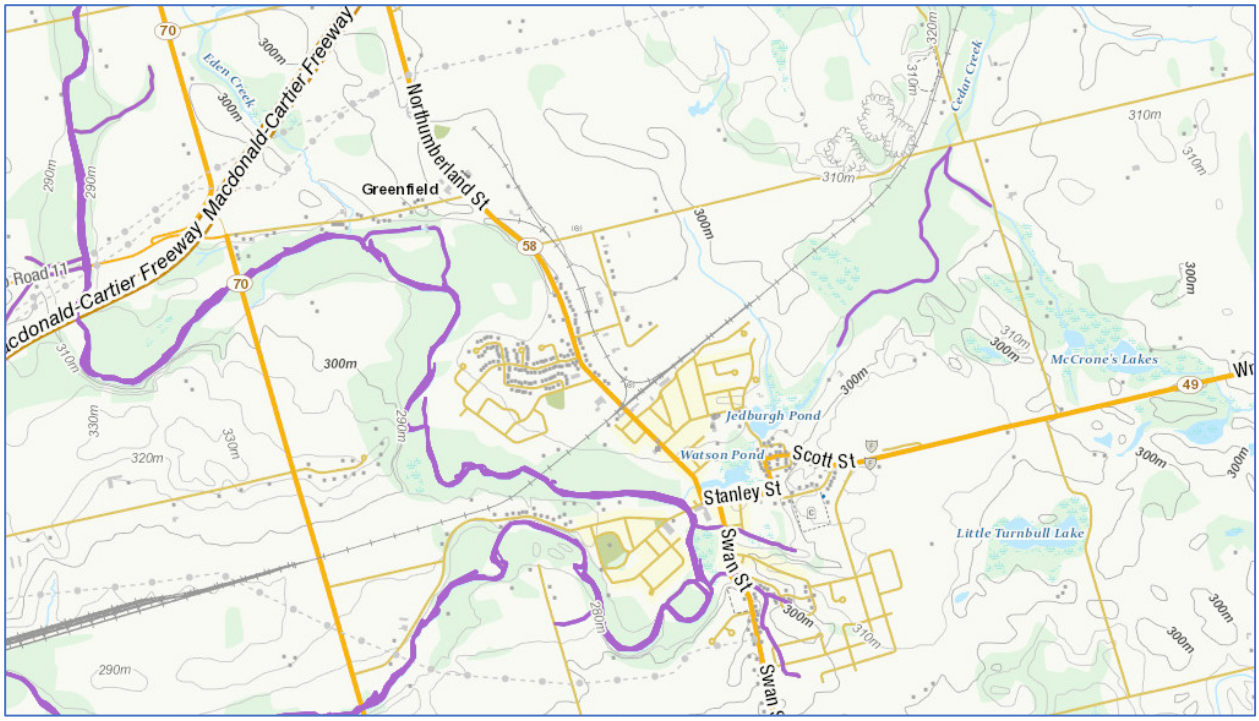

Figure 2: DFO Aquatic SAR mapping showing purple-shaded reaches of the Nith River in and near Ayr that indicate habitat of Black Redhorse, Silver Shiner and Rainbow Mussel.

CEDAR CREEK

Cedar Creek enters the study area from the northeast as a flowing coldwater creek and, in the centre of Ayr just upstream of its confluence with the Nith River, includes the historic mill ponds Watson Pond and Jedburgh Pond in the GRCA-owned Upper Mill Pond property. The ponds also contain coldwater habitat. GRCA provided comments and information that discussed salmonid migratory access, presence, artificial stocking, and spawning in the vicinity of the ponds in Ayr.

The GRFMP identifies issues in Cedar Creek and other coldwater lower Nith River tributaries as involving rural land use impacts (e.g., nutrient and sediment inputs, riparian zone destruction and alterations in flow conditions), aggregate extraction impacts (e.g., changes to groundwater conditions), and effects of on-line ponds (e.g., negative impacts on fish migration, possible positive effects of limiting fish migration to exclude non-native predators, loss of flowing-water habitat, and water temperature and water quality effects).

GRCA reported that upstream migration into Cedar Creek from the Nith River over the lower Ayr dam into Watson Pond is known for Rainbow Trout, a species that can jump low barriers. Upstream passage by other, non-jumping, Nith River fish species was not reported. Upstream migration by Rainbow Trout beyond the upper dam into Jedburgh Pond has not been reported. GRCA reported that native coldwater Brook Trout spawning in Cedar Creek upstream of Jedburgh Pond. As such, the Cedar Creek fish community is mostly separated from that of the Nith River and the native resident Brook Trout population is protected by the upper Ayr dam from potential invasion by and competition with the non-native Rainbow Trout and with the non-native Brown Trout that GRCA stocks in Watson Pond as a put-and-take fishery.

GRCA provided the following list of fish species (Table 2) from MNRF aquatic survey data for Cedar Creek (above, between and below the Watson and Jedburgh mill ponds):

Table 2: Cedar Creek Fish Species

SUCKER FAMILY	**CATOSTOMIDAE**	
white sucker	*Catostomus commersonii*	
black redhorse	*Moxostoma duquesnei*	Threatened (SARA, ESA)
MINNOW FAMILY	**CYPRINIDAE**	
fathead minnow	*Pimephales promelas*	
blacknose dace	*Rhinichthys atratulus*	
longnose dace	*Rhinichthys cataractae*	
creek chub	*Semotilus atromaculatus*	
SALMON FAMILY	**SALMONIDAE**	
rainbow trout	*Oncorhynchus mykiss*	non-native coldwater sportfish; seasonal migrant
brook trout	*Salvelinus fontinalis*	native coldwater sportfish; resident
MUDMINNOW FAMILY	**UMBRIDAE**	
central mudminnow	*Umbra limi*	
SUNFISH FAMILY	**CENTRARCHIDAE**	
pumpkinseed	*Lepomis gibbosus*	
largemouth bass	*Micropterus salmoides*	top predator, sportfish
STICKLEBACK FAMILY	**GASTEROSTEIDAE**	
brook stickleback	*Culaea inconstans*	
SCULPIN FAMILY	***COTTIDAE***	
mottled sculpin	*Cottus bairdii*	coldwater prey/forage fish

The Cedar Creek fish community is less diverse than that of the Nith River and notably contains resident coldwater species Brook Trout and Mottled Sculpin, which are indicative of good water quality and input of cold groundwater that maintains coldwater conditions year-round. The occurrence of migratory Rainbow Trout within the Cedar Creek is limited to the lowermost Watson Pond and the upper Ayr dam protects the native coldwater fishery from invasion by this non-native species. The occurrence of Largemouth Bass in Cedar Creek is entirely a consequence of historical stocking within the mill ponds as Largemouth Bass requires warm temperature and still water conditions that naturally flowing reaches of Cedar Creek cannot provide. Otherwise, the fish community includes several native minnows, most of which are associated with flowing stream habitats and the native Central Mudminnow and Brook Stickleback which are characteristic of headwater drainage features and small watercourses.

The Cedar Creek fish species include mostly spring spawners. Brook Trout is a fall spawner, the eggs of which incubate in streambed substrates over the winter and hatch the following spring. This confers an extended sensitive period on those portions of Cedar Creek where Brook Trout spawn and indicates use of the October 1 – May 31 construction timing restriction, with possible extension to July 15 to also protect the Cedar Creek spring-spawning species. While coldwater habitat occurs in Watson and Jedburgh Ponds, it could be argued that only the spring-spawning timing restriction of March 15 – July 15 should apply as Brook Trout spawning habitat does not occur in the ponds.

DFO online aquatic SAR mapping (purple-coloured watercourse segments on Figure 3, below) indicates the presence of a single Threatened species (Black Redhorse) in flowing sections of Cedar Creek upstream of Watson Pond and Jedburgh Pond. Federally assigned Critical Habitat has not been defined for Black Redhorse and therefore no Critical Habitat of SAR is mapped within Cedar Creek. The provincial Endangered Species Act (ESA) protects the general habitat of Black Redhorse within Cedar Creek, which includes the mapped channel sections and adjacent riparian and floodplain areas.

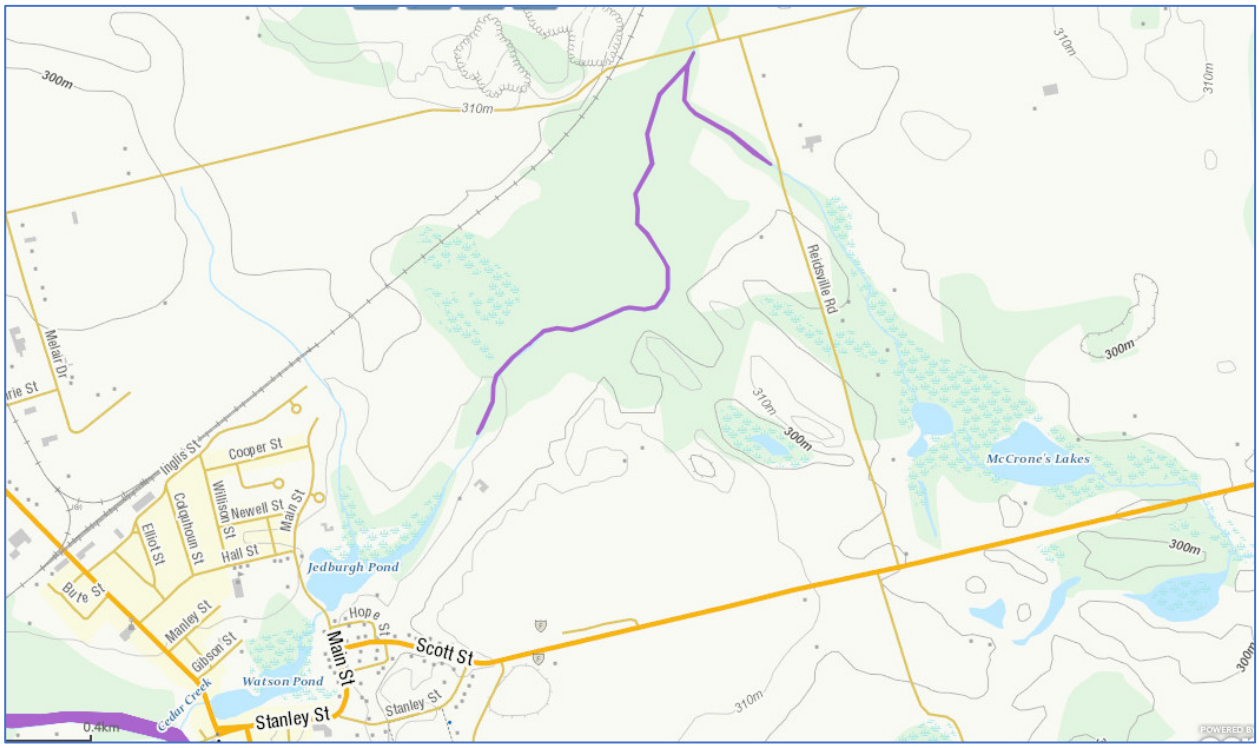

Figure 3: DFO Aquatic SAR mapping showing purple-shaded reaches of Cedar Creek upstream of Ayr that indicates habitat of Black Redhorse.

EDEN CREEK

Eden Creek is northwest and entirely outside of the study area, but a small northern extension of the study area includes part of the Eden Creek subwatershed. GRFMP indicates that Eden Creek is a mixed water fishery that includes both coldwater and warmwater habitats and associated species.

The GRFMP identifies issues with Eden Creek as including effects of rural land use practices that contribute excess nutrients and sediments, limit the extent of riparian habitat and alter the flow regime through water-taking.

GRCA cited MNRF aquatic survey data available through GIS records to list the following fish species in the lower portion of Eden Creek (between Alps Rd & the confluence with the Nith River):

Table 3: Eden Creek Fish Species

SUCKER FAMILY	**CATOSTOMIDAE**	
white sucker	*Catostomus commersonii*	

northern hog sucker	*Hypentelium nigricans*	
MINNOW FAMILY	**CYPRINIDAE**	
common shiner	*Luxilus cornutus*	
blacknose dace	*Rhinichthys atratulus*	
longnose dace	*Rhinichthys cataractae*	
creek chub	*Semotilus atromaculatus*	
SALMON FAMILY	**SALMONIDAE**	
rainbow trout	*Oncorhynchus mykiss*	non-native coldwater sportfish; seasonal migrant
brook trout	*Salvelinus fontinalis*	native coldwater sportfish; resident
MUDMINNOW FAMILY	**UMBRIDAE**	
central mudminnow	*Umbra limi*	
SUNFISH FAMILY	**CENTRARCHIDAE**	
bluegill	*Lepomis marochirus*	
STICKLEBACK FAMILY	**GASTEROSTEIDAE**	
brook stickleback	*Culaea inconstans*	
SCULPIN FAMILY	***COTTIDAE***	
mottled sculpin	*Cottus bairdii*	coldwater prey/forage fish

The Eden Creek fish community is like that of Cedar Creek, with mostly native species, most of which are characteristic of flowing water habitat, and notably including the coldwater Brook Trout and Mottled Sculpin. Rainbow Trout are recorded in Eden Creek, but it was not reported whether this migratory non-native is able to ascend Eden Creek reaches containing the native Brook Trout.

As Eden Creek does not occur within the study area, it is unlikely that any stormwater management projects would involve works or activities within the watercourse or near enough to it that construction timing restrictions for spring-spawning or fall-spawning species would be required.

DFO's online aquatic SAR mapping indicates no SAR and no Critical Habitat of SAR in Eden Creek.

AQUATIC SPECIES AT RISK

Three aquatic SAR are known to occur within the study area reaches of the Nith River, one of which, the Black Redhorse, also occurs within parts of lower Cedar Creek.

The Black Redhorse (*Moxostoma duquesnei*) is a member of the sucker family that is listed as Threatened federally and provincially. Suitable habitat for the Black Redhorse is shallow, medium-sized weed-free rivers and creeks with sand and gravel substrates. Spawning habitat is fast-flowing water over gravelly riffles where eggs are deposited in the spring (May/June) of each year and hatch shortly thereafter. The Black Redhorse is a resident species that occurs year-round in the study area within the Nith River and in lower reaches of Cedar Creek. It is not known to occur in Eden Creek. Threats to Black Redhorse in Ontario include upstream migration barriers (e.g., dams, weirs, impassable culverts), water level fluctuations, and the availability of suitable habitat with clean clear unpolluted water that allows for production of its aquatic invertebrate prey and successful reproduction. In Ontario the Black Redhorse and its "general habitat" are protected by the Endangered Species Act. Black Redhorse is one of the aquatic species subject to O. Reg. 242/08

section 23.4 which identifies mitigation and restoration measures for certain works and activities within or adjacent to watercourses, and as such affords protection to both instream and riparian habitat in watercourses in which it occurs.

The Silver Shiner (*Notropis photogenis*) is a member of the minnow family that is listed as Threatened federally and provincially. Suitable habitat for the Silver Shiner is medium to large weed-free creeks and rivers with sand and gravel substrates. Spawning habitat is fast-flowing water over gravelly riffles where eggs are deposited in June/July and hatch soon afterward. The Silver Shiner is a resident species that occurs year-round in the study area within the Nith River. It is not known to occur in either of Cedar Creek or Eden Creek. Threats to Silver Shiner in Ontario include dams that create upstream migration barriers and alter natural flowing water habitats, land use impacts that degrade water quality and increase sedimentation, predation by artificially stocked sportfish and capture for use as bait fish. Temperature is noted as a limiting factor as Silver Shiner in southern Ontario are at the extreme northern limit of the species' geographic range. In Ontario the Silver Shiner and its "general habitat" are protected by the Endangered Species Act and O. Reg. 242/08. For Silver Shiner the general habitat is described in detail under three categories of decreasing sensitivity including "Category 1: Flowing pools, runs and riffles in occupied reaches", "Category 2: Shallow, nearshore habitats, and areas with aquatic vegetation in occupied reaches" and "Category 3: Floodplains and riparian edges adjacent to occupied reaches". Within the study area, Silver Shiner habitat therefore includes the entire segment of the Nith River, its floodplain and banks.

The Rainbow (*Villosa iris*) is a small freshwater mussel that is listed as Special Concern federally and provincially. It was previously listed as provincially Threatened and nationally Endangered but was subsequently found to occur in abundance in southern Ontario and was downlisted to Special Concern. The Rainbow occurs in small to medium sized rivers with fast flow and sand/gravel/rock substrates. Within the study area, the Rainbow occurs within the Nith River. It is not known to occur in Cedar Creek or Eden Creek. As a Special Concern species, neither it nor its habitat are protected by the Endangered Species Act.

SUMMARY AND CONCLUSIONS

Fish habitat within the Ayr SWMMP study area includes portions of the warmwater Nith River and the coldwater Cedar Creek. Eden Creek fish habitat is outside of the study area, which includes only a small portion of land that drains towards Eden Creek but no segments of the creek itself.

The GRFMP identifies rural and land use impacts on the Nith River and its tributaries of impaired water quality (nutrients, turbidity, temperature) and sedimentation within streambeds, altered flow conditions due to water-taking and impoundments, and reduced extent of vegetated riparian habitats. Stormwater management can address impaired water quality, sedimentation and flow conditions. Where stormwater facilities and/or their outlets are constructed near watercourses, there may be opportunities to restore naturally vegetated riparian habitat.

Work and activities to create, retrofit, modify or maintain SWM facilities near water within the study area may trigger mitigation measures to protect fish and fish habitat (e.g., seasonal construction timing restrictions combined with appropriate physical measures such as erosion and sedimentation controls) and measures to protect aquatic SAR (i.e., individuals and general habitat of Threatened Black Redhorse and Silver Shiner in compliance with the provincial ESA and the federal SARA).

DFO describes seasonal mitigation measures as follows: "Restricted activity timing windows are applied to protect fish from impacts of works or undertakings in and around water during spawning migrations and other critical life history stages." In Ontario, the timing "windows", or more intuitively "restrictions", are based on fish community life history characteristics and are timed to respect a distinction between fish species that spawn in the spring and those that spawn in the fall. Eggs of spring spawners mature quickly and hatch soon afterward in that same spring or early summer. Eggs of fall spawners, of which the coldwater Brook Trout and the stocked Brown Trout are the only representatives in Ayr, overwinter in the streambed substrates where they are deposited during spawning and do not hatch until the following spring. The specific timing restrictions are applied regionally, to Ontario's Northwest, Northeast and Southern Regions, respectively, and reflect regional climatic and fish community differences. The Southern Region timing restrictions that apply to the watercourses in the Ayr SWMMP study area are:

- Spring spawning timing restriction applies to Nith River (March 15 – July 15).
- Fall spawning timing restriction applies to Cedar Creek and Eden Creek (October 1 – May 31).

For SWM works and activities near water and within the general habitat of Threatened SAR Black Redhorse and/or Silver Shiner, the "Aquatic Species" exemption in Section 23.4 of O. Reg. 242/08 may apply if the type and extent of disturbance meets criteria and, if so, will guide the application of appropriate mitigation, monitoring and restoration measures. Otherwise, work and activities near water could require both ESA and SARA permits issued by the provincial Ministry of Environment, Conservation and Parks (MECP) and DFO respectively.

In summary, stormwater management represents an opportunity for local improvements to fish habitat through improved water quality and water quantity and possibly also through localized habitat restoration. Constraints to construction and operation of specific stormwater management facilities will need to be assessed on a site-specific basis that takes into account the watercourse involved and the local characteristics and sensitivities of its fish community and fish habitat.

LGL LIMITED
environmental research associates

Technical Report

DESKTOP NATURAL TERRESTRIAL AND WETLAND ENVIRONMENTAL SCREENING REPORT

COLE # 2019-0506 AYR SWM-MP

for:

COLE ENGINEERING GROUP LTD.

by:

LGL Limited
environmental research associates

APRIL 2020

LGL PROJECT NO. TA8993

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Date:	April 27, 2020	Version:	1, Draft
	April 30, 2020		2, Final

APRIL 2020
LGL PROJECT TA8993

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Figure 4 Wetlands, Woodlands and ANSI 7

1.0 INTRODUCTION

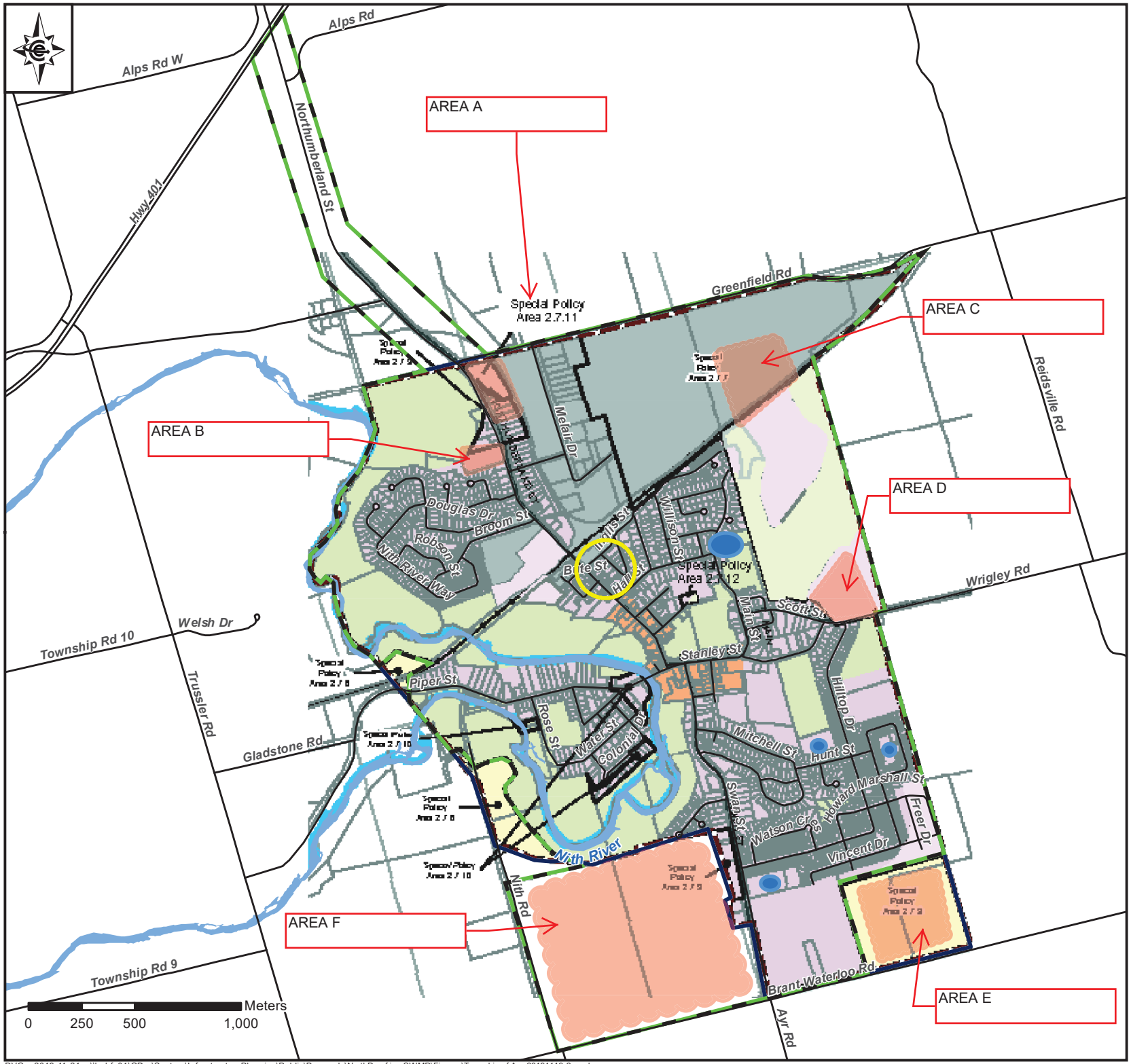
As part of the planning for future residential (and other) development in the Town of Ayr (Ayr), Region of Waterloo, Ontario, LGL Limited (LGL) was retained to complete a Natural Heritage Screening Report. The purpose of the Natural Heritage Screening Report is to compile information from available sources to determine the species at risk (SAR) and sensitive natural heritage features that are known within the Township of Ayr (Study Area), which could be affected by future development. In particular, the Natural Heritage Screening will be used by Cole Engineering Ltd. (Cole) in the development of a Stormwater Management Master Plan for Ayr. For the purpose of this report, the Study Area is the Town of Ayr, plus an area extending to Highway 401, with areas of approximate future development (Figure 1).

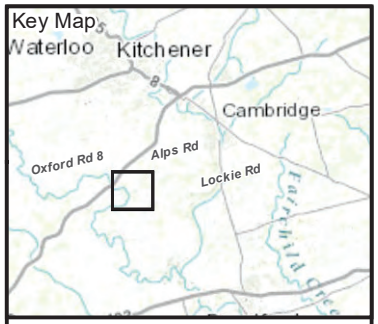
2.0 METHODS

LGL conducted a desktop-based review of natural heritage constraints for the Study Area. The databases reviewed to determine these constraints include the following:

- Land Information Ontario (LIO) (natural areas and species);
- Atlas of the Mammals of Ontario;
- Bat Conservation International Species Profiles;
- Atlas of the Breeding Birds of Ontario;
- eBird;
- iNaturalist;
- Aquatic species at Risk Maps (Department of Fisheries and Oceans Canada);
- Butterfly Atlas of Ontario;
- Alvars of Ontario;
- Tallgrass Ontario (Simcoe Lowlands Physiographic region);
- The Vascular Plants of Ontario (Oldham and Brinker, 2009);
- Vascular Plants at Risk in Ontario (Leslie, 2018);
- Grand River Conservation Authority (GRCA) Regulation Limits (and a request for information);
- Township of North Dumfries Official Plan; and,
- Region of Waterloo Official Plan.

From these databases, LGL developed figures showing where the natural feature polygons that occur within the Study Area. A table of the SAR that could occur in the area was also developed.





Legend

- Approximate Study Boundary
- Municipal Boundary
- Watercourse

Landuse Type

- Agricultural
- Urban Growth Centre
- General Industrial
- Open Space
- Urban Residential and Ancillary
- Urban Growth Centre

Approximate Future Development

SWM Facilities

Figure 1
Ayr Land Use

Township of North Dumfries
Storm Water Management
Master Plan

COLE

Project No.:	Date:
2019-0506	November 2019

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3.0 RESULTS

The study Area consists of several land use types, including agricultural, urban growth, industrial, residential and open space. Most notably, the Nith River and Cedar Creek, their tributaries and associated riparian habitat fall within the Study Area. There are also areas of wetlands, woodlands and aquatic features.

A site reconnaissance was conducted on April 24, 2020 to confirm the site conditions visible from public roads. A closer inspection may be required in advance of construction when the development areas are better known, but the description below provides an account of the current site conditions on that date.

Area A is a fallow field with mowed grass. It slopes from Northumberland Road towards the rail tracks. There is a fencerow of mature trees of mixed species between the mowed field and the houses.

Area B is currently under construction for a housing development. It is unclear whether any space will remain for stormwater management, or if this has already been incorporated into the development underway. West of the area, there are mature coniferous trees and then the landscape slopes steeply towards the Nith River.

Area C is not easily visible from the road, but appears to be an agricultural field that was most recently used for corn. The area adjacent to the railroad appears to have been filled with some gravel and rock material.

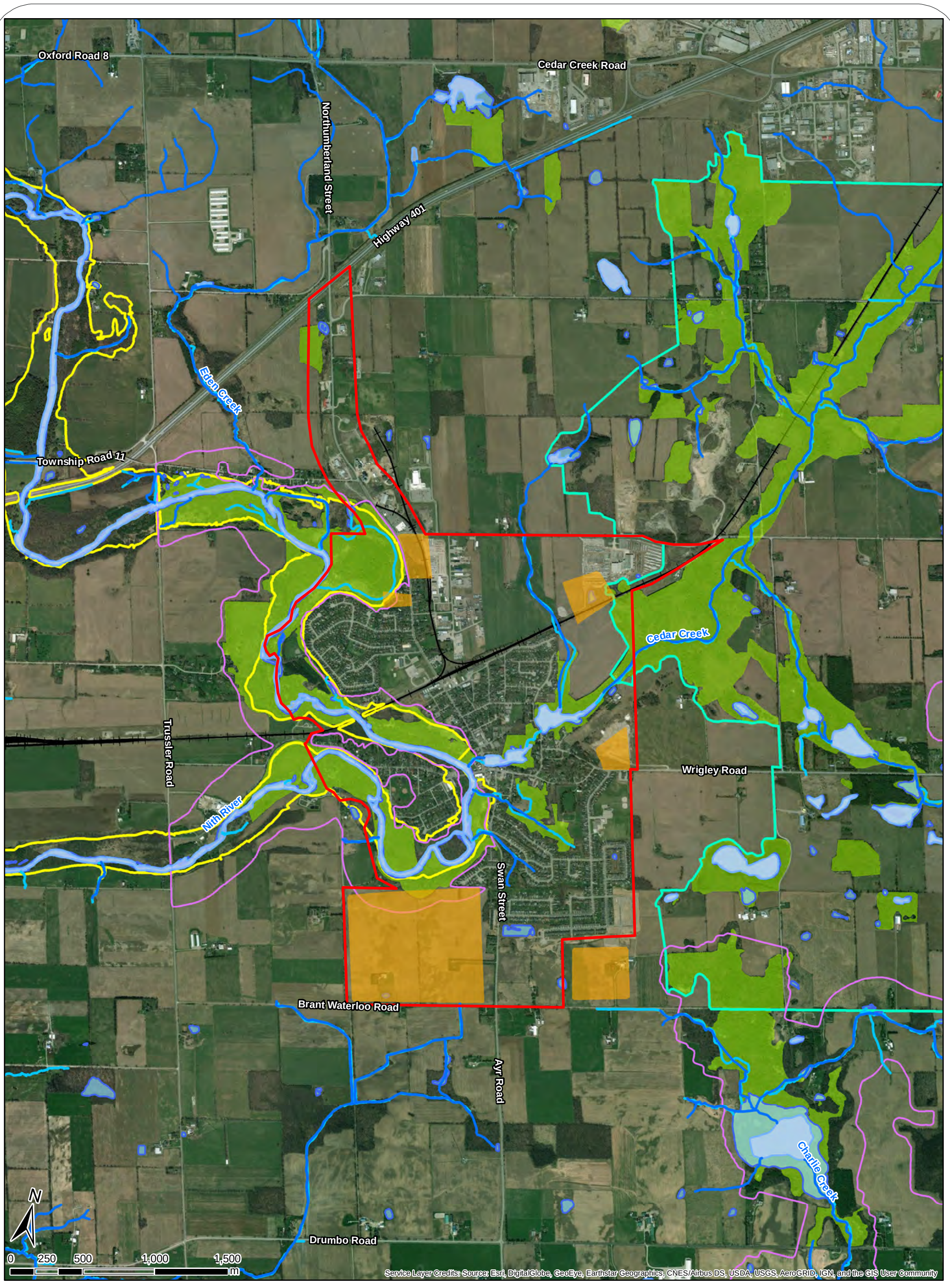
Area D is an aggregate pit that appears to be in the process of reclamation. The entire area is barren soil, with some pooled water in the low points. There are some mature trees between Wrigley Road and the former pit.

Area E is mostly agricultural fields, but there are stockpiles of aggregate material and an old house with associated outbuildings. There is also a small vegetated area just west of the house. The field to the west of the house was most recently in corn and the field to the east of the house was most recently in wheat, although the crop appears to be older and may not have been planted in 2019. The Charlie Creek is on the south side of Brant-Waterloo Road, flowing to the east.

Area F is a larger area which is made up of a few sections of agricultural land. Most of the fields were most recently in corn production. There is a fencerow of mature trees that splits the fields in a northerly direction and mature trees between the fields and the roads. There is a large house in the eastern field, surrounded by trees. Another old farmhouse is in the western field, where there is a small horse pasture, a small pond surrounded by wetland and a small wetland near Brant-Waterloo Road. Mature trees also line the drive up to the house and around the house and associated outbuildings.

3.1 REGION OF WATERLOO OFFICIAL PLAN

Map 4 of the Waterloo Regional Official Plan (2015) depicts the Greenlands Network. These layers have been super-imposed onto the Figure 2 to show where they fall within the Study Area. Area B, C and F have a small overlap with Core Environmental Features and Significant Valleyland. Areas B and F are also within the area of the Growth Plan for the Greater Golden Horseshoe. Area B also has a small amount of overlap with the Environmentally Sensitive Landscape for the Dumfries Carolinian Area. Refinement of the Future Development Areas may be necessary to avoid overlap with these natural areas.



Region of Waterloo Greenlands Network

- Railway
- Watercourse (LIO)
- Watercourse (GRCA)
- Study Area
- Approximate Future Development
- Waterbody (LIO)
- Waterbody (GRCA)
- Significant Valleys
- Growth Plan for the Greater Golden Horseshoe
- Environmentally Sensitive Landscape:Dumfries Carolinian
- Core Environmental Features:
  Provincially Significant Wetlands, Environmentally Sensitive Policy Areas,
  Forests greater than 4 ha

Data sources: Ministry of Natural Resources and Forestry, Grand River Conservation Authority, Region of Waterloo.
Contains information licenced under the Open Government Licence - Ontario, GRCA Open Data Licence v2 and Region of Waterloo Open Data Licence v.2.0

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Project	TA8993	**Figure**	2
Date	April, 2020	**Prepared By**	AJ
Scale	1:25,000	**Verified By**	DSU

The North Dumfries Official Plan generally defers the management of environmentally significant features to the Region of Waterloo. Map 5A of the North Dumfries Official Plan shows the Greenlands Network, using the same layers for Significant Valleylands, Environmentally Sensitive Landscape and Core Environmental Features as the Region of Waterloo.

3.2 NATURAL AREAS

In addition to the areas mapped by the Region of Waterloo, other natural areas occur in the Study Area. Portions of Area A, B, C, and F fall within the regulation limit, managed by the Grand River Conservation Area (GRCA) and the edge of Area B is also within the floodplain (Figure 3). Similarly, there are wetlands and woodland within the Study Area and Areas of Natural and Scientific Interest (ANSI), just outside of the Study Area (Figure 4).

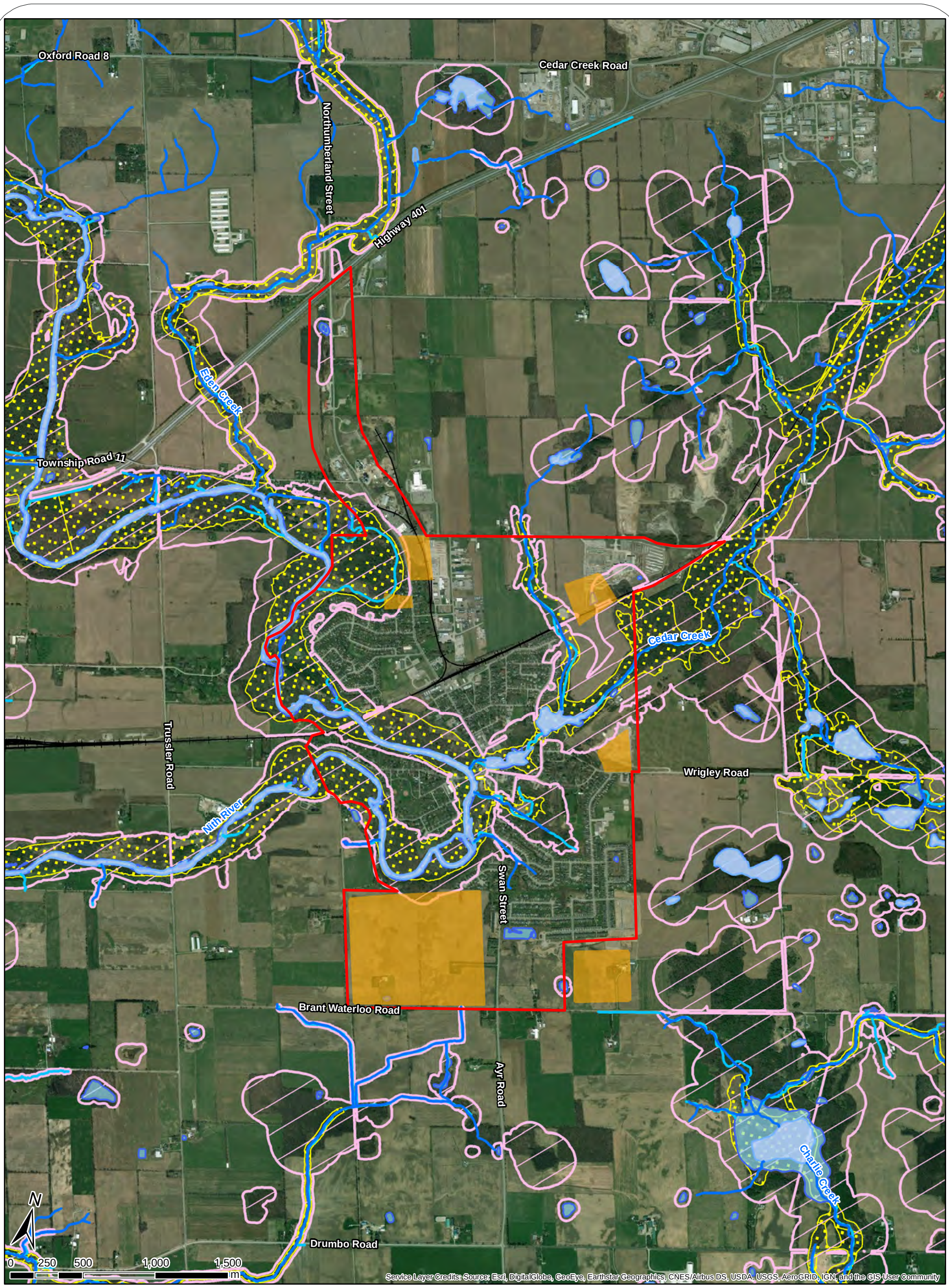
The GRCA has layers for wetlands and regulation limits that occur within the Study Area (Figure 3). Many of these are associated with the Nith River and the Cedar Creek. The Greenfield Swamp Complex PSW is associated with the Nith River, and is located near Area B, with a very small area of overlap. The Roseville Swamp Cedar Creek Wetland Complex PSW is associated with the Cedar Creek and is located between Areas C and D, again with a small area of overlap with Area C.

In a letter dated on April 8, 2020, the GRCA described some discrepancies in the wetland mapping available. They described a discrepancy for wetland mapping that is west of Northumberland Street and south of the tracks. This is not one of the Future Development Areas. They suggest that a site visit is necessary to confirm the wetland boundary, but this may only be necessary if infrastructure is proposed in or near this location. The GRCA also described an unevaluated wetland that is east of Swan Street and south of Hilltop Drive, but this too is not within the Future Development Areas. Based on a site reconnaissance, there are small wetland areas within Area F that are not mapped. Wetlands are dynamic based on annual surface water and the presence of wetland plants. Despite the avoidance of wetlands by most of the Future Development Areas, any infrastructure that is planned in close proximity to wetlands may require a seasonal in-field wetland boundary delineation in advance of construction.

Three ANSI's are located near the Study Area, but not within it (Figure 4). The Little Turnbull Lake ANSI and the McCrone Lake ANSI are life science ANSI's and the Ingersoll Moraine Outwash Fan is an earth science ANSI. These natural areas should be considered if there is the potential for offsite impacts or cumulative effects from the development.

3.3 AQUATIC HABITAT

There are several watercourses and waterbodies and the potential for aquatic SAR which are associated with the Nith River, Cedar Creek and their tributaries, but these will be addressed in a separate report. Aquatic SAR are included in Table 1 for completeness, but are not addressed further in this report.



Natural Areas

- Railway
- Watercourse (LIO)
- Watercourse (GRCA)
- Study Area
- Approximate Future Development
- Waterbody (LIO)
- Waterbody (GRCA)
- Regulation Limit (GRCA)
- Regulatory Floodplain (GRCA)

Data sources: Ministry of Natural Resources and Forestry, Grand River Conservation Authority

Contains information licenced under the Open Government Licence - Ontario and GRCA Open Data Licence v2

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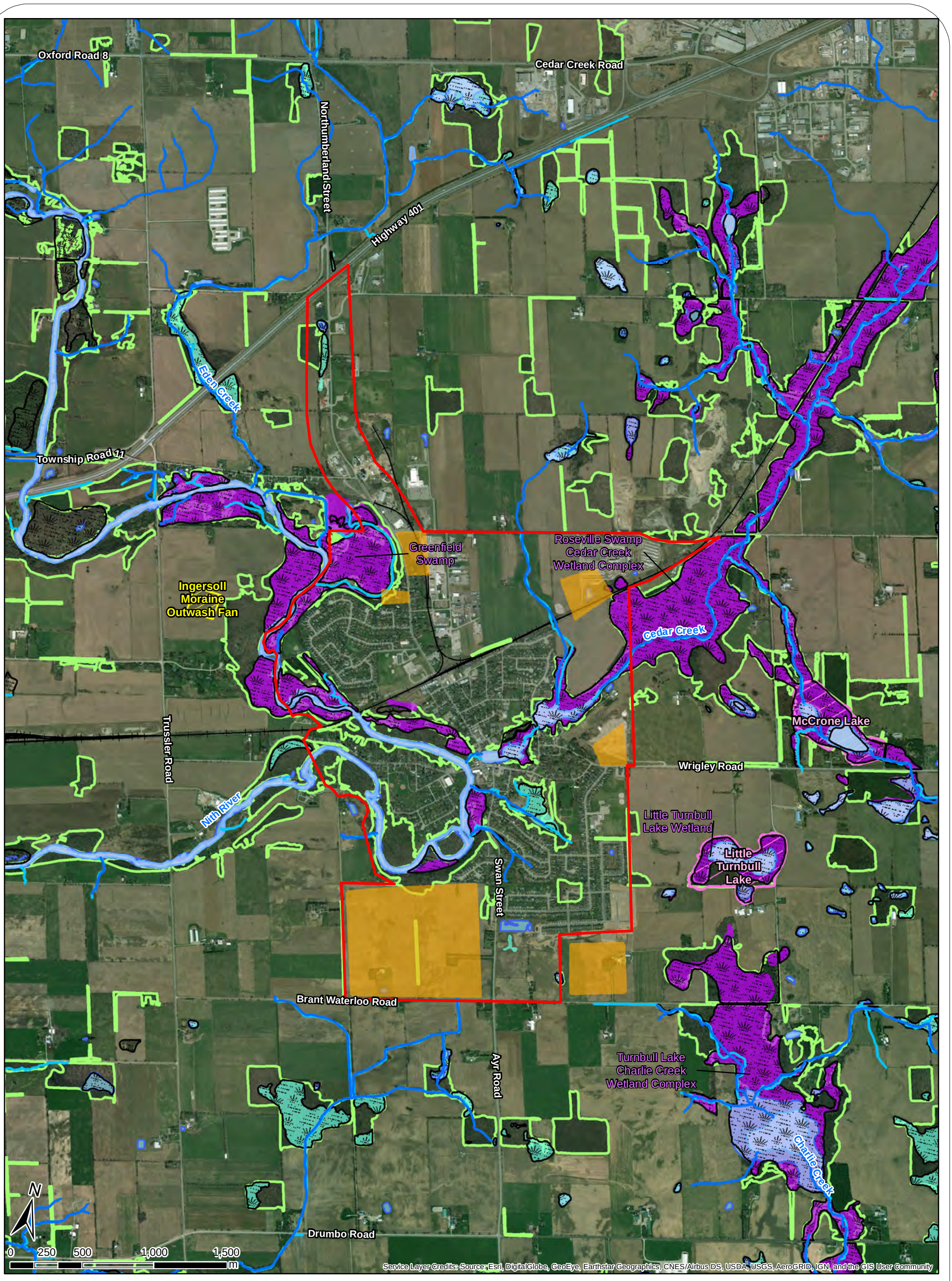
Project	TA8993	**Figure**	3
Date	April, 2020	**Prepared By**	AJ
Scale	1:25,000	**Verified By**	DSU



Wetlands, Woodlands and ANSI

- Railway
- Watercourse (LIO)
- Watercourse (GRCA)
- Study Area
- Approximate Future Development
- Waterbody (LIO)
- Waterbody (GRCA)
- ANSI, Life Science
- ANSI, Earth Science
- Regulated Wetland (GRCA)
- Provincially Significant Wetland
- Wetland Not Evaluated Per OWES
- Wooded Area

Data sources: Ministry of Natural Resources and Forestry, Grand River Conservation Authority

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Project	TA8993	**Figure**	4
Date	April, 2020	**Prepared By**	AJ
Scale	1:25,000	**Verified By**	DSU

3.4 SPECIES AT RISK

Protection for species in Ontario is provided through the *Endangered Species Act* (ESA). That protection is afforded to species that have been listed as Endangered (END) or Threatened (THR) on the Species at Risk in Ontario (SARO) list, as designated by the Committee on the Status of Species at Risk in Ontario (COSSARO). Species listed as Special Concern (SC) are not afforded protection on the ESA, but are considered to be at risk to become endangered if there is further decline of the species. The federal *Species at Risk Act* (SARA) generally applies on federal land, for federal projects or on projects where Environment and Climate Change Canada (ECCC) is of the opinion that protection has not been sufficiently provided by the province for a particular species. When the responsibility for SAR was transitioned from the Ministry of Natural Resources and Forestry (MNRF) to the Ministry of Environment, Conservation and Parks (MECP), there was a change in direction for information and permitting requests and the process is still being resolved. Current direction is to rely on available online resources for screening purposes and to contact the MECP later in the process of a project when potential impacts to SAR are better known. Therefore, an information request was not submitted to the MECP for this project.

Through a review of the species atlases, NHIC and online resources, 32 species were identified as END, THR and SC (Table 1). Of these, 21 species are listed as END or THR. Table 1 provides a habitat description for each of these species. Other species at risk may occur within the Study Area that have not been identified here. General species inventories in advance of construction will help to further refine the plant and animal species, including SAR that use areas which will be disturbed.

3.4.1 Terrestrial Species at Risk

Bird species afforded protection include the Bank Swallow (*Riparia riparia*), Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx oryzivorus*), Cerulean Warbler (*Setophaga cerulea*) Chimney Swift (*Chaetura pelagica*), Eastern Meadowlark (*Sturnella magna*) and Least Bittern (*Ixobrychus exilis*).

Bank Swallow could nest in many locations, often in material stockpiles or small embankments which are not easily discernable from aerial imagery and none were visible from the roadside reconnaissance on April 24, 2020. The Nith River bank itself is a highly probable area for this species to nest, but avoidance of this feature may be necessary anyways.

Barn Swallow can occur in many man-made structures such as buildings, bridges and culverts and Chimney Swift also typically uses man-made chimney or chimney-like structures. Many of these occur in the Study Area in general. There may be rail underpasses suitable for this species in Area C and there are houses, barns and outbuildings which may be suitable in Areas E and F.

Bobolink and Eastern Meadowlark occur in grasslands which could include agricultural fields that are in hay production, pasture or in fields left fallow. As of April 24, 2020, most of the fields within the Future Development Areas were most recently in rotational crop. There is a small horse pasture in Area F which could be suitable for these species, but it is not optimal because it does not meet the field area typically required for them.

Cerulean Warbler typically nests in large tracts of deciduous forest and Least Bittern nests in large open marsh habitat. While both of these habitat types exist in the Study Area, the Future Development Areas avoid them.

Birds of most species are also protected under the *Migratory Birds Convention Act*. A breeding bird survey may be necessary to determine actual bird nesting at and close to any above-ground development.

Four mammal species, all bats, have been identified through their species distribution maps on the BCI website. These include the Eastern Small-footed Myotis (*Myotis leibii*), Little Brown Myotis (*Myotis lucifugus*), Tri-colored Bat (*Perimyotis subflavus*) and the Northern Myotis (*Myotis septentrionalis*). These species all use different habitat types which could occur within the Study Area. Although the Future Development Areas have mostly avoided woodlands, wetlands and buildings, a specific search for habitat and possibly for species presence may be required in advance of development. Based on the site reconnaissance on April 24, 2020 there does not appear to be any features suitable for bat hibernation within the Future Development Areas, nor were there any areas that appear suitable as maternity roost areas for Eastern Small-footed Myotis, Northern Myotis or Tri-colored Bat. There are trees along the edges of many of the fields within the Future Development Areas which could be suitable for maternity roosting areas for Little Brown Myotis. The old houses and outbuildings on Areas E and F may also be suitable as roosts for Little Brown Myotis and should be surveyed prior to development.

The Blanding's Turtle (*Emydoidea blandingii*) was been identified in the Study Area through the NHIC, last recorded in 2011. This species uses wetlands, which have been avoided in the selection of the Future Development Areas, but do exist in other parts within the Study Area. The small wetland pockets in Area F could provide habitat, but are very small and not close to other suitable wetlands. However, any wetlands or aquatic areas that are near development may require further investigation for this species, and they could also move into stormwater ponds, if constructed.

Several plants have been identified within the Waterloo Region in the Rare Vascular Plants of Ontario (2009) or Vascular Plants at Risk in Ontario (Leslie, 2018), but there is no record specifically known within the Study Area. Protected vascular plant species include the American Chestnut (*Castanea dentata*), American Columbo (*Frasera caroliniensis*), American Ginseng (*Panax quinquefolius*), Butternut (*Juglans cinerea*), False Hop Sedge (*Carex lupuliformis*) and White Wood Aster (*Eurybia divaricata*).

Trees in woodlands are also protected by the Region of Waterloo under Bylaw Number 08-026. A Tree bylaw does not currently exist for the Township of North Dumfries, but was introduced at an Advisory Committee meeting in June 2019. Therefore, a bylaw could provide some protection for trees in the future. A botanical inventory and tree inventory may be required in advance of development to search for these species.

In advance of construction, it may also be necessary to assess Significant Wildlife Habitat that may be under protection through the Provincial Policy Statement and the Planning Act through and Environmental Impact Statement (EIS).

3.4.2 Aquatic Species at Risk

Aquatic species identified through background review include two fish species, the Silver Shiner (*Notropis photogenis*) and the Black Redhorse (*Moxostoma duquesnei*) and one mollusc, the Wavy-rayed Lampmussel (*Lampsilis fasciola*). Aquatic species protected under the ESA, SARA or the *Fisheries Act* will be addressed in a separate report.

Table 1 Species at Risk that Could Occur at the Study Area, Based on Review of Publicly Available Databases.

Common Name	Scientific Name	Species At Risk Act (Sch 1)	Endangered Species Act	Habitat Requirements[5]	Potential to Occur in the Future Development Areas
Monarch	*Danaus plexippus*	SC	SC	In Ontario, monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there are milkweed (Asclepius spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010).	**Moderate** – most fields are rotation crop which is not suitable for this species. Some field edges may be fallow and contain milkweed in limited abundance.
Bank swallow	*Riparia riparia*	THR	THR	In Ontario, the bank swallow breeds in a variety of natural and anthropogenic habitats, including lake bluffs, stream and river banks, sand and gravel pits, and road cuts. Nests are generally built in a vertical or near-vertical bank. Breeding sites are typically located near open foraging sites such as rivers, lakes, grasslands, agricultural fields, wetlands and riparian woods. Forested areas are generally avoided (Garrison 1999).	**High** – Area B includes a small portion of the Nith River valley. Aggregate stockpiles are present in Area D and may be present at other areas depending on site use.
Barn swallow	*Hirundo rustica*	THR	THR	In Ontario, barn swallow breeds in areas that contain a suitable nesting structure, open areas for foraging, and a body of water. This species nests in human made structures including barns, buildings, sheds, bridges, and culverts. Preferred foraging habitat includes grassy fields, pastures, agricultural cropland, lake and river shorelines, cleared right-of-ways, and wetlands (COSEWIC 2011). Mud nests are fastened to vertical walls or built on a ledge underneath an overhang. Suitable nests from previous years are reused (Brown and Brown 1999).	**High** – Potential rail underpass structures at Area C, houses barns and outbuildings at Area E and F
Bobolink	*Dolichonyx oryzivorus*	THR	THR	In Ontario, bobolink breeds in grasslands or graminoid dominated hayfields with tall vegetation (Gabhauer 2007). Bobolink prefers grassland habitat with a forb component and a moderate litter layer. They have low tolerance for presence of woody vegetation and are sensitive to frequent mowing within the breeding season. They are most abundant in established, but regularly maintained, hayfields, but also breed in lightly grazed pastures, old or fallow fields, cultural meadows and newly planted hayfields. Their nest is woven from grasses and forbs. It is built on the ground, in dense vegetation, usually under the cover of one or more forbs (Martin and Gavin 1995).	**Low** – As of April 24, 2020 fields are predominantly in rotation crop. One small field (approximately 0.75 hectares) is horse pasture, but likely too small for this species. If fields are left fallow or turned to hay or pasture, this species may nest.
Canada warbler	*Cardellina canadensis*	THR	SC	In Ontario, breeding habitat for Canada warbler consists of moist mixed forests with a well-developed shrubby understory. This includes low-lying areas such as cedar and alder swamps, and riparian thickets (McLaren 2007). It is also found in densely vegetated regenerating forest openings. Suitable habitat often contains a developed moss layer and an uneven forest floor. Nests are well concealed on or near the ground in dense shrub or fern cover, often in stumps, fallen logs, overhanging stream banks or mossy hummocks (Reitsma et al. 2010).	**Low** – no mature forest within Future Development Areas. However, forest associated with the Nith Valley near Areas A and B may be suitable.
Cerulean warbler	*Setophaga cerulea*	END	THR	In Ontario, breeding habitat of cerulean warbler consists of second-growth or mature deciduous forest with a tall canopy of uneven vertical structure and a sparse understory. This habitat occurs in both wet bottomland forests and upland areas, and often contains large hickory and oak trees. This species may be attracted to gaps or openings in the upper canopy. The cerulean warbler is associated with large forest tracks, but may occur in woodlots as small as 10 ha (COSEWIC 2010). Nests are usually built on a horizontal limb in the mid-story or canopy of a large deciduous tree (Buehler et al. 2013).	**Low** – no mature forest within Future Development Areas. However, forest associated with the Nith Valley near Areas A and B may be suitable.
Chimney swift	*Chaetura pelagica*	THR	THR	In Ontario, chimney swift breeding habitat is varied and includes urban, suburban, rural and wooded sites. They are most commonly associated with towns and cities with large concentrations of chimneys. Preferred nesting sites are dark, sheltered spots with a vertical surface to which the bird can grip. Unused chimneys are the primary nesting and roosting structure, but other anthropogenic structures and large diameter cavity trees are also used (COSEWIC 2007).	**Moderate** – Old houses at Areas E and F may have chimneys suitable for this species to nest.
Common nighthawk	*Chordeiles minor*	THR	SC	These aerial foragers require areas with large open habitat. This includes farmland, open woodlands, clearcuts, burns, rock outcrops, alvars, bog ferns, prairies, gravel pits and gravel rooftops in cities (Sandilands 2007)	**Moderate** – this species could nest on open areas such as abandoned fields or aggregate storage areas.

Common Name	Scientific Name	Species At Risk Act (Sch 1)	Endangered Species Act	Habitat Requirements[5]	Potential to Occur in the Future Development Areas
Eastern meadowlark	*Sturnella magna*	THR	THR	In Ontario, the eastern meadowlark breeds in pastures, hayfields, meadows and old fields. Eastern meadowlark prefers moderately tall grasslands with abundant litter cover, high grass proportion, and a forb component (Hull 2003). They prefer well drained sites or slopes, and sites with different cover layers (Roseberry and Klimstra 1970)	**Low** – As of April 24, 2020 fields are predominantly in rotation crop. One small field (approximately 0.75 hectares) is horse pasture, but likely too small for this species. If fields are left fallow or turned to hay or pasture, this species may nest.
Eastern wood-pewee	*Contopus virens*	SC	SC	The eastern wood-pewee inhabits a wide variety of wooded upland and lowland habitats but is most commonly associated with the mid-canopy of forest clearings, and edge habitat in deciduous and mixed forests. It also occurs in anthropogenic habitats that provide an open forested aspect such as parks and suburban neighbourhoods. It prefers intermediate-age mature forest stands with little understory vegetation (COSEWIC 2012).	**Low** – no mature forest within Future Development Areas. However, forest associated with the Nith Valley near Areas A and B may be suitable. May occur in the small wooded areas in Area E and F.
Grasshopper sparrow pratensis subspecies	*Ammodramus savannarum (pratensis subspecies)*	SC	SC	In Ontario, grasshopper sparrow is found in medium to large grasslands with low herbaceous cover and few shrubs. It also uses a wide variety of agricultural fields, including cereal crops and pastures. Close-grazed pastures and limestone plains (e.g. Carden and Napanee Plains) support highest density of this bird in the province (COSEWIC 2013).	**Low** – No shrubby grasslands identified in the Future Development Areas. This habitat could develop over time if fields are left fallow, and there is some potential that it could use open crop fields or the small horse pasture.
Least bittern	*Ixobrychus exilis*	THR	THR	In Ontario, the least bittern breeds in marshes, usually greater than 5 ha, with emergent vegetation, relatively stable water levels and areas of open water. Preferred habitat has water less than 1 m deep (usually 10 – 50 cm). Nests are built in tall stands of dense emergent or woody vegetation (Woodliffe 2007). Clarity of water is important as siltation, turbidity, or excessive eutrophication hinders foraging efficiency (COSEWIC 2009).	**Low** – There are no large marsh areas within the Future Development Areas.
Peregrine falcon (anatum subspecies)	*Falco peregrinus anatum*	SC	SC	In Ontario, peregrine falcon breeds in areas containing suitable nesting locations and sufficient prey resources. Such habitat includes both natural locations containing cliff faces (heights of 50 - 200 m preferred) and also anthropogenic landscapes including urban centres containing tall buildings, open pit mines and quarries, and road cuts. Peregrine falcons' nest on cliff ledges and crevices and building ledges. Nests consist of a simple scrape in the substrate (COSEWIC 2007).	**Low** –There are no cliff faces or tall man-made structures (buildings, bridge, etc.) within the Future Development Areas.
Wood thrush	*Hylocichla mustelina*	THR	SC	In Ontario, wood thrush breeds in moist, deciduous hardwood or mixed stands that are often previously disturbed, with a dense deciduous undergrowth and with tall trees for singing perches. This species selects nesting sites with the following characteristics: lower elevations with trees less than16 m in height, a closed canopy cover (>70 %), a high variety of deciduous tree species, moderate sub-canopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter (COSEWIC 2012).	**Low** – no mature forest within Future Development Areas. However, forest associated with the Nith Valley near Areas A and B may be suitable. May occur in the small wooded areas in Area E and F.
Eastern small-footed myotis	*Myotis leibii*	—	END	This species is not known to roost within trees, but there is very little known about its roosting habits. The species generally roosts on the ground under rocks, in rock crevices, talus slopes and rock piles. It occasionally inhabits buildings. Areas near the entrances of caves or abandoned mines may be used for hibernaculum, where the conditions are drafty with low humidity, and may be subfreezing (Humphrey 2017).	**Low** – no cliffs, crevices or rock piles suitable for this species were visible from the road during the site reconnaissance on April 24, 2020
Little brown myotis	*Myotis lucifugus*	END	END	In Ontario, this species range is extensive and covers much of the province. It will roost in both natural and man-made structures. They require a number of large dead trees, in specific stages of decay and that project above the canopy in relatively open areas (Lacki, 2007). May form nursery colonies in the attics of buildings within 1 km of water. Caves or abandoned mines may be used for hibernaculum, but high humidity and stable above freezing temperatures are required.	**High** – Some fencerow trees in Areas A, B, D, E and F have cavities which may be suitable for roosting. Old houses, barns and outbuildings in Areas E and F may also be suitable.

Common Name	Scientific Name	Species At Risk Act (Sch 1)	Endangered Species Act	Habitat Requirements[5]	Potential to Occur in the Future Development Areas
Tri-colored bat	*Perimyotis subflavus*	END	END	In Ontario, tri-colored bat may roost in foliage, in clumps of old leaves, hanging moss or squirrel nests. They are occasionally found in buildings although there are no records of this in Canada (Poissant et al, 2010). They typically feed over aquatic areas with an affinity to large-bodied water and will likely roost in close proximity to these. Hibernation sites are found deep within caves or mines in areas of relatively warm temperatures. These bats have strong roost fidelity to their winter hibernation sites and may choose the exact same spot in a cave or mine from year to year.	**Low** – No leaf clumps were visible during the site reconnaissance on April 24, 2020. However, this species may use the habitat along the Nith River or Cedar Creek.
Northern myotis	*Myotis septentrionalis*	END	END	In Ontario, this species range is extensive and covers much of the province. It will usually roost in hollows, crevices, and under loose bark of mature trees. Roosts may be established in the main trunk or a large branch of either living or dead trees. Caves or abandoned mines may be used for hibernaculum, but high humidity and stable above freezing temperatures are required (COSSARO 2012).	**Low** – No mature forest within Future Development Areas. However, forest associated with the Nith Valley near Areas A and B may be suitable.
Blanding's turtle - Great Lakes/St. Lawrence population	*Emydoidea blandingii*	THR	THR	In Ontario, Blanding's turtle will use a range of aquatic habitats, but favor those with shallow, standing or slow-moving water, rich nutrient levels, organic substrates and abundant aquatic vegetation. They will use rivers, but prefer slow-moving currents and are likely only transients in this type of habitat. This species is known to travel great distances over land in the spring in order to reach nesting sites, which can include dry conifer or mixed forests, partially vegetated fields, and roadsides. Suitable nesting substrates include organic soils, sands, gravel and cobble. They hibernate underwater and infrequently under debris close to water bodies (COSEWIC 2005).	**Low** – Limited wetland habitat within the Future Development Areas, but the specie could occur in the wetlands adjacent to these areas.
Eastern ribbonsnake - (Great Lakes population)	*Thamnophis sauritus*	SC	SC	In Ontario, eastern ribbonsnake is semi-aquatic, and is rarely found far from shallow ponds, marshes, bogs, streams or swamps bordered by dense vegetation. They prefer sunny locations and bask in low shrub branches. Hibernation occurs in mammal burrows, rock fissures or even ant mounds (COSEWIC 2012).	**Low** – Limited wetland habitat within the Future Development Areas, but the specie could occur in the wetlands adjacent to these areas.
American chestnut	*Castanea dentata*	END	END	In Ontario, American chestnut occurs in mixed or deciduous forests in the Carolinian zone (Farrar 1995). It is often found in communities with dense canopy cover and often associated with oak and maple. This tree grows primarily on acidic, sand or gravel soils (Boland et al. 2012).	**Moderate** – This species was historically very common and remnant individuals could occur anywhere.
American columbo	*Frasera caroliniensis*	END	END	In Ontario, American columbo is most commonly associated with open deciduous forested slopes, but it can also be found in thickets, swamps and clearings. It is often associated with oak, hickory and sassafras trees. American columbo grows on a wide variety of soils, particularly dry mesic to mesic clay and clay loam soils (COSEWIC 2006).	**Low** – typically occurs in prairie and open deciduous forest, which does not appear to be present in the Future Development Areas
American ginseng	*Panax quinquefolius*	END	END	In Ontario, American ginseng is found in moist, undisturbed and relatively mature deciduous woods often dominated by sugar maple. It is commonly found on well-drained, south-facing slopes. American ginseng grows under closed canopies in neutral, loamy soils (COSEWIC 2000).	**Low** – No mature forest within Future Development Areas. However, forest associated with the Nith Valley near Areas A and B may be suitable.
Broad beech fern	*Phegopteris hexagonoptera*	—	SC	In Ontario, broad beech fern inhabits rich, undisturbed mature deciduous forest dominated by beech and maple. It typically grows in moist to wet, sandy soils of lower valley slopes and occasionally swamps (van Overbeeke et al. 2013).	**Low** – No mature forest within Future Development Areas. However, forest associated with the Nith Valley near Areas A and B may be suitable.
Butternut	*Juglans cinerea*	END	END	In Ontario, butternut is found along stream banks, on wooded valley slopes, and in deciduous and mixed forests. It is commonly associated with beech, maple, oak and hickory (Voss and Reznicek 2012). Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils. This species is shade intolerant (Farrar 1995).	**Moderate** – This species was historically very common and remnant individuals could occur anywhere.
False hop sedge	*Carex lupuliformis*	END	END	In Ontario, false hop sedge occurs in marshes, riverine swamps, borders of vernal pools, and wet depressions of forests. It occasionally occurs in shallow water or very wet floodplain forests. Usually grows under a moderately open canopy but can tolerate high levels of sunshine. Substrates are calcareous or neutral and include moist wet mucks, silt loams, or alluvial deposits with a sandy texture (Environment Canada 2014).	**Low** – Limited wetland habitat within the Future Development Areas, but the specie could occur in the wetlands adjacent to these areas.
Green dragon	*Arisaema dracontium*	—	SC	In Ontario, green dragon occurs in somewhat-wet to wet deciduous forests along streams. In particular, it grows in maple forest and forest dominated by red ash and white elm trees. Green dragon is restricted to shaded or partially shaded seasonally inundated floodplains (Donley et al. 2013). It is primarily restricted to southwestern Ontario.	**Low** – Limited wetland habitat within the Future Development Areas, but the specie could occur in the wetlands adjacent to these areas.

Common Name	Scientific Name	Species At Risk Act (Sch 1)	Endangered Species Act	Habitat Requirements[5]	Potential to Occur in the Future Development Areas
White wood aster	*Eurybia divaricata*	THR	THR	In Ontario, white wood aster grows in open, dry to moist, deciduous woodlands with well-drained soils. It seems to grow along trails in forests dominated by sugar maple and American beech, with associates such as red, white, and black oak, shagbark hickory, and basswood (COSEWIC 2002).	**Low** – No mature forest within Future Development Areas. However, forest associated with the Nith Valley near Areas A and B may be suitable.
Aquatic Species					
Black redhorse	*Moxostoma duquesnei*	—	THR	In Ontario, Black Redhorse has been found in tributaries of Lake Erie, Lake St. Clair, Lake Huron and Lake Ontario. In the Lake Erie drainage, it is known from the Grand River watershed and Catfish Creek, however the Catfish Creek population is considered extirpated. In the Lake St. Clair drainage, it is present in the Thames River watershed. In the Lake Huron drainage, it is found in the Saugeen, Bayfield River, Maitland River and Ausable River watersheds. In the Lake Ontario drainage, it has been found in Spencer Creek and Lake Simcoe, however Lake Simcoe records are considered to be introductions. Habitats are typically found in moderately sized to large rivers and streams with moderate to fast flows. It is rarely found associated with aquatic vegetation. Preferred substrates include rubble, gravel, sand, boulders and silt. In summer, this fish species generally prefers pools, and they overwinter in deeper pools. Spring spawning has been observed in riffle habitats, over substrates ranging from fine gravel to large cobble, and at water temperatures between 15°C and 21°C (COSEWIC, 2015).	To be discussed in the aquatic screening Report
Silver shiner	*Notropis photogenis*	—	THR	In Ontario, the Silver Shiner is found in tributaries of lakes St. Clair Thames River), Erie (Grand River) and Ontario (Bronte and Sixteen Mile Creek). They prefer moderately-flowing sections of larger streams with clear water and moderate currents. Usual substrates include gravel, rubble, boulder, and sand. Aquatic vegetation may be present or absent. The Silver Shiner most frequently occurs in deep, swift riffles and faster currents of pools below riffles. Spawning habitat is suggested to occur in relatively deep riffles (COSEWIC, 2011).	To be discussed in the aquatic screening Report
Rainbow	*Villosa iris*	END	SC	In Ontario, is found in St. Clair delta and the Saugeen, Maitland, Bayfield, Ausable, Sydenham, Thames, Grand, Trent, Moira and Salmon Rivers. The Rainbow mussel is found in shallow, well- oxygenated waters of small to medium-sized rivers (often near emergent vegetation) and sometimes lakes. It is most abundant in waters less than 1 m deep. Preferred substrates are cobble, gravel, sand and occasionally mud or boulder (DFO, 2016).	To be discussed in the aquatic screening Report
Wavy-rayed lampmussel	*Lampsilis fasciola*	SC	THR	In Ontario, Wavy-rayed Lampmussel inhabits clear, medium-sized rivers and streams, with steady flow and stable substrate. It is typically found in clean sand or gravel substrates, often stabilized with cobble or boulders, in and around riffle areas up to 1 m in depth. It may also be found in large creeks and rivers. This species is known to occur in the Ausable, Grand, Maitland, Sydenham, and Thames (North and South) rivers, and in the St. Clair River delta (Morris 2011).	To be discussed in the aquatic screening Report

4.0 CONCLUSION

The proposed future residential developments in the Study Area may intersect with several environmental constraints, including wetlands, woodlands, watercourses and habitat for SAR. However, the selection of Future Development Areas have focussed on locations that are mostly outside of these habitat types and where there is existing human disturbance and rotational crop fields. In advance of development of infrastructure, site-specific inventories of these habitats and the habitat of SAR should be conducted to determine if permits are required. A summary of the environmental permits which could be required is provided in Table 2.

Table 2 Summary of Environmental Permits and Regulations Review.

Legislation	Plan/Regulation/ By-law	Permit/ Approval/ Authorization	Required						Comments
			Area A	Area B	Area C	Area D	Area E	Area F	
Federal Approvals									
Fisheries Act	n/a	Harmful, Alteration, Disruption, Destruction (HADD). DFO Review process required for all in-water work and for all works below the high water mark.							To be determined in the Aquatic Screening Report To be determined in the Aquatic Screening Report
Migratory Birds Convention Act	n/a	Project must abide by MBCA legislation for vegetation removals.	yes	yes	yes	yes	yes	yes	The MBCA requirements should be documented in a site specific Environmental Impact Study (EIS). Typically, observing seasonal constraints for vegetation removal will help to avoid contravention of this act.
Species at Risk Act	n/a	SARA permit- for terrestrial species, applicable to Federal Lands only; or for aquatic species.	no	no	no	no	no	no	No requirement identified at this time unless ECCC is of the opinion that species were not provided adequate protection by the province.
Provincial Approvals									
Conservation Authorities Act	Ontario Regulation (GRCA) Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (O.Reg.150/06).	A permit is required for all works identified within Regulated Areas. Regulated features include but are not limited to watercourses, wetlands, valleylands (plus setbacks), hazardous lands, lands within 120m of Provincially Significant Wetlands, dynamic beach/waterfront (plus setbacks).	yes	yes	yes	no	no	yes	In many cases, there is only small overlap of the regulation limit and the Future Development Area. Refinement of the Future Development Areas may result in avoiding regulation limit areas. Area F has wetlands that are not identified and may be added to the regulation limit area.
Endangered Species Act	Several Regulations Exist.	Ministry of the Environment, Conservation and Parks (MECP) administers the Endangered Species Act, 2007 (ESA) in Ontario.	Unlikely	Unlikely	Unlikely	Unlikely	Possible	Possible	Screening for potential SAR Bat Habitat for tree removals; Kentucky Coffee Tree identified but not considered under the ESA by the MECP where trees are of planted origin; Potential for Monarch identified however this species is not regulated under the ESA. No aquatic SAR habitat identified.
Municipal Approvals									
Greenlands Network, Significant Valleylands, Core Environmental Features, Environmentally Sensitive Landscapes	Region of Waterloo Official Plan, Township of North Dumfries Official Plan	Region of Waterloo, Township of North Dumfries	no	yes	yes	no	no	yes	Small areas of overlap with the Future Development Areas could be avoided by refinement of these areas.
Tree Protection By-laws	Region of Waterloo - Woodland Tree Protection Bylaw 08-026 Township of North Dumfries – no bylaw currently enacted	"woodland" means land that is located within the boundaries of The Regional Municipality of Waterloo that is at least one hectare or more in area with at least: (i) 1,000 trees, of any size, per hectare; (ii) 750 trees, measuring over five centimetres in diameter, per hectare; (iii) 500 trees, measuring over 12 centimetres in diameter, per hectare; or (iv) 250 trees, measuring over 20 centimetres in diameter, per hectare; but does not include a cultivated fruit or nut orchard or a plantation established for the purpose of producing Christmas trees.	yes	yes	no	no	Possible around house	Possible around house and wetland	Field assessment may be necessary to determine if areas meet the definition of a woodland. Refinement of the Future Development Areas may avoid woodland areas.

APPENDIX C

ECAs

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Ontario

Ministry of the Environment
Ministère de l'Environnement

ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 6206-9EFSHJ
Issue Date: January 21, 2014

The Corporation of the Township of North Dumfries
1171 Greenfield Road
Rural Route, No. 4
Cambridge, Ontario
N1R 5S5

Site Location: Gibson Street
Township of North Dumfries
Regional Municipality of Waterloo, Ontario

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

sanitary and storm sewers to be constructed in the Township of North Dumfries, in the Regional Municipality of Waterloo, as follows:

- sanitary sewers on Gibson Street from approximately 15 m north of Gibson Street to Gibson Street and
along Gibson Street approximately 40 m westerly;

- storm sewers on Gibson Street from approximately 10 m north of Gibson Street to Gibson Street and along
Gibson Street approximately 7 m westerly;

all in accordance with the application from the Corporation of the Township of North Dumfries, dated October 17, 2013, including final plans and specifications prepared by MTE Consultants Inc.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation;

2. "Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the Part II.1 of the Environmental Protection Act;

3. " *District Manager* " means the District Manager of the appropriate local district office of the *Ministry,* where the *Works* are geographically located;

4. "Ministry" means the Ontario Ministry of the Environment;

5. "Owner" means The Corporation of the Township of North Dumfries and includes its successors and assignees;

6. " *Water Supervisor* " means the Water Supervisor of the appropriate local Safe Drinking Water Branch office of the *Ministry,* where the *Works* are geographically located; and

7. "Works" means the sewage works described in the Owner's application, this Approval and in the supporting documentation referred to herein, to the extent approved by this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

1.1 The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, the application for approval of the Works and the submitted supporting documents and plans and specifications as listed in this Approval.

1.3 Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this Approval are severable. If any requirement of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this Approval shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.

3. CHANGE OF OWNER

(1) The Owner shall notify the Water Supervisor and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of

the most recent declaration filed under the Business Names Act , R.S.O. 1990, c.B17 shall be included in the notification to the Water Supervisor;

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act , R.S.O. 1990, c. C39 shall be included in the notification to the Water Supervisor.

4. SOURCE WATER PROTECTION

4.1 The Owner shall, within sixty (60) calendar days of the Minister of the Environment posting approval of a Source Protection Plan on the environmental registry established under the Environmental Bill of Rights, 1993 for the area in which this Approval is applicable, apply to the Director for an amendment to this Approval that includes the necessary measures to conform with all applicable policies in the approved Source Protection Plan.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which Approval was granted. This Condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The Condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this Approval of the existence of this Approval.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included to ensure that the works covered by this Approval will conform to the significant threat policies and designated Great Lakes policies in the Source Protection Plan.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;

7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal 's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-3717 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 21st day of January, 2014

Katrina Chrzanowska, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

RS/
c: District Manager, MOE Guelph District Office
Water Supervisor, MOE Guelph District Office
Rodger Mordue, The Corporation of the Township of North Dumfries
Kris Fletcher, Regional Clerk, Region of Waterloo (File # ND-01-13)
Badrul Khan, P.Eng., Senior Project Manager, Region of Waterloo (File # ND-01-13)
Carrie Curtis, MTE Consultants Inc.

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ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 1549-C73QUT
Issue Date: October 22, 2021

2081788 Ontario Corporation
836 Normandy Drive
Woodstock, Ontario
N4T 0E6

Site Location: Broos Subdivision Phase 2
869 Brant-Waterloo Road
Township of North Dumfries, Regional Municipality of Waterloo

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the establishment of stormwater management Works relating to the Broos Subdivision Phase 2, located in the Township of North Dumfries, for the collection, transmission, treatment and disposal of stormwater runoff, to provide Enhanced Level quality control, erosion protection, and quantity control, attenuating post-development peak flows for all storms up to and including the 100-year storm event to pre-development peak flow release rates, consisting of the following:

oil and grit separator (catchment area 7.66 hectares): one (1) oil and grit separator, HydroStorm HS10 or Equivalent Equipment, located on Leslie Davis Street, approximately 12 metres west of Robert Wyllie Street, providing Enhanced Level of protection, having a sediment storage capacity of 13.2 cubic metres, an oil storage capacity of 4,355 litres, a total storage volume of approximately 20.0 cubic metres and a maximum treatment rate of 250 litres per second, receiving inflow from storm sewers on Leslie Davis Street, discharging via a 750 millimetre diameter outlet pipe to the storm sewers on Leslie Davis Street;

oil and grit separator (catchment area 3.65 hectares): one (1) oil and grit separator, HydroStorm HS8 or Equivalent Equipment, located on Robert Wyllie Street approximately 11 metres north of Leslie Davis Street, providing Enhanced Level of protection, having a sediment storage capacity of 6.3 cubic metres, an oil storage capacity of 2,372 litres, a total storage volume of approximately 10.0 cubic metres, and a maximum treatment rate of 150 litres per second, receiving inflow from storm sewers on Street H (Robert Wyllie Street), discharging via a 600 millimetre diameter outlet pipe to the storm sewers on Leslie Davis Street;

oil and grit separator (catchment area 3.64 hectares): one (1) oil and grit separator, HydroStorm HS8 or Equivalent Equipment, located on Leslie Davis Street approximately 25 metres east of Robert Wyllie Street, providing Enhanced Level of protection, having a sediment storage capacity of 6.3 cubic metres, an oil storage capacity of 2,372 litres, a total storage volume of approximately 10.0 cubic metres, and a maximum treatment rate of 150 litres per second, receiving inflow from storm sewers on Leslie Davis Street, discharging via a 600 millimetre diameter outlet pipe to the storm sewers on the easement adjacent to Block 329;

oil and grit separator (catchment area 5.85 hectares): one (1) oil and grit separator, HydroStorm HS10 or Equivalent Equipment, located within an easement between Lot 225 and 226 approximately 35 metres east of Duff Wilson Crescent, providing Enhanced Level of protection, having a sediment storage capacity of 13.2 cubic metres, an oil storage capacity of 4,355 litres, a total storage volume of approximately 20.0 cubic metres and a maximum treatment rate of 250 litres per second, receiving inflow from storm sewers on Duff Wilson Crescent, discharging via a 750 millimetre diameter outlet pipe to the proposed stormwater management facility;

stormwater management facility (catchment area 23.29 hectares, 60.5% imperviousness): one (1) constructed wetland with a rip-rap lined inlet micropool at the northwest end and two (2) dividing berms for extending the flow path, located at the southeast corner of the site, having a permanent pool volume of 2,088 cubic metres, an extended detention volume of 4,360 cubic metres and total storage volume of 13,411 cubic metres for the 100-year storm, including two (2) inlet pipes located at the northwest end of the wetland having diameters of 1,050 millimetres and 750 millimetres each within a concrete headwall, an outlet micropool at the southeast end, a water quality/ extended detention outlet consisting of a 300 millimetre diameter reverse sloped pipe with a 90 millimetre diameter orifice and storm sewers approximately 30 metres in length, discharging to the proposed storm sewers on Brant-Waterloo Road, a water quantity outlet consisting of twin 600 millimetre diameter pipes within a concrete headwall and a 1.8 metre wide concrete emergency overflow weir, discharging to the proposed drainage channel along the north side of Brant-Waterloo Road;

storm sewers within the Brant-Waterloo Road right-of-way, located below the proposed roadside drainage channel, from the proposed stormwater management facility outlet to approximately 150 metres east of the proposed stormwater management facility outlet, discharging via a 750 millimetre diameter outlet pipe installed within a concrete headwall to Charlie Creek, with the area around the outlet protected by rip-rap;

drainage channel along the north side of Brant-Waterloo Road, from the proposed stormwater management facility outlet to approximately 150 metres east of the proposed stormwater management facility outlet, with a bottom width of 0.5 metres, 3:1 side slopes, and a minimum depth of 0.75 metres, discharging to the proposed storm sewers within the Brant-Waterloo Road right-of-way, and ultimately to Charlie Creek;

culvert , a 400 millimetre diameter CSP, crossing Prince Philip Boulevard north of Brant-Waterloo Road;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;
all in accordance with the submitted application and supporting documents listed in Schedule A forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this entire document and any schedules attached to it, and the application;
2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;
3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;
4. "EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;
5. "Equivalent Equipment" means a substituted equipment or like-for-like equipment that meets the required quality and performance standards of the approved named equipment;
6. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;
7. "MNRF" means the Ministry of Natural Resources and Forestry of the government of Ontario and includes all officials, employees or other persons acting on its behalf;
8. "Owner" means 2081788 Ontario Corporation, and includes its successors and assignees;

9. "OWRA" means the *Ontario Water Resources Act,* R.S.O. 1990, c. O.40, as amended;
10. "Works" means the sewage Works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **GENERAL CONDITIONS**
    1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
    2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.
    3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.
    4. Where there is a conflict between the documents listed in Schedule A and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.
    5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.
    6. The issuance of, and compliance with the conditions of, this Approval does not:
        a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local

conservation authority/MNRF necessary to construct or operate the sewage works; or

b. limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. **EXPIRY OF APPROVAL**
    1. This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.
    2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. **CHANGE OF OWNER**
    1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:
        a. change of Owner;
        b. change of address of the Owner;
        c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or
        d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act,* R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.
    2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.
    3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. **OPERATION AND MAINTENANCE**

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.
2. The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the Works do not constitute a safety or health hazard to the general public.
3. The Owner shall inspect and ensure that the design minimum liquid retention volume is maintained in the Works at all times, except when maintenance is required.
4. The Owner shall undertake an inspection of the condition of the Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the Works to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the Works, as applicable. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.
5. The Owner shall construct, operate and maintain the Works with the objective that the effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam or discoloration on the receiving waters.
6. The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's administrative office for inspection by the Ministry. The logbook shall include the following:
    a. the name of the Works; and
    b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the Works.
7. The Owner shall prepare an operations manual prior to the commencement of operation of the Works that includes, but is not necessarily limited to, the following information:
    a. operating and maintenance procedures for routine operation of the Works;
    b. inspection programs, including frequency of inspection, for the Works

and the methods or tests employed to detect when maintenance is necessary;

c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;

d. contingency plans and procedures for dealing with potential spills and any other abnormal situations and for notifying the District Manager; and

e. procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

8. The Owner shall maintain the operations manual current and retain a copy at the Owner's administrative office for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

5. **TEMPORARY EROSION AND SEDIMENT CONTROL**
   1. The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a minimum of 25 millimetres of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.
   2. The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

6. **REPORTING**
   1. One (1) week prior to the start-up of the operation of the Works, the Owner shall notify the District Manager (in writing) of the pending start-up date.
   2. The Owner shall, upon request, make all reports, manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.
   3. The Owner shall prepare a performance report within ninety (90) days following the end of the period being reported upon, and submit the report(s) to the District Manager when requested. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be prepared to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:
      a. a description of any operating problems encountered and corrective

actions taken;

b. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works, including an estimate of the quantity of any materials removed from the Works;

c. a summary of any complaints received during the reporting period and any steps taken to address the complaints;

d. a summary of all spill or abnormal discharge events; and

e. any other information the District Manager requires from time to time.

7. **RECORD KEEPING**
    1. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation, maintenance and monitoring activities required by this Approval.

Schedule A

1. Application for Environmental Compliance Approval dated December 10, 2020 and received on April 22, 2021, prepared by Meritech Engineering on behalf of 2081788 Ontario Corporation;
2. Stormwater Management Report, Broos Subdivision, Phase 2, dated December 18, 2020, prepared by Meritech Engineering;
3. Engineering Drawings, a set of seven (7) engineering drawings, signed, stamped and dated on December 16, 2021, prepared by prepared by Meritech Engineering;
4. Design Brief: Stormwater Management Facility and Outfall, dated on December 10, 2020; and,
5. Email correspondence dated October 4, 7, and 18, 2021, addressed to the Ministry from Meritech Engineering.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. Condition 1.6 is included to emphasize that the issuance of this Approval does not diminish any other statutory and regulatory obligations to which the Owner is subject in the

construction, maintenance and operation of the Works. The Condition specifically highlights the need to obtain any necessary conservation authority approvals. The Condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.
4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from the Works are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the Works. The Condition also ensures that adequate storage is maintained in the Works at all times as required by the design. Furthermore, this Condition is included to ensure that the Works are operated and maintained to function as designed.
5. Condition 5 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction until they are no longer required.
6. Condition 6 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.
7. Condition 7 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 22nd day of October, 2021

Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

JW/
c: District Manager, MECP Guelph District Office
Chris Togeretz, Meritech Engineering

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 5273-AY8GP3
Issue Date: May 2, 2018

The Regional Municipality of Waterloo
150 Frederick Street
Kitchener, Ontario
N2G 4J3

Site Location: Northumberland Street, Stanley Street and Swan Street
Township of North Dumfries, Regional Municipality of Waterloo

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the establishment of wastewater infrastructure Works located in the Township of North Dumfries, Regional Municipality of Waterloo, consisting of the following:

- storm sewers on Sawn Street (from approximately 72 metres south of Stanley Street to approximately 7 metres north of Fowler Street and from approximately 51 metres south of Burnside Drive to approximately north edge of Hilltop Drive and approximately 25 metres south-eastward), discharging to existing sewers, located approximately 85 metres north of Hilltop Drive and to an existing culvert located approximately 10 metres north of Fowler Street;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted application and supporting documents listed in Schedule A forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this entire document and any schedules attached to it, and the application;
2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

3. "EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;
4. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;
5. "Owner" means The Regional Municipality of Waterloo, and includes its successors and assignees;
6. "OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;
7. "Water Supervisor" means the Water Supervisor of the appropriate local office of the Safe Drinking Water Branch of the Ministry, where the Works are geographically located;
8. "Works" means the sewage works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **GENERAL CONDITIONS**
    1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
    2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.
    3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.
    4. Where there is a conflict between the documents listed in Schedule "A" and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

2. EXPIRY OF APPROVAL

1. This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.
2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. CHANGE OF OWNER

1. The Owner shall notify the Water Supervisor and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

    a. change of Owner;

    b. change of address of the Owner;

    c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c.B17 shall be included in the notification to the Water Supervisor; or

    d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the

Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the Water Supervisor.

2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the Water Supervisor and the Director.
3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. OPERATION AND MAINTENANCE

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.

Schedule "A"

1. Application for Environmental Compliance Approval, dated February 16, 2018, received on April 4, 2018, submitted by The Regional Municipality of Waterloo;
2. Transfer of Review Letter of Recommendation, dated April 3, 2018, and signed by Badrul Khan, P. Eng., Senior Project Manager, Region of Waterloo;
3. Emails dated April 18, 2018, from Badrul Khan, P. Eng., Senior Project Manager, The Regional Municipality of Waterloo, and emails dated April 20, 2018 to April 27, 2018, from Dan Schipper, P. Eng., Walterfedy.

The reasons for the imposition of these terms and conditions are as follows:

REASONS:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.
2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.
4. Condition 4 is included to prevent the operation of stormwater pipes and other conveyance until such time that their required associated stormwater management Works are also constructed.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal

AND

The Director appointed for the purposes of Part II.1 of the Environmental

655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 2nd day of May, 2018

Christina Labarge, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

NW/
c: District Manager, MOECC Guelph
Dan Schipper, WalterFedy
Kris Fletcher, Regional Clerk, Corporate Resources, Region of Waterloo
Badrul Khan, P. Eng., Senior Project Manager, Region of Waterloo (File No. ND-01-18)
Rodger Mordue, Clerk Acting, Township of North Dumfries

Content Copy Of Original

ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 1511-BK5MAV
Issue Date: December 31, 2019

The Corporation of the Township of North Dumfries
2958 Greenfield Rd Ayr
North Dumfries, Ontario
N0B 1E0

Site Location: 260-264 Northumberland Street (Regional Road 58) & 2-14 Gore Estate Court
Township of North Dumfries, Regional Municipality of Waterloo
N0B 1E0

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the establishment of stormwater management Works to serve the proposed Gore Estates Subdivision, located in the Township of North Dumfries, for the collection, transmission, treatment and disposal of stormwater runoff from a total catchment area of 2.102 hectares, to provide Enhanced Level water quality protection and erosion control, and to attenuate post-development peak flows to pre-development peak flows for all storm events up to and including the 10-year storm event, discharging to Nith River, consisting of the following:

roadside ditches on Gore Estate Court, discharging to catch basins located on the bottom of the ditch with an emergency overflow weir discharging to the grassed swale in case of storm events greater than 10 year event;

subsurface soakaway pits located on the rear yard of 2 through 8 Gore Estate Court (inclusive), to collect and infiltrate the 25 mm rooftop runoff, having a total length of 2 metres, a width of 2 metres, a maximum allowable storage depth of 2 metres and a maximum available storage volume of 3.2 cubic metres each;

subsurface infiltration trench (catchment area 0.564 hectares), one (1) infiltration trench, located under the roadside ditches on Gore Estate Court, having a total length of 200 metres, a width of 1 metres, a maximum allowable storage depth of 1.6 metres and a maximum available storage volume of 128 cubic metres, complete with a 300 millimetre diameter perforated storm sub-drain installed in the clear stone layer, non-woven filter fabric installed and an emergency overflow outlet discharging through grassed swales to Nith River;

subsurface infiltration trench (catchment area 0.205 hectares), one (1) infiltration trench, located on the rear yard of 260-264 Northumberland Street and 10-14 Gore Estate Court, having a total length of 45 metres, a width of 2 metres, a maximum allowable storage depth of 2.5 metres and a maximum available storage volume of 90 cubic metres;

subsurface infiltration trench (catchment area 0.050 hectares), one (1) infiltration trench, located between 13 and 14 Gore Estate Court, having a total length of 7 metres, a width of 2 metres, a maximum allowable storage depth of 2 metres and a maximum available storage volume of 11.2 cubic metres;

subsurface infiltration trench (catchment area 0.401 hectares), four (4) infiltration trenches, located on 7,9,11, and 13 Gore Estate Court, each having a length of 16 metres, a width of 2.5 metres, a maximum allowable storage depth of 2 metres and a maximum available storage volume of 32 cubic metres each and a total available storage volume of 128 cubic metres;

subsurface infiltration trench (catchment area 0.144 hectares), one (1) infiltration trench, located on 5 Gore Estate Court, having a total length of 10 metres, a width of 3 metres, a maximum allowable storage depth of 2.2 metres and a maximum available storage volume of 26.4 cubic metres each; and

grassed swales on the part of the subdivision, from roadside ditch near catch basin DCB5 to level spreader towards bank of Nith River, discharging overflow from roadside ditch during storm events larger than 10 year event to Nith River;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted application and supporting documents listed in Schedule A forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this entire document and any schedules attached to it, and the application;

2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;
3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;
4. "EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;
5. "Equivalent Equipment" means a substituted equipment or like-for-like equipment that meets the required quality and performance standards of the approved named equipment;
6. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;
7. "MNRF" means the Ministry of Natural Resources and Forestry of the government of Ontario and includes all officials, employees or other persons acting on its behalf;
8. "Owner" means The Corporation of the Township of North Dumfries, and includes its successors and assignees;
9. "OWRA" means the *Ontario Water Resources Act,* R.S.O. 1990, c. O.40, as amended;
10. "Works" means the sewage Works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **GENERAL CONDITIONS**
    1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
    2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.
4. Where there is a conflict between the documents listed in Schedule A and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.
5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.
6. The issuance of, and compliance with the conditions of, this Approval does not:
    a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority/MNRF necessary to construct or operate the sewage works; or
    b. limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. **EXPIRY OF APPROVAL**
    1. This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.
    2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. **CHANGE OF OWNER**
    1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

a. change of Owner;

b. change of address of the Owner;

c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or

d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act,* R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.
3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. **OPERATION AND MAINTENANCE**
    1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.
    2. The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the Works do not constitute a safety or health hazard to the general public.
    3. The Owner shall undertake an inspection of the condition of the Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the Works to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the Works, as applicable. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.
    4. The Owner shall construct, operate and maintain the Works with the objective that the effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient

to create a visible film, sheen, foam or discoloration on the receiving waters.

5. The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's administrative office for inspection by the Ministry. The logbook shall include the following:
    a. the name of the Works; and
    b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the Works.

6. The Owner shall prepare an operations manual prior to the commencement of operation of the Works that includes, but is not necessarily limited to, the following information:
    a. operating and maintenance procedures for routine operation of the Works;
    b. inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;
    c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;
    d. contingency plans and procedures for dealing with potential spills and any other abnormal situations and for notifying the District Manager; and
    e. procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

7. The Owner shall maintain the operations manual current and retain a copy at the Owner's administrative office for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

5. **TEMPORARY EROSION AND SEDIMENT CONTROL**
    1. The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a minimum of 25 millimetres of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.
    2. The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the

remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

6. **REPORTING**
    1. One (1) week prior to the start-up of the operation of the Works, the Owner shall notify the District Manager (in writing) of the pending start-up date.
    2. The Owner shall, upon request, make all reports, manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.
    3. The Owner shall prepare a performance report within ninety (90) days following the end of the period being reported upon, and submit the report(s) to the District Manager when requested. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be prepared to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:
        a. a description of any operating problems encountered and corrective actions taken;
        b. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works, including an estimate of the quantity of any materials removed from the Works;
        c. a summary of any complaints received during the reporting period and any steps taken to address the complaints;
        d. a summary of all spill or abnormal discharge events; and
        e. any other information the District Manager requires from time to time.

7. **RECORD KEEPING**
    1. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation, maintenance and monitoring activities required by this Approval.

8. **CERTIFICATE OF REQUIREMENT**

    1. Pursuant to Section 103 of the *Ontario Water Resources Act*, no person having an interest in the Property, shall deal with the Property in any way without first giving a copy of this Approval to each person acquiring an interest in the Property as a result of the dealing.
    2. The Owner shall:

i. within sixty (60) days of the date of the issuance of this Approval, submit to the Director for their review, two copies of a completed Certificate of Requirement and a registerable description of the Property; and

ii. within ten (10) calendar days of receiving the Certificate of Requirement authorized by the Director, register the Certificate of Requirement in the appropriate Land Registry Office on title to the Property and submit to the Director the duplicate registered copy immediately following registration.

3. For the purposes of this condition, Property shall mean the properties located at 260-264 Northumberland Street (Regional Road 58) & 2-14 Gore Estate Court.

Schedule A

1. Application for Environmental Compliance Approval, dated June 13, 2019, received on June21, 2019, Submitted by Meritech Engineering on behalf of Township of Noth Dumfries;
2. Stormwater Management Design Report, dated February 2019, prepared by Meritech Engineering;
3. Engineering drawings, A set of Eight (8) engineering drawings, all stamped and dated Mar 19, 2019, prepared by Meritech Engineering; and
4. Email, from Chris Togeretz, P.Eng. of Meritech Engineering dated December 20, 2019.
5.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted.

This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. Condition 1.6 is included to emphasize that the issuance of this Approval does not diminish any other statutory and regulatory obligations to which the Owner is subject in the construction, maintenance and operation of the Works. The Condition specifically highlights the need to obtain any necessary conservation authority approvals. The Condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.
4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from the Works are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the Works. The Condition also ensures that adequate storage is maintained in the Works at all times as required by the design. Furthermore, this Condition is included to ensure that the Works are operated and maintained to function as designed.
5. Condition 5 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction until they are no longer required.
6. Condition 6 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.
7. Condition 7 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.
8. Condition 8 is included in order to require the Owner to give notice of this Approval to potential future owners of the property before the property is dealt with.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 31st day of December, 2019

Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

PP/
c: District Manager, DWECD, MECP Guelph
Chris Togeretz, Meritech Engineering

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Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 4409-BF8JNZ
Issue Date: September 12, 2019

828543 Ontario Inc. and 839658 Ontario Inc.
1919 Albion Road
Toronto, Ontario
M9W 5S8

Site Location: Legacy Estates Subdivision
Robert Woolner Street, William Creighton Street,
Di Donato Crescent and Leslie Davis Street
Township of North Dumfries, Regional Municipality of Waterloo

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the establishment of wastewater infrastructure Works located in the Township of North Dumfries, Regional Municipality of Waterloo, consisting of the following:

storm sewers on Robert Woolner Street (from approximately 16 metres north of Brant Waterloo Road to approximately 6 metres east-south-east of the centre of the roundabout at Leslie Davis Drive), discharging to proposed sewers, located on Leslie Davis Drive;

storm sewers on Robert Woolner Street (from approximately 54 metres north of the centre of the roundabout at Leslie Davis Drive to approximately 10 metres south of Gourlay Farm Lane), discharging to proposed sewers, located on Gourlay Farm Lane;

storm sewers on William Creighton Street (from approximately 81 metres west of Vincent Drive to approximately 15 metres north of Leslie Davis Street), discharging to proposed sewers, located on Leslie Davis Street;

storm sewers on Di Donato Crescent (north entrance) (from approximately 10 metres west of Robert Woolner Street and approximately 128 metres north of Brant Waterloo Road), discharging to proposed sewers, located on Robert Woolner Street;

storm sewers on Di Donato Crescent (south entrance) (from approximately 10 metres west of Robert Woolner Street and approximately 43 metres north of Brant Waterloo Road), discharging to proposed sewers, located on Robert Woolner Street;

storm sewers on Di Donato Crescent (north entrance) (from approximately 122 metres west of Robert Woolner Street and approximately 128 metres north of Brant Waterloo Road to approximately 197 metres west of Robert Woolner Street and approximately 128 metres north of Brant Waterloo Road), discharging to proposed sewers, located on Service Easement Block 43;

storm sewers on Di Donato Crescent (south entrance) from approximately 99 metres west of Robert Woolner Street and approximately 43 metres north of Brant Waterloo to approximately 197 metres west of Robert Woolner Street and approximately 128 metres north of Brant Waterloo Road), discharging to proposed sewers, located on service Easement Block 43;

storm sewers on servicing Easement Block 43 (from approximately 197 metres west of Robert Woolner Street and approximately 128 metres north of Brant Waterloo Road to Leslie Davis Street), discharging to proposed sewers, located on Leslie Davis Street; and

storm sewers on Leslie Davis Street (from approximately 45 metres east of Robert Woolner Street to approximately 15 metres east of William Creighton Street), discharging to proposed sewers, located on Leslie Davis Street;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;
all in accordance with the submitted application and supporting documents listed in Schedule "A" forming part of this approval.

For the purpose of this environmental compliance approval, the following definitions apply:

DEFINITIONS

1. "Approval" means this entire document and any schedules attached to it, and the application;
2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;
3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;
4. "EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;
5. "Ministry" means the ministry of the government of Ontario responsible for the

EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

6. "Owner" means 828543 Ontario Inc. and 839658 Ontario Inc., and includes their successors and assignees;
7. "OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;
8. "Works" means the sewage Works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **GENERAL CONDITIONS**
    1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
    2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.
    3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.
    4. Where there is a conflict between the documents listed in Schedule "A" and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.
    5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

2. EXPIRY OF APPROVAL

1. This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.
2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. CHANGE OF OWNER

1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

    a. change of Owner;

    b. change of address of the Owner;

    c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or

    d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the

Director.

3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. OPERATION AND MAINTENANCE

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.

Schedule "A"

1. Application for Environmental Compliance Approval, dated June 26, 2019, received on August 9, 2019, submitted by 828543 Ontario Inc. and 839658 Ontario Inc.;
2. Transfer of Review Letter of Recommendation, dated August 8, 2019 and signed by Mike Pearce, P.Eng., Senior Project Manager, Transfer of Review, The Regional Municipality of Waterloo;
    a. Final Plans and Specifications prepared by Stantec Consultants Ltd.
    b. Pipe Data Form - Watermain, Storm Sewer, Sanitary Sewer, and Forcemain Design Supplement to Application for Approval for Water and Sewage Works.
    c. Hydraulic Design Sheets prepared by Stantec Consultants Ltd.
3. Emails dated August 26, 2019 and September 4, 2019 from Michael Huisman, C.E.T., Engineering Technologist, Stantec Consultants Ltd.
4. Emails dated August 25, 2019 and August 27, 2019 from Mike Pearce, P.Eng., Senior Project Manager, Transfer of Review, The Regional Municipality of Waterloo.

The reasons for the imposition of these terms and conditions are as follows:

REASONS:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.
2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.
4. Condition 4 is included to prevent the operation of stormwater pipes and other conveyance until such time that their required associated stormwater management Works are also constructed.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment,

M5G 1E5

Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 12th day of September, 2019

Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

RV/
c: District Manager, MECP Guelph
Kris Fletcher, Regional Clerk, Corporate Resources, Region of Waterloo (File No. ND-01-19)
Mike Pearce, P.Eng., Senior Project, Transfer of Review, Region of Waterloo
Andrew McNeely, Township of North Dumfries
Michael Huisman, C. Tech., Stantec Consultants Ltd.

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ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 5264-BATK97
Issue Date: May 2, 2019

839658 Ontario Inc.
1919 Albion Rd
Toronto, Ontario
M9W 5S8

Site Location: Legacy Estates Subdivision
895 Brant-Waterloo Rd
Township of North Dumfries,
Regional Municipality of Waterloo, Ontario
N0B 1E0

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

establishment of stormwater management Works to serve the proposed Legacy Estates Subdivision development, located at 895 Brant-Waterloo Rd, in the Township of North Dumfries, Regional Municipality of Waterloo, for the collection, transmission, treatment and disposal of stormwater runoff from a total catchment area of 25.4 hectares, to provide Enhanced Level water quality protection and erosion control, and to attenuate post-development peak flows to pre-development peak flow for all storm events up to and including the 100-year storm event, discharging to Nith River, consisting of the following:

stormwater management facility (catchment area 25.4 hectares): one (1) constructed wetland with a 1.5 metre deep sediment forebay, located immediately adjacent to the intersection of Swan Street and Brant-Waterloo Road, having a permanent storage volume of approximately 2,035 cubic metres, an extended detention volume of approximately 1,016 cubic metres, and a total active storage volume of approximately 19,775 cubic metres at an active storage depth of 2.0 metres (elevation 296.0 metres), complete with one (1) inlet structure at the northwest corner, consisting of a 1200 millimetre storm inlet pipe and a concrete headwall, one (1) 20.0 metre wide emergency overflow weir, one (1) 3.0 meter wide access road, and one (1) outlet structure at the southwest corner, consisting of a 1,200 millimetre diameter perforated CSP riser, a 150 millimetre diameter orifice and a 600 millimetre outlet pipe, discharging to the Mitchell Drain via the orifice and a cooling trench along the perimeter of the constructed wetland during low flows and the outlet pipe/orifice during higher flows, allowing a maximum discharge of

0.81 cubic metres per second under the 100-year storm event to the Mitchell Drain;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the supporting documents set out in Schedule "A" attached to this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this entire document and any schedules attached to it, and the application;

2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;

4. "EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;

5. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

6. "MNRF" means the Ministry of Natural Resources and Forestry of the government of Ontario and includes all officials, employees or other persons acting on its behalf;

7. "Owner" means 839658 Ontario Inc., and includes its successors and assignees;

8. "OWRA" means the *Ontario Water Resources Act,* R.S.O. 1990, c. O.40, as amended;

9. "Works" means the sewage Works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **GENERAL CONDITIONS**

    1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
    2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.
    3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.
    4. Where there is a conflict between the documents listed in Schedule A and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.
    5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.
    6. The issuance of, and compliance with the conditions of, this Approval does not:
        a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority/MNRF necessary to construct or operate the sewage works; or
        b. limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. **EXPIRY OF APPROVAL**

    1. This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.
    2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still

applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. **CHANGE OF OWNER**

1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:
    a. change of Owner;
    b. change of address of the Owner;
    c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or
    d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act,* R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.
2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.
3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. **OPERATION AND MAINTENANCE**

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.
2. The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the Works do not constitute a safety or health hazard to the general public.
3. The Owner shall inspect and ensure that the design minimum liquid retention volume is maintained in the Works at all times, except when maintenance is required.
4. The Owner shall undertake an inspection of the condition of the Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure

that sediment, debris and excessive decaying vegetation are removed from the Works to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the Works, as applicable. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.

5. The Owner shall construct, operate and maintain the Works with the objective that the effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam or discoloration on the receiving waters.
6. The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's administrative office for inspection by the Ministry. The logbook shall include the following:
    a. the name of the Works; and
    b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the Works.
7. The Owner shall prepare an operations manual prior to the commencement of operation of the Works that includes, but is not necessarily limited to, the following information:
    a. operating and maintenance procedures for routine operation of the Works;
    b. inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;
    c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;
    d. contingency plans and procedures for dealing with potential spills and any other abnormal situations and for notifying the District Manager; and
    e. procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.
8. The Owner shall maintain the operations manual current and retain a copy at the Owner's administrative office for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

5. TEMPORARY EROSION AND SEDIMENT CONTROL

1. The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a

minimum of 25 millimetres of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

2. The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

6. **REPORTING**

1. One (1) week prior to the start-up of the operation of the Works, the Owner shall notify the District Manager (in writing) of the pending start-up date.
2. The Owner shall, upon request, make all reports, manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.
3. The Owner shall prepare a performance report within ninety (90) days following the end of the period being reported upon, and submit the report(s) to the District Manager when requested. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be prepared to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:
    a. a description of any operating problems encountered and corrective actions taken;
    b. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works, including an estimate of the quantity of any materials removed from the Works;
    c. a summary of any complaints received during the reporting period and any steps taken to address the complaints;
    d. a summary of all spill or abnormal discharge events; and
    e. any other information the District Manager requires from time to time.

7. **RECORD KEEPING**

1. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation, maintenance and monitoring activities required by this Approval.

Schedule A

1. Application for Environmental Compliance Approval, dated September 13, 2018 and

received on December 14, 2018, submitted by Stantec Consulting Ltd. on behalf of 839658 Ontario Inc.;

2. Hilltop Estate Subdivision Stage 4 (now known as Legacy Estates Subdivision), Ayr, Stormwater Management Plan, dated September 22, 2017 and prepared by Stantec Consulting Ltd.;

3. Memo Re. Legacy Subdivision Stormwater Management - Comment Responses, dated June 14, 2018 and prepared by Bryan Weersink of Stantec Consulting Ltd.;

4. A set of forty-three (43) engineering drawings, stamped and dated on November 19 and 21, 2018, prepared by Stantec Consulting Ltd.; and

5. Other supporting documents.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. Condition 1.6 is included to emphasize that the issuance of this Approval does not diminish any other statutory and regulatory obligations to which the Owner is subject in the construction, maintenance and operation of the Works. The Condition specifically highlights the need to obtain any necessary conservation authority approvals. The Condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.
2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.
4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from the Works are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the Works. The Condition also ensures that adequate storage is maintained in the Works at all times as required by the design. Furthermore, this Condition is included to ensure that the Works are operated and maintained to function as

designed.

5. Condition 5 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction until they are no longer required.
6. Condition 6 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.
7. Condition 7 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 2nd day of May, 2019

Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

SW/
c: District Manager, MECP Guelph
John Vleeming, Stantec Consultants Ltd.

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Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 8252-A3SHUL
Issue Date: November 3, 2015

2081788 Ontario Corporation
2 Prince Edward Road
Woodstock, Ontario
N4V 1G7

Site Location: Hilltop Subdivision, Stage 3 and Broos Property Subdivision, Phase 1
Lots 32 and 33, Concession 7
Township of North Dumfries, Regional Municipality of Waterloo

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

sanitary and storm sewers to be constructed in the Township of North Dumfries, Regional Municipality of Waterloo, as follows:

sanitary sewers on Street A (from approximately 43 m east of north intersection with Patterson Street to approximately 8 m north-east of south intersection with Patterson Street) and Street B (from approximately middle of north intersection with Patterson Street to approximately middle of south intersection with Patterson Street); and

storm sewers on Street A (from approximately 94 m south-east of north intersection with Street B to approximately south intersection with Patterson Street) and Street B (from approximately middle of north intersection with Patterson Street to approximately middle of south intersection with Patterson Street);

all in accordance with the application from 2081788 Ontario Corporation, dated October 7, 2015, including final plans and specifications prepared by Stantec Consultants Ltd.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;

6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 655 Bay Street, Suite 1500 Toronto, Ontario M5G 1E5	AND	The Director appointed for the purposes of Part II.1 of the Environmental Protection Act Ministry of the Environment and Climate Change 135 St. Clair Avenue West, 1st Floor Toronto, Ontario M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 3rd day of November, 2015

Gregory Zimmer, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

YH/
c: District Manager, MOECC Guelph District Office
Kris Fletcher, Clerk, Regional Municipality of Waterloo
Badrul Khan, P. Eng., Senior Project Manager, Regional Municipality of Waterloo (File No. ND-01-15)
Rodger Mordue, Clerk Acting, Township of North Dumfries
Kevin Brousseau, C.E.T, Stantec Consultants Ltd.
John Vleeming, Stantec Consultants Ltd.

CONTENT COPY OF ORIGINAL

Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 1502-6UYKUU
Issue Date: October 27, 2006

828543 & 839658 Ontario Inc.
1919 Albion Rd
Toronto, Ontario
M9W 6J9

Site Location: Hilltop Subdivision, Stage 3
Lots 33 & 34, Concession 7
North Dumfries Township, Regional Municipality of Waterloo

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

storm sewers to be constructed in the Township of North Dumfries, Regional Municipality of Waterloo, on Matthew Street, Hilltop Drive, John Way, Marten Crescent, Hunt Street, Christian Street, Robert Drive and Blocks 106 and 76 , all in accordance with the application from 828543 & 839658 Ontario Inc., dated September 21, 2006, including final plans and specifications prepared by Stantec Consulting Ltd.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

CONTENT COPY OF ORIGINAL

DATED AT TORONTO this 27th day of October, 2006

Sarah Paul, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

GS/
c: District Manager, MOE Guelph
Kevin Brousseau, Stantec Consulting Ltd.
K. Fletcher, Clerk, Regional Municipality of Waterloo
Jo-Anne Ing, Regional Municipality of Waterloo
M. Bosetti, Clerk, Township of North Dumfries

CONTENT COPY OF ORIGINAL

Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 1985-77WJNA
Issue Date: October 23, 2007

The Regional Municipality of Waterloo
150 Frederick St 6th Floor
Kitchener, Ontario
N2G 4J3

Site Location: Northumberland Street Reconstruction
173 to 1107 Northumberland Street
Waterloo City, Regional Municipality of Waterloo

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

- one (1) oil/grit interceptor (MH 3) located on Northumberland Street, having a sediment capacity of 26945 litres, an oil capacity of 3930 litres, a total holding capacity of 31285 litres and a maximum treatment flow rate of 70 litres per second, discharging to Nith River via an existing 200m long grassed ditch;

all in accordance with the application dated March 5, 2007 and received on March 7, 2007, signed by Bill Brodribb, Director, Design and Construction, the Regional Municipality of Waterloo , and all supporting documentation and information, including final plans and specifications prepared by Region of Waterloo;

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

(1) "*Certificate*" means this entire Certificate of Approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

(2) "*Owner*" means The Corporation of the Regional Municipality of Waterloo, and includes its successors and assignees; and

(3) "*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

CONTENT COPY OF ORIGINAL

1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this *Certificate* shall not be affected thereby.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. OPERATION AND MAINTENANCE

3.1 The *Owner* shall design, construct and operate the oil/grit interceptor with the objective that no visible oil sheens occur in the effluent discharged from the oil/grit interceptor.

3.2 The *Owner* shall carry out and maintain an annual inspection and maintenance program on the operation of the oil/grit interceptor in accordance with the manufacturer's recommendation.

3.3 After a two (2) year period, the District Manager of the MOE District Office may alter the frequency of inspection of the oil/grit interceptor if he/she is requested to do so by the *Owner* and considers it acceptable upon review of information submitted in support of the request.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition No.1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the *Owners* their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate*.

2. Condition No.2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition No.3 is imposed to ensure that the oil/grit interceptor is operated and maintained without any adverse impact on the environment.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the

CONTENT COPY OF ORIGINAL

Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 23rd day of October, 2007

Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

AM/
c: District Manager, MOE Guelph
Greg Proctor, The Regional Municipality of Waterloo

Content Copy Of Original

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 4689-A8ZLNZ
Issue Date: June 29, 2016

2081788 Ontario Corporation
2 Prince Edward Rd
Woodstock, Ontario
N4V 1G7

Site Location: Broos Property Phase 1
Lot 32 and 33, Concession 7
Township of North Dumpfries, County of Wellington

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

expansion of Storm Water Management Works to service Hilltop Community Subdivision and Broos Property for enhanced level of quality and quantity control of 25 millimetres to Regional Storm events (including 100-year) post development flows to pre-development flow rates consisting of the following:

Proposed Works

Facility 'B' (catchment area of 29.8 hectares (interim) 30.3 hectares (ultimate) of development and 39.1 hectares (interim), 30.8 hectares (ultimate) external undeveloped area):

a **constructed wetland** located on Blocks 39 and 77, located at east of Swan Street, complete with two (2) forebays with approximately 3055 cubic metres in permanent, 4926 cubic metres (interim) and 2763 cubic metres (ultimate) of extended detention and a total storage volume of 76118 cubic metres (interim) and 60216 cubic metres (ultimate), complete with:

one (1) 195 millimetre, one (1) 250 millimetre, one (1) 450 millimetre diameter vertical orifices located in a 1800 millimetre diameter perforated riser to discharge into a 525 millimetre diameter outlet pipe to drain into the existing Valleyview Stormwater Management Facility ultimately discharging to the Nith River,

one (1) 10 metre wide 500 millimetre deep trapezoidal overflow spillway to discharge to Swan Street side ditch to Nith River,

0.7 metre deep, 1.5 metre wide, approximately 445 metre **long infiltration gallery** located along the lots 1-28, complete with 150 millimetre diameter perforated pipe and 50 millimetre diameter clear stone,

0.7 metre deep, 1.5 metre wide, approximately 172.7 metre long **infiltration gallery** located along the rear yards of blocks 32-46, complete with 150 millimetre diameter perforated pipe and 50 millimetre diameter clear stone;

0.7 metre deep, 1.5 metre wide, approximately 172.7 metre long **infiltration gallery** located along

the rear yards of blocks 47-58 and 78-85, complete with 150 millimetre diameter perforated pipe and 50 millimetre diameter clear stone;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

Previous Works

Facility 'A' (catchment area of 8.6 hectares):

a **constructed wetland** located on Block 106, east of Marten Crescent, complete with a forebay with approximately 1,042 cubic metres in permanent, 447 cubic metres of extended detention and a total storage volume of 9,324 cubic metres, complete with,

one (1) 110 millimetre and one (1) 400 millimetre diameter vertical orifices located in a 1500 millimetre diameter perforated riser to discharge into a 600 millimetre diameter outlet pipe to drain into Municipal storm drainage manhole MH61 on Hunt Street,

a 2.4 metre wide by 2.0 metre deep, 300 metre long infiltration gallery around the periphery of the wetland complete with 300 millimetre diameter perforated pipe and 20 millimetre to 50 millimetre diameter clear stone,

a 4 metre wide by 150 millimetre deep overflow spillway, protected with rip-rap to discharge stormwater flow west onto the Hilltop Drive, in case of blockage of all outlets during severe storms,

1.0 metre deep, varying width, approximately 465 metres long **infiltration galleries** located at the backyard of the residential area as shown on drawings, complete with 150 millimetre diameter perforated pipe and 20 millimetre to 50 millimetre diameter clear stone;

all in accordance with the submitted application and supporting documents listed in Schedule "A" forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation;

2. "Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the Part II.1 of the Environmental Protection Act;

3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;

5. "Ministry" means the Ontario Ministry of the Environment and Climate Change;

6. "Owner" means 2081788 Ontario Corporation, and includes its successors and assignees;

7. "Previous Works" means those portions of the sewage works previously constructed and approved under an Approval;

8. "Proposed Works" means the sewage works described in the Owner's application, this Approval, to the extent approved by this Approval;

9. "Water Supervisor" means the Water Supervisor of the appropriate local office of the Safe Drinking Water Branch of the Ministry, where the Works are geographically located;

10. "Works" means the sewage works described in the Owner's application, this Approval and in the supporting documentation referred to herein, to the extent approved by this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

1.1 The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Approval.

1.3 Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this Approval are severable. If any requirement of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this Approval shall not be affected thereby.

1.6 The issuance of, and compliance with the conditions of, this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority/MNRF necessary to construct or operate the sewage works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.

3. CHANGE OF OWNER

3.1 The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; and

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

3.2 Notwithstanding any other requirements in this Approval, upon transfer of the ownership or assumption of the Works to a municipality if applicable, any reference to the District Manager shall be replaced with the Water Supervisor.

4. OPERATION AND MAINTENANCE

4.1 The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the stormwater works do not constitute a safety or health hazard to the general public.

4.2 The Owner shall undertake an inspection of the condition of the stormwater management system, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the above noted stormwater management Works to prevent the excessive build-up of sediment, debris and/or decaying vegetation to avoid reduction of capacity of the stormwater management Works. The Owner shall also regularly inspect and clean out the inlet to and outlet from the works to ensure that these are not obstructed.

4.3 The Owner shall ensure that the design storage volumes are maintained at all times.

4.4 The Owner shall inspect the Works and carry out regular operation and maintenance activities as proposed in the Section 4.0 of the "Stormwater Management Report, Hilltop Stage 3, (Phase 4) and Broos Property (Phase 1)", dated July 13, 2015 prepared by Stantec Consulting Ltd.

4.5 The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall make the logbook available for inspection by the Ministry upon request. The logbook shall include, but not necessarily be limited to, the following information:

(a) the name of the Works; and

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed.

5. TEMPORARY EROSION AND SEDIMENT CONTROL

5.1 The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event

(a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly .

5.2 The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

6. RECORD KEEPING

6.1 The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this Approval.

7. GROUNDWATER MONITORING AND RECORDING

7.1 The Owner shall, establish two (2) groundwater monitoring wells of 50 millimetre diameter PVC pipe, 8.0 metres and 25 metres deep at locations as indicated on the 'Stormwater Management Plan' drawing # C-100 and upon commencement of operation of the Works, carry out the following sampling and monitoring program. All samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality of the groundwater over the time period being monitored.

7.2 For the purposes of this condition, the following definitions apply: (a) Annually means once every twelve months.

7.3 Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 1 - Groundwater Monitoring		
Parameters	**(Sample Type)**	**Frequency**
Groundwater Level	Reading	three(3) times, once in spring, summer and fall
Chloride	(Grab)	annually
Total Ammonia Nitrogen	(Grab)	annually
Total dissolved Metals	(Grab)	annually

7.4 The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions;

(d) for any parameters not mentioned in the documents referenced in (a) and (b), the written approval of the District Manager shall be obtained prior to sampling.

7.5 The temperature and pH of the effluent from the Works shall be determined in the field at the time of sampling for Total Ammonia Nitrogen. The concentration of un-ionized ammonia shall be calculated using the total ammonia concentration, pH and temperature using the methodology stipulated in "Ontario's Provincial Water Quality Objectives" dated July 1994, as amended, for ammonia (un-ionized).

7.6 The Owner shall retain for a minimum of three (3) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

Schedule "A"

1. Application for Environmental Compliance Approval for Municipal and Private Sewage Works, dated October 7, 2015 and received on October 23, 2015, submitted by 2081788 Ontario Corporation.
2. Stormwater Management Report, Hilltop Stage 3, (Phase 4) and Broos Property (Phase 1), dated July 13, 2015 prepared by Stantec Consulting Ltd.

3. Engineering Drawings: Broos Property Phase 1 & Hilltop Stage 3 Phase 4, dated October 2015 prepared by Stantec Consulting Ltd.

4. E-mails from David Williams and Kevin Brousseau of Stantec Consulting Ltd. to the ministry, dated April 12, 2016, June 15, 2016, June 24, 2016 and June 27, 2016.

5. Application for Approval of Municipal and Private Sewage Works, dated September 21, 2006, Stormwater Management Report, August 2006, final plans and addendum documents prepared and submitted by Kevin Brousseau, C.E.T., Stantec Consulting Ltd., Consulting Engineers.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this Approval the existence of this Approval. Condition 1.6 is included to emphasize that the issuance of the Approval does not diminish any other statutory and regulatory obligations to which the owner is subject in the construction, maintenance and operation of the works. The condition specifically highlights the need to obtain any necessary conservation authority approvals. The condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from the approved stormwater management Works is required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the Works. It is also required to ensure that adequate storage is maintained in the stormwater management facilities at

all times as required by the design, and to prevent stormwater impounded in the works from becoming stagnant. Furthermore, Condition 4 is included to ensure that the stormwater management Works are operated and maintained to function as designed.

5. Condition 5 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction, until they are no longer required.

6. Condition 6 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

7. Condition 7 is included to ensure that the performance of the works is evaluated, recorded and reported on an annual basis.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 0522-6U8PDG issued on November 15, 2006

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 29th day of June, 2016

Gregory Zimmer, P.Eng.
Director
appointed for the purposes of Part II.1 of
the *Environmental Protection Act*

NS/
c: District Manager, MOECC Guelph Office
DWMD Supervisor, MOECC Guelph Office
Kevin Brousseau, Stantec Consultants Ltd.

Content Copy Of Original

ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 6433-AYJRF4
Issue Date: June 6, 2018

Grant Castle Corp.
18 Adelaide St Maxville
Post Office Box, No. 100
North Glengarry, Ontario
K0C 1T0

Site Location: 1202 Northumberland Street
Township of North Dumfries, Regional Municipality of Waterloo

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the establishment of an oil and water separator to act as spill control and to manage storm runoff from the reinforced concrete apron of a petroleum cardlock facility, located between Highway 401 and Greenfield Road, on the west side of Northumberland Street, within the Nith River Watershed, in the Township of North Dumfries, in the Regional Municipality of Waterloo, consisting of the following;

- **oil and water separator (catchment area: 0.0132 hectares)**: one (1) oil and water separator (Porter's 4090 Litres, three chamber, pre-cast concrete interceptor or Equivalent Equipment), located north-west of the concrete apron of the petroleum concrete cardlock facility, to provide spill control for the area of the pump island by acting as a containment, having an approximate length of 3.15 meters, an approximate width of 1.52 meters and a liquid depth of 1.16 meters, having a maximum sediment capacity of 495 litres, a maximum oil storage capacity of 3,030 litres, a total holding capacity of 4,090 litres and a maximum treatment flow rate of 39.5 litres per minute, discharging via a 100 millimetre diameter HDPE pipe to the existing low lying area located on the west side of the facility and ultimately to a wetland. Includes one (1) manual emergency in-line shut-off value located downstream of the above noted oil water separator;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted application and supporting documents listed in Schedule A forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this entire document and any schedules attached to it, and the application;
2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;
3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;
4. "EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;
5. "Equivalent Equipment" means a substituted equipment or like-for-like equipment that meets the required quality and performance standards of the approved named equipment;
6. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;
7. "MNRF" means the Ministry of Natural Resources and Forestry of the government of Ontario and includes all officials, employees or other persons acting on its behalf;
8. "Owner" means Grant Castle Corp., and includes its successors and assignees;
9. "OWRA" means the *Ontario Water Resources Act,* R.S.O. 1990, c. O.40, as amended;
10. "Works" means the sewage works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **GENERAL CONDITIONS**
    1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.
3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.
4. Where there is a conflict between the documents listed in Schedule A and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.
5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.
6. The issuance of, and compliance with the conditions of, this Approval does not:
    a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority/MNRF necessary to construct or operate the sewage works; or
    b. limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. **EXPIRY OF APPROVAL**
    1. This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.
    2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. **CHANGE OF OWNER**
    1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:
        a. change of Owner;
        b. change of address of the Owner;
        c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or
        d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act,* R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.
    2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.
    3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. **OPERATION AND MAINTENANCE**
    1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.
    2. The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the Works do not constitute a safety or health hazard to the general public.
    3. The Owner shall undertake an inspection of the condition of the Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the Works to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the Works, as applicable. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.

4. The Owner shall construct, operate and maintain the Works with the objective that the effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam or discoloration on the receiving waters.
5. The Owner shall ensure the immediate clean-out of the Works after a fuel or oil spill capture.
6. The Owner shall ensure that equipment and material for the containment, clean-up and disposal of fuel and oil and materials contaminated with such, is on hand and in good repair for immediate use in the event of:
    a. loss of fuel or oil to the Works; or
    b. a spill within the meaning of Part X of the EPA.
7. The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's administrative office for inspection by the Ministry. The logbook shall include the following:
    a. the name of the Works;
    b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the Works; and
    c. the date of each spill within the catchment area, including follow-up actions and remedial measures undertaken.
8. The Owner shall prepare an operations manual prior to the commencement of operation of the Works that includes, but is not necessarily limited to, the following information:
    a. operating and maintenance procedures for routine operation of the Works;
    b. inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;
    c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;
    d. contingency plans and procedures for dealing with potential spills and any other abnormal situations and for notifying the District Manager; and
    e. procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.
9. The Owner shall maintain the operations manual current and retain a copy at

the Owner's administrative office for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

5. **TEMPORARY EROSION AND SEDIMENT CONTROL**
    1. The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a minimum of 25 millimetres of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.
    2. The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

6. **REPORTING**
    1. One (1) week prior to the start-up of the operation of the Works, the Owner shall notify the District Manager (in writing) of the pending start-up date.
    2. The Owner shall, upon request, make all reports, manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.
    3. The Owner shall prepare a performance report within ninety (90) days following the end of the period being reported upon, and submit the report(s) to the District Manager when requested. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be prepared to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:
        a. a description of any operating problems encountered and corrective actions taken;
        b. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works, including an estimate of the quantity of any materials removed from the Works;
        c. a summary of any complaints received during the reporting period and any steps taken to address the complaints;
        d. a summary of all spill or abnormal discharge events; and
        e. any other information the District Manager requires from time to time.

7. **SPILL CONTINGENCY PLAN**
    1. Within six (6) months from the issuance of this Approval, the Owner shall implement a spill contingency plan - that is a set of procedures describing how to mitigate the impacts of a spill within the area serviced by the Works. The Owner shall, upon request, make this plan available to Ministry staff. This plan shall include as a minimum:
        a. the name, job title and location (address) of the Owner, person in charge, management or person(s) in control of the facility;
        b. the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;
        c. a site plan drawn to scale showing the facility, nearby buildings, streets, catch-basins and manholes, drainage patterns (including direction(s) of flow in storm sewers), any receiving body(ies) of water that could potentially be significantly impacted by a spill and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);
        d. steps to be taken to report, contain, clean up and dispose of contaminants following a spill;
        e. a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and Ministry Spills Action Centre 1-800-268-6060;
        f. Safety Data Sheets (SDS) for each hazardous material which may be transported or stored within the area serviced by the Works;
        g. the means (internal corporate procedures) by which the spill contingency plan is activated;
        h. a description of the spill response training provided to employees assigned to work in the area serviced by the Works, the date(s) on which the training was provided and by whom;
        i. an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and
        j. the date on which the contingency plan was prepared and subsequently, amended.
    2. The spill contingency plan shall be kept in a conspicuous, readily accessible location on-site.

3. The spill contingency plan shall be amended from time to time as required by changes in the operation of the facility.

8. **RECORD KEEPING**
    1. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation, maintenance and monitoring activities required by this Approval.

Schedule A

1. Application for Environmental Compliance Approval, dated April 9, 2018, received on April 9, 2018, submitted by Jeffrey Environmental Consultants Inc. on behalf of Grant Castle Corp.;
2. Design Brief (along with all its appendices), dated March 2018, prepared by Jeffrey Environmental Consultants Inc.;
3. Engineering Drawing, Site Plan, stamped and dated on March 7, 2018, prepared by Jeffrey Environmental Consultants Inc.; and
4. Email from Mark Jeffrey of Jeffrey Environmental Consultants Inc., dated May 7, 2018;

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. Condition 1.6 is included to emphasize that the issuance of this Approval does not diminish any other statutory and regulatory obligations to which the Owner is subject in the construction, maintenance and operation of the Works. The Condition specifically highlights the need to obtain any necessary conservation authority approvals. The Condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.
2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works

in compliance with it.

4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from the Works are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the Works. The Condition also ensures that adequate storage is maintained in the Works at all times as required by the design. Furthermore, this Condition is included to ensure that the Works are operated and maintained to function as designed.
5. Condition 5 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction until they are no longer required.
6. Condition 6 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.
7. Condition 7 is included to ensure that the Owner will implement the Spill Contingency Plan, such that the environment is protected and deterioration, loss, injury or damage to any person(s) or property is prevented.
8. Condition 8 is included to require that all records are required for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me, the Environmental Review Tribunal and in accordance with Section 47 of the Environmental Bill of Rights, 1993, S.O. 1993, c. 28 (Environmental Bill of Rights), the Environmental Commissioner, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;

2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 655 Bay Street, Suite 1500 Toronto, Ontario M5G 1E5	AND	The Environmental Commissioner 1075 Bay Street, Suite 605 Toronto, Ontario M5S 2B1	AND	The Director appointed for the purposes of Part II.1 of the Environmental Protection Act Ministry of the Environment and Climate Change 135 St. Clair Avenue West, 1st Floor Toronto, Ontario M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

This instrument is subject to Section 38 of the Environmental Bill of Rights, 1993, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at www.ebr.gov.on.ca, you can determine when the leave to appeal period ends.

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 6th day of June, 2018

Christina Labarge, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

GW/
c: District Manager, MOECC Guelph
Mark Jeffrey, P.Eng., Jeffery Environmental Consultants Inc.

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Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 1985-77WJNA
Issue Date: October 23, 2007

The Regional Municipality of Waterloo
150 Frederick St 6th Floor
Kitchener, Ontario
N2G 4J3

Site Location: Northumberland Street Reconstruction
173 to 1107 Northumberland Street
Waterloo City, Regional Municipality of Waterloo

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

- one (1) oil/grit interceptor (MH 3) located on Northumberland Street, having a sediment capacity of 26945 litres, an oil capacity of 3930 litres, a total holding capacity of 31285 litres and a maximum treatment flow rate of 70 litres per second, discharging to Nith River via an existing 200m long grassed ditch;

all in accordance with the application dated March 5, 2007 and received on March 7, 2007, signed by Bill Brodribb, Director, Design and Construction, the Regional Municipality of Waterloo , and all supporting documentation and information, including final plans and specifications prepared by Region of Waterloo;

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

(1) "*Certificate*" means this entire Certificate of Approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

(2) "*Owner*" means The Corporation of the Regional Municipality of Waterloo, and includes its successors and assignees; and

(3) "*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

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1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this *Certificate* shall not be affected thereby.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. OPERATION AND MAINTENANCE

3.1 The *Owner* shall design, construct and operate the oil/grit interceptor with the objective that no visible oil sheens occur in the effluent discharged from the oil/grit interceptor.

3.2 The *Owner* shall carry out and maintain an annual inspection and maintenance program on the operation of the oil/grit interceptor in accordance with the manufacturer's recommendation.

3.3 After a two (2) year period, the District Manager of the MOE District Office may alter the frequency of inspection of the oil/grit interceptor if he/she is requested to do so by the *Owner* and considers it acceptable upon review of information submitted in support of the request.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition No.1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the *Owners* their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate*.

2. Condition No.2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition No.3 is imposed to ensure that the oil/grit interceptor is operated and maintained without any adverse impact on the environment.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the

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Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 23rd day of October, 2007

Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

AM/
c: District Manager, MOE Guelph
Greg Proctor, The Regional Municipality of Waterloo

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Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 9032-6ZKRSC
Issue Date: April 3, 2007

The Regional Municipality of Waterloo
150 Frederick Street
Kitchener, Ontario
N2G 4J3

Site Location: Northumberland Street, Easement (Northwest of Canadian Pacific Railway Rail Line)
North Dumfries Township, Regional Municipality of Waterloo, Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

storm and sanitary sewers to be constructed in the Township of North Dumfries, Regional Municipality of Waterloo, on Northumberland Street and on Easement northwest of the Canadian Pacific Railway Rail Line, all in accordance with the application from The Regional Municipality of Waterloo, dated February 26, 2007, including final plans and specifications prepared by The Regional Municipality of Waterloo.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

CONTENT COPY OF ORIGINAL

DATED AT TORONTO this 3rd day of April, 2007

Sarah Paul, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

GG/
c: District Manager, MOE Guelph District Office
Kris, Fletcher, Clerk, Corporate Resources
Donna Serrati, P. Eng., Senior Project Manger, Regional Municipality of Waterloo
Rodger Mordue, Acting Administrator-Clerk, Township of North Dumfries
Greg Proctor, C. E. T., Project Manager, The Regional Municipality of Waterloo

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Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 4409-BF8JNZ
Issue Date: September 12, 2019

828543 Ontario Inc. and 839658 Ontario Inc.
1919 Albion Road
Toronto, Ontario
M9W 5S8

Site Location: Legacy Estates Subdivision
Robert Woolner Street, William Creighton Street,
Di Donato Crescent and Leslie Davis Street
Township of North Dumfries, Regional Municipality of Waterloo

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the establishment of wastewater infrastructure Works located in the Township of North Dumfries, Regional Municipality of Waterloo, consisting of the following:

storm sewers on Robert Woolner Street (from approximately 16 metres north of Brant Waterloo Road to approximately 6 metres east-south-east of the centre of the roundabout at Leslie Davis Drive), discharging to proposed sewers, located on Leslie Davis Drive;

storm sewers on Robert Woolner Street (from approximately 54 metres north of the centre of the roundabout at Leslie Davis Drive to approximately 10 metres south of Gourlay Farm Lane), discharging to proposed sewers, located on Gourlay Farm Lane;

storm sewers on William Creighton Street (from approximately 81 metres west of Vincent Drive to approximately 15 metres north of Leslie Davis Street), discharging to proposed sewers, located on Leslie Davis Street;

storm sewers on Di Donato Crescent (north entrance) (from approximately 10 metres west of Robert Woolner Street and approximately 128 metres north of Brant Waterloo Road), discharging to proposed sewers, located on Robert Woolner Street;

storm sewers on Di Donato Crescent (south entrance) (from approximately 10 metres west of Robert Woolner Street and approximately 43 metres north of Brant Waterloo Road), discharging to proposed sewers, located on Robert Woolner Street;

storm sewers on Di Donato Crescent (north entrance) (from approximately 122 metres west of Robert Woolner Street and approximately 128 metres north of Brant Waterloo Road to approximately 197 metres west of Robert Woolner Street and approximately 128 metres north of Brant Waterloo Road), discharging to proposed sewers, located on Service Easement Block 43;

storm sewers on Di Donato Crescent (south entrance) from approximately 99 metres west of Robert Woolner Street and approximately 43 metres north of Brant Waterloo to approximately 197 metres west of Robert Woolner Street and approximately 128 metres north of Brant Waterloo Road), discharging to proposed sewers, located on service Easement Block 43;

storm sewers on servicing Easement Block 43 (from approximately 197 metres west of Robert Woolner Street and approximately 128 metres north of Brant Waterloo Road to Leslie Davis Street), discharging to proposed sewers, located on Leslie Davis Street; and

storm sewers on Leslie Davis Street (from approximately 45 metres east of Robert Woolner Street to approximately 15 metres east of William Creighton Street), discharging to proposed sewers, located on Leslie Davis Street;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;
all in accordance with the submitted application and supporting documents listed in Schedule "A" forming part of this approval.

For the purpose of this environmental compliance approval, the following definitions apply:

DEFINITIONS

1. "Approval" means this entire document and any schedules attached to it, and the application;
2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;
3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;
4. "EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;
5. "Ministry" means the ministry of the government of Ontario responsible for the

EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

6. "Owner" means 828543 Ontario Inc. and 839658 Ontario Inc., and includes their successors and assignees;
7. "OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;
8. "Works" means the sewage Works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **GENERAL CONDITIONS**
    1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
    2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.
    3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.
    4. Where there is a conflict between the documents listed in Schedule "A" and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.
    5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

2. EXPIRY OF APPROVAL

1. This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.
2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. CHANGE OF OWNER

1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

    a. change of Owner;

    b. change of address of the Owner;

    c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or

    d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the

Director.

3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. OPERATION AND MAINTENANCE

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.

Schedule "A"

1. Application for Environmental Compliance Approval, dated June 26, 2019, received on August 9, 2019, submitted by 828543 Ontario Inc. and 839658 Ontario Inc.;
2. Transfer of Review Letter of Recommendation, dated August 8, 2019 and signed by Mike Pearce, P.Eng., Senior Project Manager, Transfer of Review, The Regional Municipality of Waterloo;
    a. Final Plans and Specifications prepared by Stantec Consultants Ltd.
    b. Pipe Data Form - Watermain, Storm Sewer, Sanitary Sewer, and Forcemain Design Supplement to Application for Approval for Water and Sewage Works.
    c. Hydraulic Design Sheets prepared by Stantec Consultants Ltd.
3. Emails dated August 26, 2019 and September 4, 2019 from Michael Huisman, C.E.T., Engineering Technologist, Stantec Consultants Ltd.
4. Emails dated August 25, 2019 and August 27, 2019 from Mike Pearce, P.Eng., Senior Project Manager, Transfer of Review, The Regional Municipality of Waterloo.

The reasons for the imposition of these terms and conditions are as follows:

REASONS:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.
2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.
4. Condition 4 is included to prevent the operation of stormwater pipes and other conveyance until such time that their required associated stormwater management Works are also constructed.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment,

M5G 1E5

Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 12th day of September, 2019

Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

RV/
c: District Manager, MECP Guelph
Kris Fletcher, Regional Clerk, Corporate Resources, Region of Waterloo (File No. ND-01-19)
Mike Pearce, P.Eng., Senior Project, Transfer of Review, Region of Waterloo
Andrew McNeely, Township of North Dumfries
Michael Huisman, C. Tech., Stantec Consultants Ltd.

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Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 1502-6UYKUU
Issue Date: October 27, 2006

828543 & 839658 Ontario Inc.
1919 Albion Rd
Toronto, Ontario
M9W 6J9

Site Location: Hilltop Subdivision, Stage 3
Lots 33 & 34, Concession 7
North Dumfries Township, Regional Municipality of Waterloo

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

storm sewers to be constructed in the Township of North Dumfries, Regional Municipality of Waterloo, on Matthew Street, Hilltop Drive, John Way, Marten Crescent, Hunt Street, Christian Street, Robert Drive and Blocks 106 and 76 , all in accordance with the application from 828543 & 839658 Ontario Inc., dated September 21, 2006, including final plans and specifications prepared by Stantec Consulting Ltd.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

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DATED AT TORONTO this 27th day of October, 2006

Sarah Paul, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

GS/
c: District Manager, MOE Guelph
Kevin Brousseau, Stantec Consulting Ltd.
K. Fletcher, Clerk, Regional Municipality of Waterloo
Jo-Anne Ing, Regional Municipality of Waterloo
M. Bosetti, Clerk, Township of North Dumfries

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ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 1021-B9KRYR
Issue Date: March 2, 2019

828543 Ontario Inc. and 839658 Ontario Inc.
1919 Albion Road
Toronto, Ontario
M9W 5S8

Site Location: Legacy Estates Subdivision
Township of North Dumfries, Regional Municipality of Waterloo

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the establishment of wastewater infrastructure Works located in the Township of North Dumfries, Regional Municipality of Waterloo, consisting of the following:

- **sanitary sewers** on Robert Woolner Street (from approximately 237 metres east of Howard Marshall Street to approximately centreline of Gourlay Farm Lane), discharging to existing sanitary sewers, located on Gourlay Farm Lane;
- **sanitary sewers** on Robert Woolner Street (from approximately 12 metres north of Brant Waterloo Road to approximately centreline of Gourlay Farm Lane), discharging to proposed sanitary sewers, located on Gourlay Farm Lane;
- **sanitary sewers** on Di Donato Crescent (from approximately centreline of Robert Woolner Street to approximately 121 metres north of Brant Waterloo Road and approximately 190 metres west of Robert Woolner Street, and from approximately 123 metres north of Brant Waterloo Road and approximately 48 metres west of Robert Woolner Street to approximately 121 metres north of Brant Waterloo Road and approximately 190 metres west of Robert Woolner Street), discharging to proposed sanitary sewers, located on Servicing Easement;
- **sanitary sewers** on Di Donato Crescent (from approximately 48 metres west of Robert Woolner Street to approximately centreline of Robert Woolner Street), discharging to proposed sanitary sewers, located on Robert Woolner Street;
- **sanitary sewers** on Servicing Easement (from approximately 121

metres north of Brant Waterloo Road and approximately 190 metres west of Robert Woolner Street to approximately centreline of Leslie Davis Street), discharging to existing sanitary sewers, located on Leslie Davis Street;

- **sanitary sewers** on Leslie Davis Street (from approximately 53 metres east of Robert Woolner Street to approximately centreline of Tice River Way, and from approximately 51 metres west of Tice River Way to approximately centreline of Tice River Way), Tice River Way (from approximately centreline of Vincent Drive to approximately centreline of Leslie Davis Street), and William Creighton Street (from approximately centreline of Vincent Drive to approximately centreline of Leslie Davis Street), discharging to proposed sanitary sewers, located on Leslie Davis Street;
- **sanitary sewers** on Vincent Drive (from approximately centreline of Leslie Davis Street to approximately centreline of Gourlay Farm Lane), discharging to existing sanitary sewers, located on Gourlay Farm Lane;
- **sanitary sewers** on Vincent Drive (from approximately 43 metres north of Tice River Way to approximately centreline of Gourlay Farm Lane), discharging to proposed sanitary sewers, located on Gourlay Farm Lane;
- **sanitary sewers** on Gourlay Farm Lane (from approximately centreline of Robert Woolner Street to approximately centreline of Tice River Way), discharging to proposed sanitary sewers, located on Tice River Way;
- **storm sewers** on Robert Woolner Street (from approximately 10 metres south of Gourlay Farm Lane, and from approximately 47 metres west of Freer Drive to approximately south of Gourlay Farm Lane), and Vincent Drive (from approximately 61 metres north of Leslie Davis Street to approximately south of Gourlay Farm Lane, and from approximately 10 metres north of Gourlay Farm Lane to approximately south of Gourlay Farm Lane), discharging to proposed storm sewers, located on Gourlay Farm Lane;
- **storm sewers** on Leslie Davis Street (from approximately 15 metres east of William Creighton Street to approximately 31 metres west of Tice River Way), Tice River Way (from approximately 67 metres west of Vincent Drive to approximately south of Leslie Davis Street), and William Creighton Street (from approximately 15 metres north of Leslie

Davis Drive to approximately south of Leslie Davis Street) discharging to proposed storm sewers, located on Leslie Davis Street; and

- **storm sewers** on Gourlay Farm Lane (from approximately east of Robert Woolner Street to approximately west of Tice River Way), discharging to proposed storm sewers, located on Tice River Way;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted application and supporting documents listed in Schedule "A" forming part of this approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this entire document and any schedules attached to it, and the application;
2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;
3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;
4. "EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;
5. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;
6. "Owner" means 828543 Ontario Inc. and 839658 Ontario Inc., and includes their successors and assignees;
7. "OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;
8. "Works" means the sewage Works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **GENERAL CONDITIONS**
    1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
    2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.
    3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.
    4. Where there is a conflict between the documents listed in Schedule "A" and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.
    5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

2. EXPIRY OF APPROVAL

1. This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.
2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. CHANGE OF OWNER

1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

    a. change of Owner;

    b. change of address of the Owner;

    c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or

    d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.
3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. OPERATION AND MAINTENANCE

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.

Schedule "A"

1. Application for Environmental Compliance Approval, dated September 30, 2018, received on February 8, 2019, submitted by 828543 Ontario Inc. and 839658 Ontario Inc.;
2. Transfer of Review Letter of Recommendation, dated February 26, 2019 and signed by Hendrik Fourie, P.Eng., Head: Environmental Projects, Transportation and Environmental Services, Regional Municipality of Waterloo;
    a. Final Plans and Specifications prepared by Stantec Consultants Ltd.
    b. Pipe Data Form - Watermain, Storm Sewer, Sanitary Sewer, and Forcemain Design Supplement to Application for Approval for Water and Sewage Works.
    c. Hydraulic Design Sheets prepared by Stantec Consultants Ltd.
3. Emails dated February 15, 2019 from Mr. John Vleeming, Stantec Consultants Ltd.
4. Email dated February 25, 2019 from Mr. John Vleeming, Stantec Consultants Ltd.
5. Email dated February 26, 2019 from Mr. Hendrik Fourie, Regional Municipality of Waterloo.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.
2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.
4. Condition 4 is included to prevent the operation of stormwater pipes and other conveyance until such time that their required associated stormwater management

Works are also constructed.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 2nd day of March, 2019

Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part

II.1 of the *Environmental Protection Act*

JG/
c: District Manager, MECP Guelph
John Vleeming, Stantec Consultants Ltd.
Kris Fletcher, Regional Clerk, Regional Municipality of Waterloo (File No. ND-02-18)
Hendrik Fourie, P.Eng., Regionl Municipality of Waterloo
Andrew McNeeley, Township of North Dumfries

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Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 0522-6U8PDG
Issue Date: November 15, 2006

828543 Ontario Inc.
1919 Albion Rd
Toronto, Ontario, M9W 6J9

Site Location: Hilltop Subdivision, Stage 3
Lot 33 & 34, Concession 7
North Dumfries Township,
Regional Municipality of Waterloo.

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

establishment of Storm Water Management Works to service Hilltop Community Subdivision on an approximately 18.0ha. land and 29.32ha. external undeveloped area, for enhanced level of quality and quantity control of 25mm to Regional Storm events (including 100-year) post development flows to predevelopment flow rates consisting of the following:

Facility 'A' (for 8.6ha. development):

- a constructed wetland located on Block 106, east of Marten Crescent, complete with a forebay with approximately 1,042cu.m. in permanent, 447cu.m. of extended detention and a total storage volume of 9,324cu.m., complete with,

- one (1) 110mm and one (1) 400mm diameter vertical orifices located in a 1500mm diameter perforated riser to discharge into a 600mm diameter outlet pipe to drain into Municipal storm drainage manhole MH61 on Hunt Street,

- a 2.4m. wide by 2.0m deep, 300m long infiltration gallery around the periphery of the wetland complete with 300mm diameter perforated pipe and 20mm to 50mm diameter clear stone,

- a 4m wide by 150mm deep overflow spillway, protected with rip-rap to discharge stormwater flow west onto the Hilltop Drive, incase of blockage of all outlets during severe storms,

- 1.0m deep, varying width, approximately 465m long infiltration galleries located at the backyard of the residential area as shown on drawings, complete with 150mm diameter perforated pipe and 20mm to 50mm diameter clear stone,

Facility 'B' (for 38.72ha. development):

- a constructed wetland located on Blocks 39 and 33, located at east of Swan Street, complete with two forebays with approximately 4,840cu.m. in permanent, 6,800cu.m. of extended detention and a total storage volume of 74,541cu.m., complete with,

- one (1) 195mm and one (1) 250mm diameter vertical orifices located in a 1800mm diameter perforated riser to discharge into a 525mm diameter outlet pipe to drain into the existing Valleyview Stormwater Management Facility ultimately discharging to the Nith River,

- one (1) 10m wide 750mm deep trapezoidal overflow spillway to discharge to Swan Street side ditch to Nith River,

including appurtenances, erosion/sedimentation control measures during every stage of construction to minimize the effects on external lands and to reduce the amount of silt carried to the Municipal Stormsewers;

all in accordance with the **Application for Approval of Municipal and Private Sewage Works,** dated September 21, 2006, **Stormwater Management Report,** August 2006, final plans and addendum documents prepared and submitted by Kevin Brousseau, C.E.T., Stantec Consulting Ltd., Consulting Engineers.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"Certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

"Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the *Ontario Water Resources Act*;

"District Manager" means the District Manager of the Guelph District Office of the Ministry;

"Ministry" means the Ontario Ministry of the Environment;

"Municipality" means the Town of North Dumfries;

"Owner" means 828543 Ontario Inc. and includes its successors and assignees; and

"Works" means the sewage works described in the Owner's application, this certificate and in the supporting documentation referred to herein, to the extent approved by this certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

(2) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(3) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. CHANGE OF OWNER

The *Owner* shall notify the *District Manager* and the *Director*, in writing, of any of the following changes within thirty (30) days of the change occurring:
(a) change of *Owner*;

(b) change of address of the *Owner*;
(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager*; and
(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager*.

4. OPERATION AND MAINTENANCE.

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(1) The *Owner* shall ensure that the design minimum liquid retention volumes are maintained in the wetlands at all times.

(2) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the *Works* to prevent the excessive build-up of sediments and/or vegetation.

(3) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook updated for inspection by the *Ministry*. The logbook shall include the following:

(a) the name of the *Works*; and
(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed.

5. RECORD KEEPING

The *Owner* shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this *Certificate*.

6. GROUNDWATER MONITORING AND RECORDING

(1) The Owner shall, establish two (2) groundwater monitoring wells of 50mm diameter PVC pipe, 8.0m and 25m deep at locations as indicated on the 'Stormwater Management Plan' drawing # C-100 and upon commencement of operation of the Works, carry out the following sampling and monitoring program. All samples and measurements taken for the purposes of this Certificate are to be taken at a time and in a location characteristic of the quality of the groundwater over the time period being monitored.

(2) For the purposes of this condition, the following definitions apply: (a) Annually means once every twelve months.

(3) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 1 - Groundwater Monitoring
Parameters (Sample Type) Frequency
Groundwater Level Reading three(3) times, once in ..... .spring, summer and fall
Chloride Grab) annually
Total Ammonia Nitrogen (Grab) annually
Total dissolved Metals (Grab) annually

(4) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:
(a) the Ministry's Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;
(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;
(c) the publication "Standard Methods for the Examination of Water and Wastewater" (20th edition), as amended from time to time by more recently published editions;
(d) for any parameters not mentioned in the documents referenced in (a) and (b), the written approval of the District Manager shall be obtained prior to sampling.

(5) The temperature and pH of the effluent from the Works shall be determined in the field at the time of sampling for Total Ammonia Nitrogen. The concentration of un-ionized ammonia shall be calculated using the total ammonia

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concentration, pH and temperature using the methodology stipulated in "Ontario's Provincial Water Quality Objectives" dated July 1994, as amended, for ammonia (un-ionized).

(6) The Owner shall retain for a minimum of three (3) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Certificate.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment..

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the works are made aware of the certificate and continue to operate the works in compliance with it.

4. Condition 4 is included to require that the *Works* be properly operated and maintained such that the environment is protected .

5. Condition 5 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the *Works*.

6. Condition 6 is included to ensure that the performance of the works is evaluated, recorded and reported on an annual basis.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

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*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 15th day of November, 2006

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

MN/
c: District Manager, MOE Guelph
Clerk, the Town of North Dumfries;
Kevin Brousseau, C.E.T., Stantec Consulting Ltd.

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ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 5264-BATK97
Issue Date: May 2, 2019

839658 Ontario Inc.
1919 Albion Rd
Toronto, Ontario
M9W 5S8

Site Location: Legacy Estates Subdivision
895 Brant-Waterloo Rd
Township of North Dumfries,
Regional Municipality of Waterloo, Ontario
N0B 1E0

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

establishment of stormwater management Works to serve the proposed Legacy Estates Subdivision development, located at 895 Brant-Waterloo Rd, in the Township of North Dumfries, Regional Municipality of Waterloo, for the collection, transmission, treatment and disposal of stormwater runoff from a total catchment area of 25.4 hectares, to provide Enhanced Level water quality protection and erosion control, and to attenuate post-development peak flows to pre-development peak flow for all storm events up to and including the 100-year storm event, discharging to Nith River, consisting of the following:

stormwater management facility (catchment area 25.4 hectares): one (1) constructed wetland with a 1.5 metre deep sediment forebay, located immediately adjacent to the intersection of Swan Street and Brant-Waterloo Road, having a permanent storage volume of approximately 2,035 cubic metres, an extended detention volume of approximately 1,016 cubic metres, and a total active storage volume of approximately 19,775 cubic metres at an active storage depth of 2.0 metres (elevation 296.0 metres), complete with one (1) inlet structure at the northwest corner, consisting of a 1200 millimetre storm inlet pipe and a concrete headwall, one (1) 20.0 metre wide emergency overflow weir, one (1) 3.0 meter wide access road, and one (1) outlet structure at the southwest corner, consisting of a 1,200 millimetre diameter perforated CSP riser, a 150 millimetre diameter orifice and a 600 millimetre outlet pipe, discharging to the Mitchell Drain via the orifice and a cooling trench along the perimeter of the constructed wetland during low flows and the outlet pipe/orifice during higher flows, allowing a maximum discharge of

0.81 cubic metres per second under the 100-year storm event to the Mitchell Drain;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the supporting documents set out in Schedule "A" attached to this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this entire document and any schedules attached to it, and the application;

2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;

4. "EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;

5. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

6. "MNRF" means the Ministry of Natural Resources and Forestry of the government of Ontario and includes all officials, employees or other persons acting on its behalf;

7. "Owner" means 839658 Ontario Inc., and includes its successors and assignees;

8. "OWRA" means the *Ontario Water Resources Act,* R.S.O. 1990, c. O.40, as amended;

9. "Works" means the sewage Works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **GENERAL CONDITIONS**

    1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
    2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.
    3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.
    4. Where there is a conflict between the documents listed in Schedule A and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.
    5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.
    6. The issuance of, and compliance with the conditions of, this Approval does not:
        a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority/MNRF necessary to construct or operate the sewage works; or
        b. limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. **EXPIRY OF APPROVAL**

    1. This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.
    2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still

applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. **CHANGE OF OWNER**

1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:
    a. change of Owner;
    b. change of address of the Owner;
    c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or
    d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act,* R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.
2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.
3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. **OPERATION AND MAINTENANCE**

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.
2. The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the Works do not constitute a safety or health hazard to the general public.
3. The Owner shall inspect and ensure that the design minimum liquid retention volume is maintained in the Works at all times, except when maintenance is required.
4. The Owner shall undertake an inspection of the condition of the Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure

that sediment, debris and excessive decaying vegetation are removed from the Works to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the Works, as applicable. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.

5. The Owner shall construct, operate and maintain the Works with the objective that the effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam or discoloration on the receiving waters.
6. The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's administrative office for inspection by the Ministry. The logbook shall include the following:
    a. the name of the Works; and
    b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the Works.
7. The Owner shall prepare an operations manual prior to the commencement of operation of the Works that includes, but is not necessarily limited to, the following information:
    a. operating and maintenance procedures for routine operation of the Works;
    b. inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;
    c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;
    d. contingency plans and procedures for dealing with potential spills and any other abnormal situations and for notifying the District Manager; and
    e. procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.
8. The Owner shall maintain the operations manual current and retain a copy at the Owner's administrative office for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

5. TEMPORARY EROSION AND SEDIMENT CONTROL

1. The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a

minimum of 25 millimetres of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

2. The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

6. **REPORTING**

1. One (1) week prior to the start-up of the operation of the Works, the Owner shall notify the District Manager (in writing) of the pending start-up date.
2. The Owner shall, upon request, make all reports, manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.
3. The Owner shall prepare a performance report within ninety (90) days following the end of the period being reported upon, and submit the report(s) to the District Manager when requested. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be prepared to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:
    a. a description of any operating problems encountered and corrective actions taken;
    b. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works, including an estimate of the quantity of any materials removed from the Works;
    c. a summary of any complaints received during the reporting period and any steps taken to address the complaints;
    d. a summary of all spill or abnormal discharge events; and
    e. any other information the District Manager requires from time to time.

7. **RECORD KEEPING**

1. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation, maintenance and monitoring activities required by this Approval.

Schedule A

1. Application for Environmental Compliance Approval, dated September 13, 2018 and

received on December 14, 2018, submitted by Stantec Consulting Ltd. on behalf of 839658 Ontario Inc.;

2. Hilltop Estate Subdivision Stage 4 (now known as Legacy Estates Subdivision), Ayr, Stormwater Management Plan, dated September 22, 2017 and prepared by Stantec Consulting Ltd.;

3. Memo Re. Legacy Subdivision Stormwater Management - Comment Responses, dated June 14, 2018 and prepared by Bryan Weersink of Stantec Consulting Ltd.;

4. A set of forty-three (43) engineering drawings, stamped and dated on November 19 and 21, 2018, prepared by Stantec Consulting Ltd.; and

5. Other supporting documents.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. Condition 1.6 is included to emphasize that the issuance of this Approval does not diminish any other statutory and regulatory obligations to which the Owner is subject in the construction, maintenance and operation of the Works. The Condition specifically highlights the need to obtain any necessary conservation authority approvals. The Condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.
2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.
4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from the Works are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the Works. The Condition also ensures that adequate storage is maintained in the Works at all times as required by the design. Furthermore, this Condition is included to ensure that the Works are operated and maintained to function as

designed.

5. Condition 5 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction until they are no longer required.
6. Condition 6 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.
7. Condition 7 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 2nd day of May, 2019

Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

SW/
c: District Manager, MECP Guelph
John Vleeming, Stantec Consultants Ltd.

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Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 4689-A8ZLNZ
Issue Date: June 29, 2016

2081788 Ontario Corporation
2 Prince Edward Rd
Woodstock, Ontario
N4V 1G7

Site Location: Broos Property Phase 1
Lot 32 and 33, Concession 7
Township of North Dumpfries, County of Wellington

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

expansion of Storm Water Management Works to service Hilltop Community Subdivision and Broos Property for enhanced level of quality and quantity control of 25 millimetres to Regional Storm events (including 100-year) post development flows to pre-development flow rates consisting of the following:

Proposed Works

Facility 'B' (catchment area of 29.8 hectares (interim) 30.3 hectares (ultimate) of development and 39.1 hectares (interim), 30.8 hectares (ultimate) external undeveloped area):

a **constructed wetland** located on Blocks 39 and 77, located at east of Swan Street, complete with two (2) forebays with approximately 3055 cubic metres in permanent, 4926 cubic metres (interim) and 2763 cubic metres (ultimate) of extended detention and a total storage volume of 76118 cubic metres (interim) and 60216 cubic metres (ultimate), complete with:

one (1) 195 millimetre, one (1) 250 millimetre, one (1) 450 millimetre diameter vertical orifices located in a 1800 millimetre diameter perforated riser to discharge into a 525 millimetre diameter outlet pipe to drain into the existing Valleyview Stormwater Management Facility ultimately discharging to the Nith River,

one (1) 10 metre wide 500 millimetre deep trapezoidal overflow spillway to discharge to Swan Street side ditch to Nith River,

0.7 metre deep, 1.5 metre wide, approximately 445 metre **long infiltration gallery** located along the lots 1-28, complete with 150 millimetre diameter perforated pipe and 50 millimetre diameter clear stone,

0.7 metre deep, 1.5 metre wide, approximately 172.7 metre long **infiltration gallery** located along the rear yards of blocks 32-46, complete with 150 millimetre diameter perforated pipe and 50 millimetre diameter clear stone;

0.7 metre deep, 1.5 metre wide, approximately 172.7 metre long **infiltration gallery** located along

the rear yards of blocks 47-58 and 78-85, complete with 150 millimetre diameter perforated pipe and 50 millimetre diameter clear stone;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

Previous Works

Facility 'A' (catchment area of 8.6 hectares):

a **constructed wetland** located on Block 106, east of Marten Crescent, complete with a forebay with approximately 1,042 cubic metres in permanent, 447 cubic metres of extended detention and a total storage volume of 9,324 cubic metres, complete with,

one (1) 110 millimetre and one (1) 400 millimetre diameter vertical orifices located in a 1500 millimetre diameter perforated riser to discharge into a 600 millimetre diameter outlet pipe to drain into Municipal storm drainage manhole MH61 on Hunt Street,

a 2.4 metre wide by 2.0 metre deep, 300 metre long infiltration gallery around the periphery of the wetland complete with 300 millimetre diameter perforated pipe and 20 millimetre to 50 millimetre diameter clear stone,

a 4 metre wide by 150 millimetre deep overflow spillway, protected with rip-rap to discharge stormwater flow west onto the Hilltop Drive, in case of blockage of all outlets during severe storms,

1.0 metre deep, varying width, approximately 465 metres long **infiltration galleries** located at the backyard of the residential area as shown on drawings, complete with 150 millimetre diameter perforated pipe and 20 millimetre to 50 millimetre diameter clear stone;

all in accordance with the submitted application and supporting documents listed in Schedule "A" forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation;

2. "Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the Part II.1 of the Environmental Protection Act;

3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;

5. "Ministry" means the Ontario Ministry of the Environment and Climate Change;

6. "Owner" means 2081788 Ontario Corporation, and includes its successors and assignees;

7. "Previous Works" means those portions of the sewage works previously constructed and approved under an Approval;

8. "Proposed Works" means the sewage works described in the Owner's application, this Approval, to the extent approved by this Approval;

9. "Water Supervisor" means the Water Supervisor of the appropriate local office of the Safe Drinking Water Branch of the Ministry, where the Works are geographically located;

10. "Works" means the sewage works described in the Owner's application, this Approval and in the supporting documentation referred to herein, to the extent approved by this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

1.1 The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Approval.

1.3 Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this Approval are severable. If any requirement of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this Approval shall not be affected thereby.

1.6 The issuance of, and compliance with the conditions of, this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority/MNRF necessary to construct or operate the sewage works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.

3. CHANGE OF OWNER

3.1 The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; and

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

3.2 Notwithstanding any other requirements in this Approval, upon transfer of the ownership or assumption of the Works to a municipality if applicable, any reference to the District Manager shall be replaced with the Water Supervisor.

4. OPERATION AND MAINTENANCE

4.1 The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the stormwater works do not constitute a safety or health hazard to the general public.

4.2 The Owner shall undertake an inspection of the condition of the stormwater management system, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the above noted stormwater management Works to prevent the excessive build-up of sediment, debris and/or decaying vegetation to avoid reduction of capacity of the stormwater management Works. The Owner shall also regularly inspect and clean out the inlet to and outlet from the works to ensure that these are not obstructed.

4.3 The Owner shall ensure that the design storage volumes are maintained at all times.

4.4 The Owner shall inspect the Works and carry out regular operation and maintenance activities as proposed in the Section 4.0 of the "Stormwater Management Report, Hilltop Stage 3, (Phase 4) and Broos Property (Phase 1)", dated July 13, 2015 prepared by Stantec Consulting Ltd.

4.5 The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall make the logbook available for inspection by the Ministry upon request. The logbook shall include, but not necessarily be limited to, the following information:

(a) the name of the Works; and

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed.

5. TEMPORARY EROSION AND SEDIMENT CONTROL

5.1 The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event

(a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly .

5.2 The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

6. RECORD KEEPING

6.1 The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this Approval.

7. GROUNDWATER MONITORING AND RECORDING

7.1 The Owner shall, establish two (2) groundwater monitoring wells of 50 millimetre diameter PVC pipe, 8.0 metres and 25 metres deep at locations as indicated on the 'Stormwater Management Plan' drawing # C-100 and upon commencement of operation of the Works, carry out the following sampling and monitoring program. All samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality of the groundwater over the time period being monitored.

7.2 For the purposes of this condition, the following definitions apply: (a) Annually means once every twelve months.

7.3 Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 1 - Groundwater Monitoring		
Parameters	**(Sample Type)**	**Frequency**
Groundwater Level	Reading	three(3) times, once in spring, summer and fall
Chloride	(Grab)	annually
Total Ammonia Nitrogen	(Grab)	annually
Total dissolved Metals	(Grab)	annually

7.4 The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions;

(d) for any parameters not mentioned in the documents referenced in (a) and (b), the written approval of the District Manager shall be obtained prior to sampling.

7.5 The temperature and pH of the effluent from the Works shall be determined in the field at the time of sampling for Total Ammonia Nitrogen. The concentration of un-ionized ammonia shall be calculated using the total ammonia concentration, pH and temperature using the methodology stipulated in "Ontario's Provincial Water Quality Objectives" dated July 1994, as amended, for ammonia (un-ionized).

7.6 The Owner shall retain for a minimum of three (3) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

Schedule "A"

1. Application for Environmental Compliance Approval for Municipal and Private Sewage Works, dated October 7, 2015 and received on October 23, 2015, submitted by 2081788 Ontario Corporation.
2. Stormwater Management Report, Hilltop Stage 3, (Phase 4) and Broos Property (Phase 1), dated July 13, 2015 prepared by Stantec Consulting Ltd.

3. Engineering Drawings: Broos Property Phase 1 & Hilltop Stage 3 Phase 4, dated October 2015 prepared by Stantec Consulting Ltd.

4. E-mails from David Williams and Kevin Brousseau of Stantec Consulting Ltd. to the ministry, dated April 12, 2016, June 15, 2016, June 24, 2016 and June 27, 2016.

5. Application for Approval of Municipal and Private Sewage Works, dated September 21, 2006, Stormwater Management Report, August 2006, final plans and addendum documents prepared and submitted by Kevin Brousseau, C.E.T., Stantec Consulting Ltd., Consulting Engineers.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this Approval the existence of this Approval. Condition 1.6 is included to emphasize that the issuance of the Approval does not diminish any other statutory and regulatory obligations to which the owner is subject in the construction, maintenance and operation of the works. The condition specifically highlights the need to obtain any necessary conservation authority approvals. The condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from the approved stormwater management Works is required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the Works. It is also required to ensure that adequate storage is maintained in the stormwater management facilities at

all times as required by the design, and to prevent stormwater impounded in the works from becoming stagnant. Furthermore, Condition 4 is included to ensure that the stormwater management Works are operated and maintained to function as designed.

5. Condition 5 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction, until they are no longer required.

6. Condition 6 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

7. Condition 7 is included to ensure that the performance of the works is evaluated, recorded and reported on an annual basis.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 0522-6U8PDG issued on November 15, 2006

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

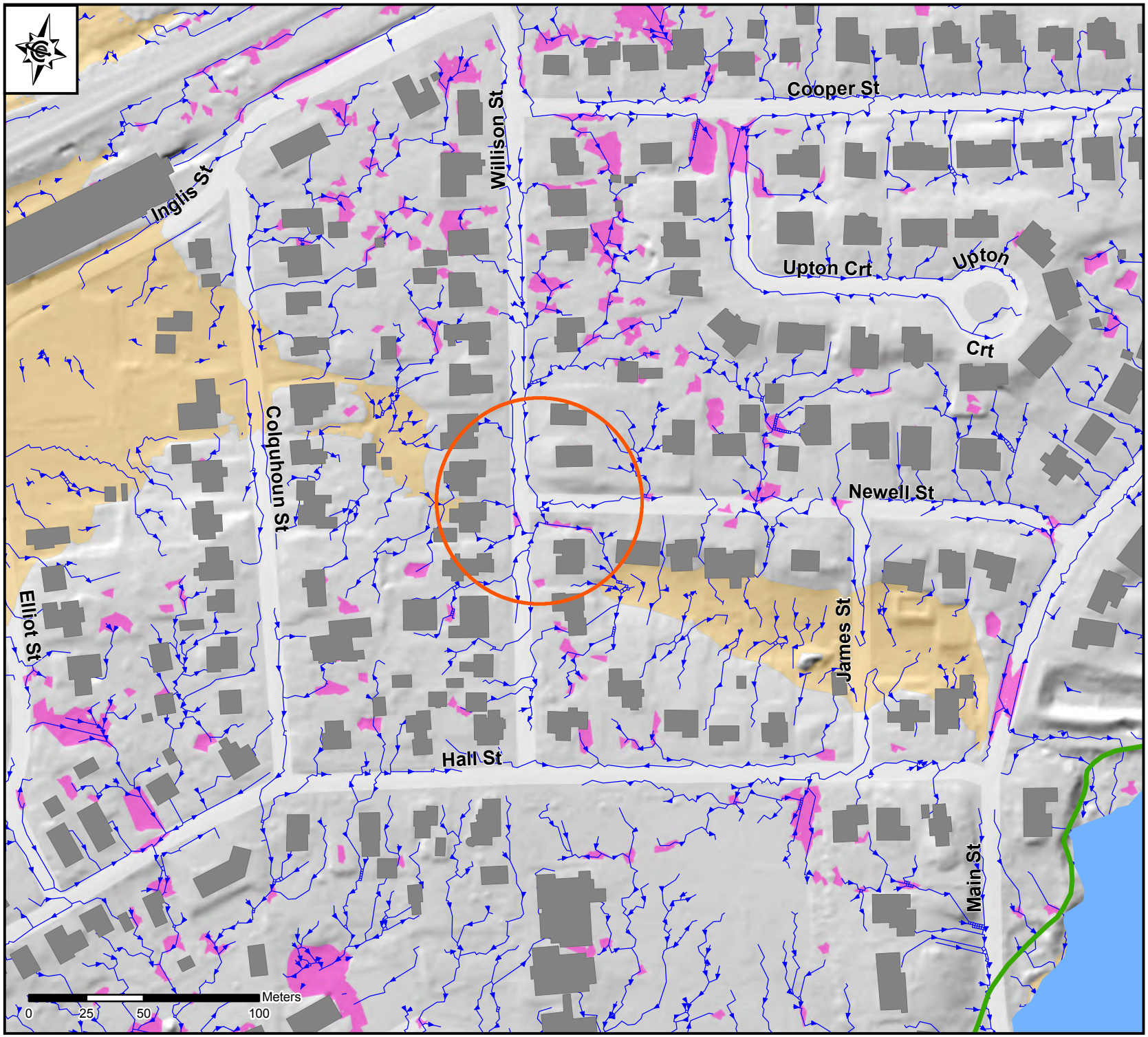
DATED AT TORONTO this 29th day of June, 2016

Gregory Zimmer, P.Eng.
Director
appointed for the purposes of Part II.1 of
the *Environmental Protection Act*

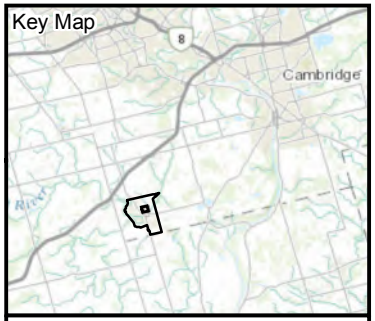
NS/
c: District Manager, MOECC Guelph Office
DWMD Supervisor, MOECC Guelph Office
Kevin Brousseau, Stantec Consultants Ltd.

APPENDIX D

Locations of Areas of Flooding Concerns



Key Map



Legend

- Regulatory Floodplain
- Wetland
- Drainage Flow Paths
- Potential Low Points
- Larger Surface Depressions / Flat Areas

Newell St & Willson St

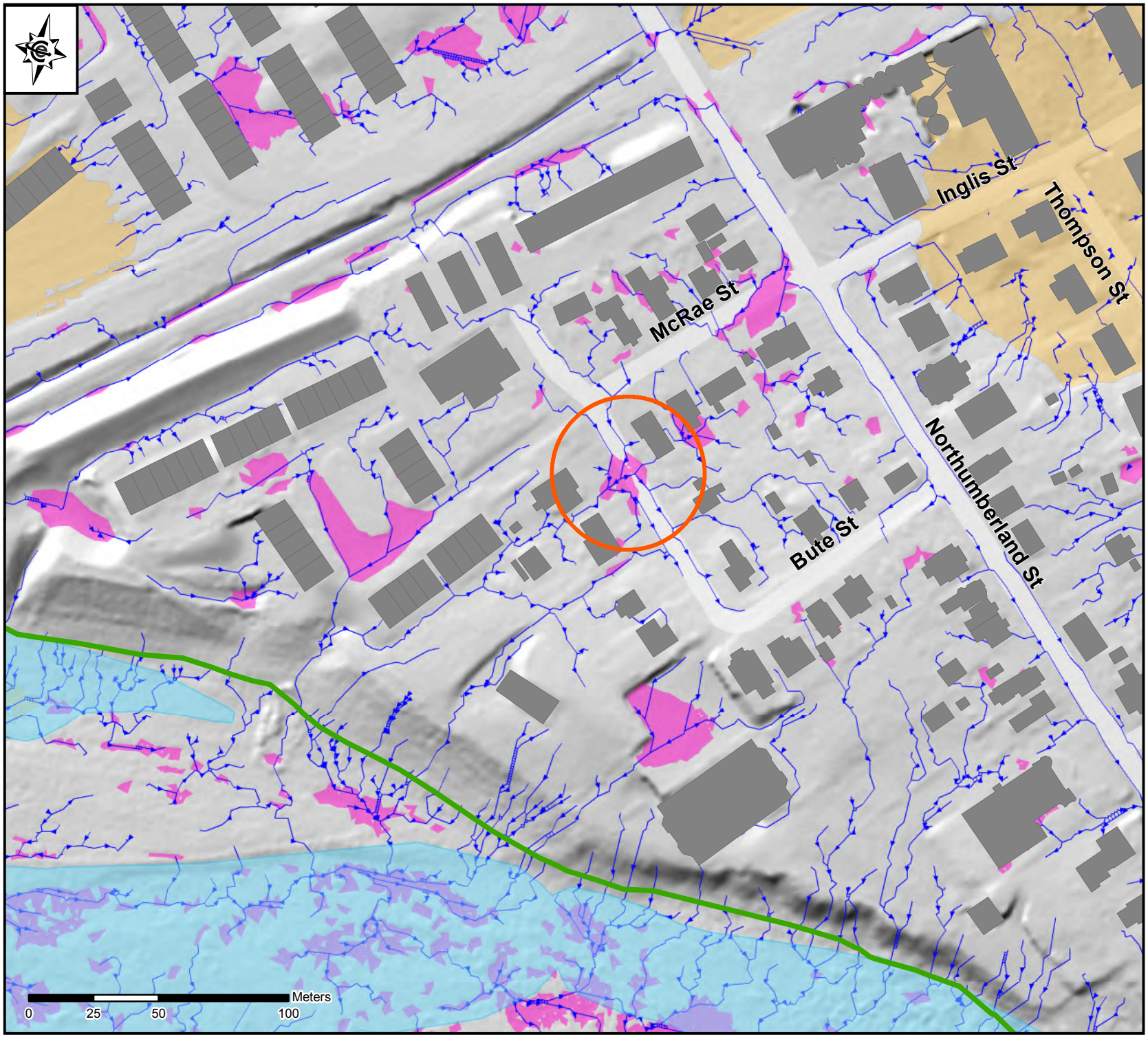
Township of North Dumfries
Storm Water Management Master Plan

IBI

Project No.:
2019-0506

Date:
January 2022

LTS 4/9/2020 D:__Projects\x2019-0506\600_GIS\20_Maps\01_Working\Newall_Willson.mxd



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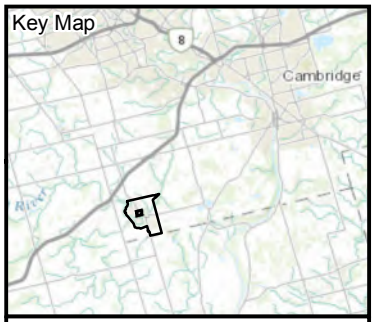


Legend

- Regulatory Floodplain
- Wetland
- Drainage Flow Paths
- Potential Low Points
- Larger Surface Depressions / Flat Areas

Bute St

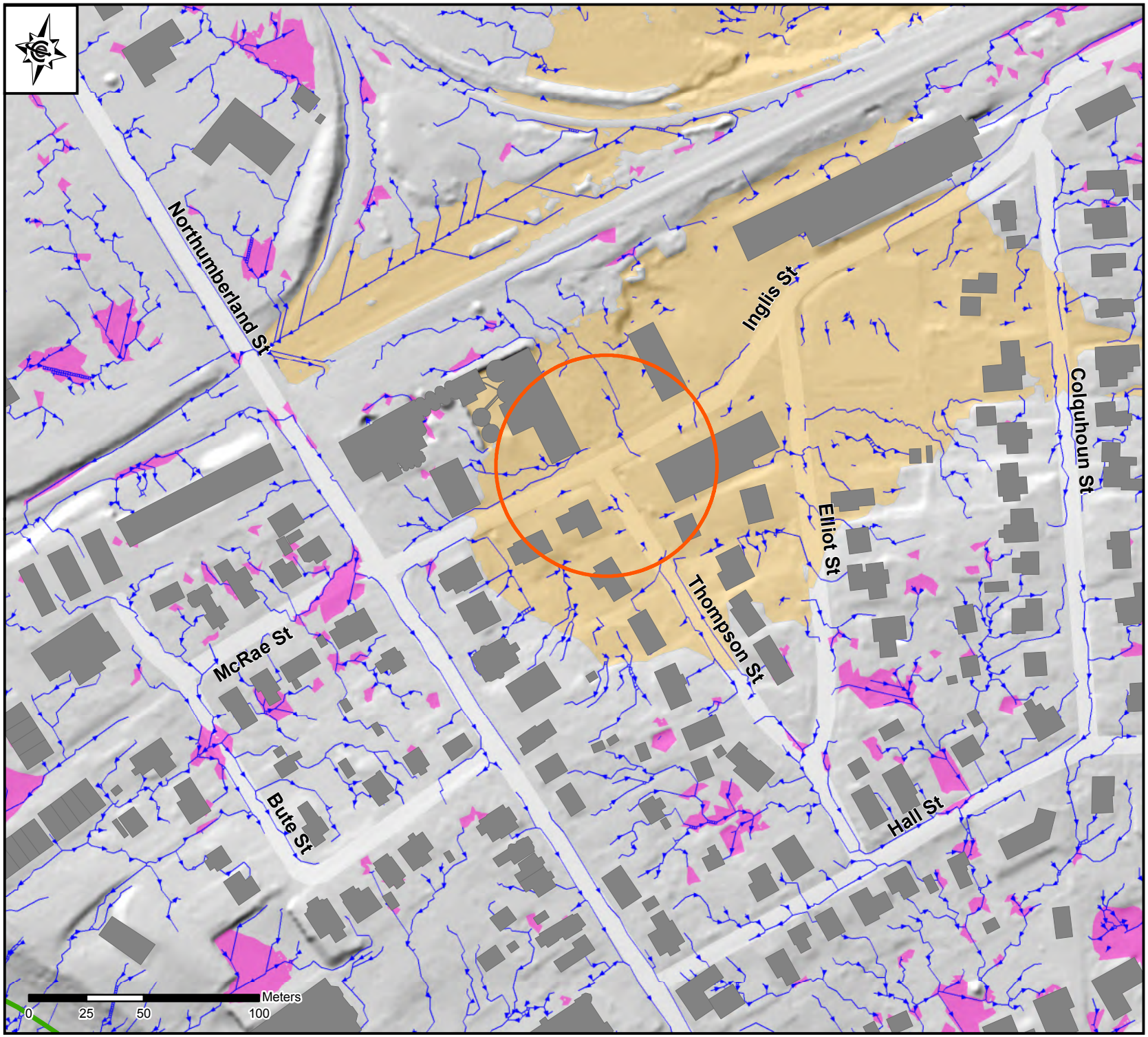
Township of North Dumfries
Storm Water Management Master Plan

IBI

Project No.:
2019-0506

Date:
January 2022

LTS 4/9/2020 D:__Projects\x2019-0506\600_GIS\20_Maps\01_Working\Bute.mxd



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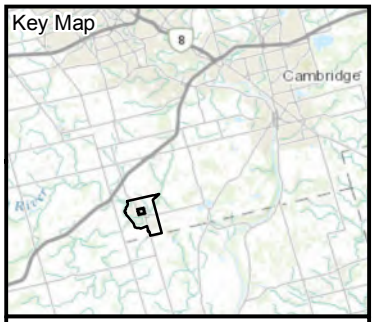


Legend

- Regulatory Floodplain
- Wetland
- Drainage Flow Paths
- Potential Low Points
- Larger Surface Depressions / Flat Areas

Inglis St and Thompson St

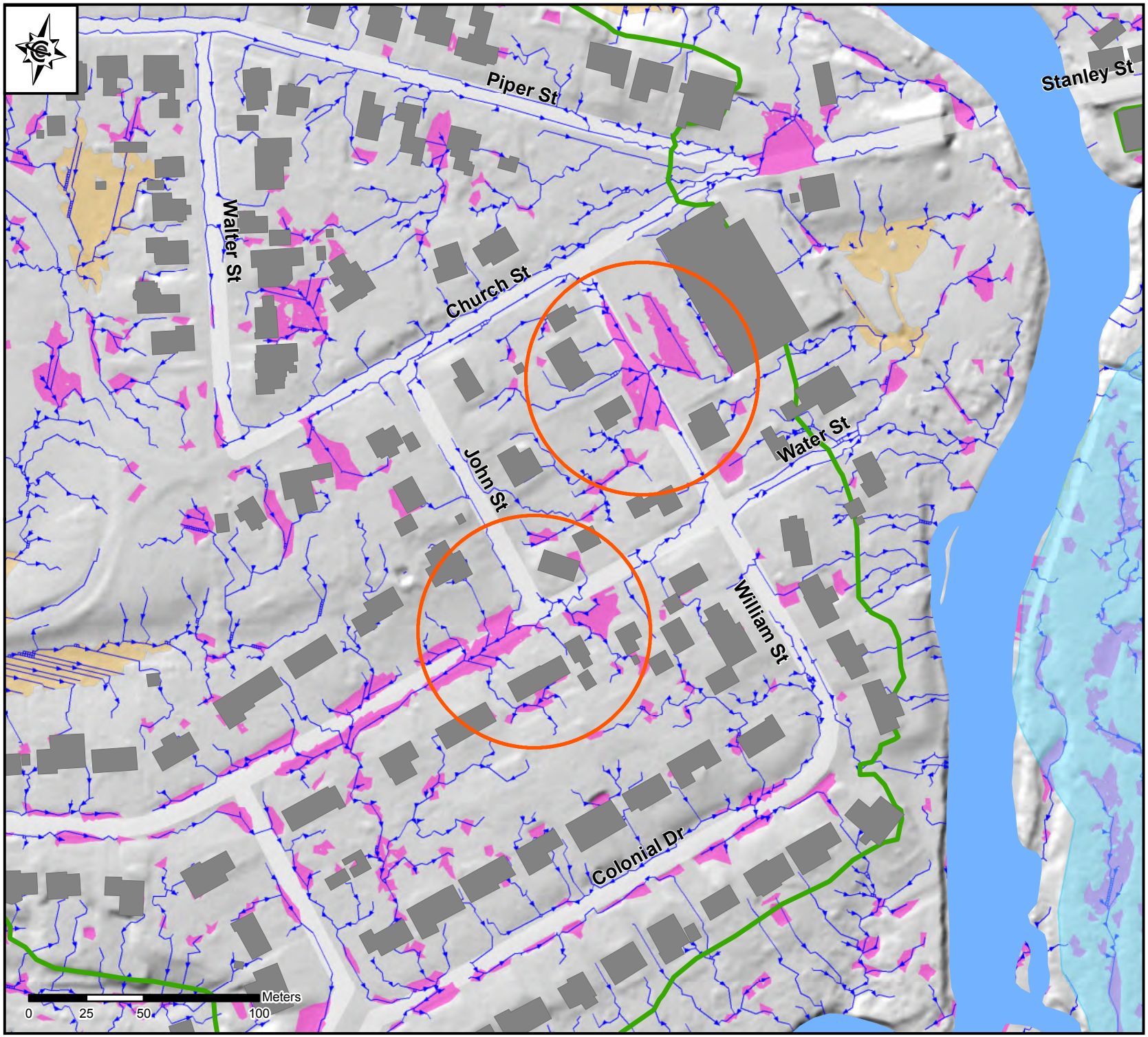
Township of North Dumfries
Storm Water Management Master Plan

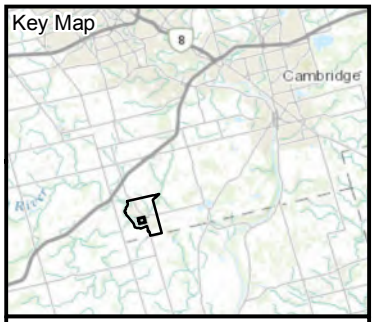
IBI

Project No.:
2019-0506

Date:
January 2022

LTS 4/9/2020 D:__Projects\x2019-0506\600_GIS\20_Maps\01_Working\Inglis_Thompson.mxd





Legend

- Regulatory Floodplain
- Wetland
- Drainage Flow Paths
- Potential Low Points
- Larger Surface Depressions / Flat Areas

William St, John St and Water St

Township of North Dumfries
Storm Water Management Master Plan

IBI

Project No.: 2019-0506

Date: January 2022

APPENDIX E

NVCA Phosphorus Tool Analysis

Table 6. Phosphorus (P) Export for Nottawasaga River Subwatersheds Derived from CANWET™ Modeled Phosphorus Loads and Land Use Areas

Subwatershed	Hay/Pasture			High Intensity Development			Row Crop		
	Area (ha)	Total P Load (kg)	P Export (kg/ha/yr)	Area (ha)	Total P Load (kg)	P Export (kg/ha/yr)	Area (ha)	Total P Load (kg)	P Export (kg/ha/yr)
Un-calibrated Subwatersheds									
ar r									
a i o r									
oat r									
nni i r									
ar r									
at on									
nt r r									
r otta a a a									
Mean									
Median									
Minimum									
Maximum									
Standard Deviation									
Calibrated Subwatersheds									
o n i r									
o r otta a a a									
a i r									
in i r									
Mean									
Median									
Minimum									
Maximum									
Standard Deviation									
All Subwatersheds									
Mean									
Median									
Minimum									
Maximum									
Standard Deviation									

ot a r ro a ation o t ar tati ti a a an ar a an r ort o or oa ro i nt n it o nt r t in r o ort o i i nt t at ar t or t i an an i to ro n in rror

APPENDIX F

Water Balance Inputs & Calculations

Monthly Water Balance Analysis - Thornthwaite and Mather model
Township of North Dumfries - Storm Water Management Master Plan, Community of Ayr
The Corporation of the Township of North Dumfries

Total Site Area (ha)	12.80		
Land Description Factors	**Area A (Agricultural)**	**Sub-Area B (Forest)**	**Sub-Area C (Category)**
Topography	0.10	0.20	0.20
Soils	0.10	0.20	0.20
Cover	0.10	0.20	0.20
Sum (Infiltration Factor)	0.30	0.60	0.60
Soil Moisture Capacity (mm)	200	100	100
Site Area	10.80	2.00	0.00
Percentage of Total Site Area	84%	16%	0%

100%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Climate Data (Data from Roseville Climate Station, Ontario via Environment Canada Website - 2018													
Average Daily Temperature (°C)	-6.4	-3.2	-1.4	2.2	17.0	18.8	21.2	21.4	17.8	10.0	-0.4	-1.3	**8.0**
Precipitation (mm)	64.0	83.2	36.7	97.9	60.1	90.1	52.1	126.7	64.2	85.3	80.7	63.9	**904.9**
Evapotranspiration Analysis (Sub-Area A)													
Heat Index	0.0	0.0	0.0	0.3	6.4	7.4	8.9	9.1	6.9	2.9	0.0	0.0	**42**
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	7.7	80.7	90.6	103.7	105.3	85.2	43.7	0.0	0.0	**517**
Potential Evapotranspiration Adjusting Factor for Latitude	0.81	0.81	1.03	1.12	1.27	1.29	1.30	1.20	1.05	0.95	0.81	0.77	
Adjusted Potential Evapotranspiration (mm)	0	0	0	9	103	117	135	127	89	41	0	0	**620**
PET (Malstrom, 1969) (mm/month)	0	0	0	9	103	117	135	127	89	41	0	0	**620**
Precipitation - PET (mm)	64	83	37	89	-42	-27	-83	0	-25	44	81	64	**285**
Accumulated Potential Water Loss (APWL)	0	0	0	0	-42	-69	-152	-152	-177	-133	-52	0	**-778**
Storage (S)	200	200	200	200	162	142	94	93	83	126	200	200	
Change in Storage	0	0	0	0	-38	-20	-48	0.0	-11	44	74	0	**0**
Actual Evapotranspiration (mm)	**0**	**0**	**0**	**9**	**98**	**110**	**100**	**127**	**75**	**41**	**0**	**0**	**561**
Recharge/Runoff Analysis													
Water Surplus (mm)	64	83	37	89	0	0	0	0	0	0	7	64	**344**
Potential Infiltration (I)	19	25	11	27	0	0	0	0	0	0	2	19	**103**
Potential Direct Surface Water Runoff (R)	**45**	**58**	**26**	**62**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**45**	**241**
Evapotranspiration (m^3)	0	0	0	940	10,618	11,900	10,829	13,687	8,121	4,464	0	0	60,559
Runoff (m^3)	4,838	6,290	2,775	6,743	0	0	0	0	0	0	542	4,831	26,019
Infiltration (m^3)	2,074	2,696	1,189	2,890	0	0	0	0	0	0	232	2,070	11,151

Evapotranspiration Analysis (Sub-Area B)													
Accumulated Potential Water Loss (APWL)	0	0	0	0	-42	-69	-152	-152	-177	-49	0	0	
Storage (S)	100	100	100	100	65	50	22	22	17	61	100	100	
Change in Storage	0	0	0	0	-35	-15	-28	0	-5	44	39	0	**0**
Actual Evapotranspiration (mm)	**0**	**0**	**0**	**9**	**95**	**105**	**80**	**127**	**69**	**41**	**0**	**0**	**526**
Recharge/Runoff Analysis													
Water Surplus (mm)	64	83	37	89	0	0	0	0	0	0	42	64	**379**
Potential Infiltration (I)	38	50	22	54	0	0	0	0	0	0	25	38	**227**
Potential Direct Surface Water Runoff (R)	**26**	**33**	**15**	**36**	**0**	**0**	**0**	**0**	**0**	**0**	**17**	**26**	**151**
Evapotranspiration (m^3)	0	0	0	174	1893	2107	1609	2534	1381	827	0	0	10524
Runoff (m^3)	512	666	294	714	0	0	0	0	0	0	333	511	3029
Infiltration (m^3)	768	998	440	1070	0	0	0	0	0	0	500	767	4544

Water Balance Total	**Inputs**	**Outputs**
Precipitation (mm)	904.9	
Soil Storage (mm)		0.0
Evapotranspiration+Evaporation (mm)		555
Infiltration (mm)		123
Runoff (mm)		227
Total	**904.9**	**904.9**

Water Balance T	**Inputs**	**Outputs**
Precipitation (m^	115827.2	
Soil Storage (m^3)		0.00
Evapotranspiration+Evaporation (m		71083
Infiltration (m^3)		15695
Runoff (m^3)		29049
Total	**115827.2**	**115827.2**

Monthly Water Balance Analysis - Thornthwaite and Mather model
Township of North Dumfries - Storm Water Management Master Plan, Community of Ayr
The Corporation of the Township of North Dumfries

Total Site Area (ha)	12.80		
Land Description Factors	**Area A (Pervious)**	**Sub-Area B (Impervious)**	**Sub-Area C (Category)**
Topography	0.10	N/A	0.20
Soils	0.10	N/A	0.20
Cover	0.10	N/A	0.20
Sum (Infiltration Factor)	0.30	No Infiltration	0.60
Soil Moisture Capacity (mm)	200	100	100
Site Area	10.80	2.00	0.00
Percentage of Total Site Area	84%	16%	0%

100%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Climate Data (Data from Roseville Climate Station, Ontario via Environment Canada Website - 2018													
Average Daily Temperature (°C)	-6.4	-3.2	-1.4	2.2	17.0	18.8	21.2	21.4	17.8	10.0	-0.4	-1.3	**8.0**
Precipitation (mm)	64.0	83.2	36.7	97.9	60.1	90.1	52.1	126.7	64.2	85.3	80.7	63.9	**904.9**
Evapotranspiration Analysis (Sub-Area A)													
Heat Index	0.0	0.0	0.0	0.3	6.4	7.4	8.9	9.1	6.9	2.9	0.0	0.0	**42**
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	7.7	80.7	90.6	103.7	105.3	85.2	43.7	0.0	0.0	**517**
Potential Evapotranspiration Adjusting Factor for Latitude	0.81	0.81	1.03	1.12	1.27	1.29	1.30	1.20	1.05	0.95	0.81	0.77	
Adjusted Potential Evapotranspiration (mm)	0	0	0	9	103	117	135	127	89	41	0	0	**620**
PET (Malstrom, 1969) (mm/month)	0	0	0	9	103	117	135	127	89	41	0	0	**620**
Precipitation - PET (mm)	64	83	37	89	-42	-27	-83	0	-25	44	81	64	**285**
Accumulated Potential Water Loss (APWL)	0	0	0	0	-42	-69	-152	-152	-177	-133	-52	0	**-778**
Storage (S)	200	200	200	200	162	142	94	93	83	126	200	200	
Change in Storage	0	0	0	0	-38	-20	-48	0	-11	44	74	0	**0**
Actual Evapotranspiration (mm)	**0**	**0**	**0**	**9**	**98**	**110**	**100**	**127**	**75**	**41**	**0**	**0**	**561**
Recharge/Runoff Analysis													
Water Surplus (mm)	64	83	37	89	0	0	0	0	0	0	7	64	**344**
Potential Infiltration (I)	19	25	11	27	0	0	0	0	0	0	2	19	**103**
Potential Direct Surface Water Runoff (R)	**45**	**58**	**26**	**62**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**45**	**241**
Evapotranspiration (m^3)	0	0	0	940	10,618	11,900	10,829	13,687	8,121	4,464	0	0	60,559
Runoff (m^3)	4,838	6,290	2,775	6,743	0	0	0	0	0	0	542	4,831	26,019
Infiltration (m^3)	2,074	2,696	1,189	2,890	0	0	0	0	0	0	232	2,070	11,151

Evaporation Analysis (Sub-Area B - Impervious)													
Evaporation Facotr (assume 20% of precipitation is evaporated from Impervious surfaces)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
Actual Evaporation (mm)	**13**	**17**	**7**	**20**	**12**	**18**	**10**	**25**	**13**	**17**	**16**	**13**	**181**
Recharge/Runoff Analysis													
Potential Infiltration (I)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Potential Direct Surface Water Runoff (R)	**51**	**67**	**29**	**78**	**48**	**72**	**42**	**101**	**51**	**68**	**65**	**51**	**724**
Evaporation (m^3)	256	333	147	392	240	360	208	507	257	341	323	256	3620
Runoff (m^3)	1024	1331	587	1566	962	1442	834	2027	1027	1365	1291	1022	14478
Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0

Water Balance Total	**Inputs**	**Outputs**
Precipitation (mm)	904.9	
Soil Storage (mm)		0.00
Evapotranspiration+Evaporation (mm)		501
Infiltration (mm)		87
Runoff (mm)		316
Total	**904.9**	**904.9**

Water Balance T	**Inputs**	**Outputs**
Precipitation (m^	115827.2	
Soil Storage (m^3)		0.00
Evapotranspiration+Evaporation (m		64178.5
Infiltration (m^3)		11151
Runoff (m^3)		40498
Total	**115827.2**	**115827.2**

APPENDIX G

IDF Curves and MTO Report Table

The following tables and figures are taken from the 2008 Final MTO Report entitled "*Identification of the Effect of Climate Change on Future Design Standards of Drainage Infrastructure in Ontario*"

Table A1 – Observed Precipitation (1961-1980): Precipitation Intensity for Different Return Periods at Station G6140954

T_d (hr)	T=2 years	T=5 years	T=10 years	T=20 years	T=50 years	T=100 years
	(mm/hr)	(mm/hr)	(mm/hr)	(mm/hr)	(mm/hr)	(mm/hr)
24	2.1	2.6	2.9	3.2	3.6	3.9
18	2.6	3.1	3.5	3.9	4.4	4.7
12	3.5	4.2	4.8	5.3	5.9	6.4
6	6.2	7.6	8.5	9.4	10.5	11.4
3	10.8	13.3	14.9	16.4	18.4	19.9
2	14.2	17.4	19.5	21.6	24.2	26.2
1	22.8	28.0	31.4	34.7	38.9	42.1
0.5	38.5	47.2	53.0	58.5	65.7	71.1
0.25	58.8	72.1	80.9	89.3	100.3	108.4
0.17	65.6	80.4	90.2	99.7	111.8	121.0
0.08	76.0	93.2	104.6	115.5	129.6	140.2

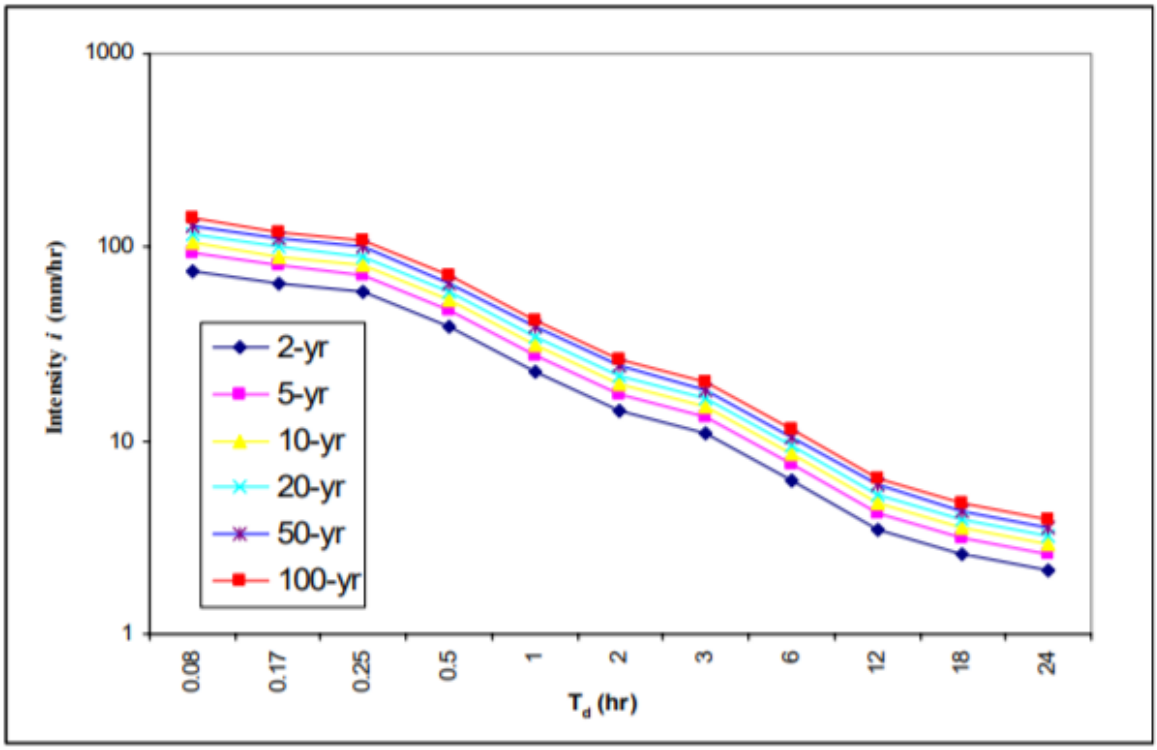


Figure A9 – IDF Curves for Observed Precipitation (1961-1980) at Station G6140954

Table A2 – Observed Precipitation (1981-2000): Precipitation Intensity for Different Return Periods at Station G6140954

T_d (hr)	T=2 years (mm/hr)	T=5 years (mm/hr)	T=10 years (mm/hr)	T=20 years (mm/hr)	T=50 years (mm/hr)	T=100 years (mm/hr)
24	2.2	2.9	3.3	3.7	4.3	4.7
18	2.7	3.5	4.0	4.5	5.2	5.7
12	3.6	4.7	5.4	6.1	7.0	7.7
6	6.5	8.4	9.7	10.9	12.5	13.7
3	11.3	14.7	16.9	19.1	21.9	23.9
2	14.8	19.3	22.2	25.0	28.7	31.4
1	23.9	31.0	35.7	40.3	46.1	50.5
0.5	40.3	52.4	60.3	68.0	77.9	85.3
0.25	61.5	79.9	92.1	103.8	118.9	130.2
0.17	68.6	89.2	102.7	115.8	132.6	145.3
0.08	79.6	103.3	119.1	134.2	153.7	168.4

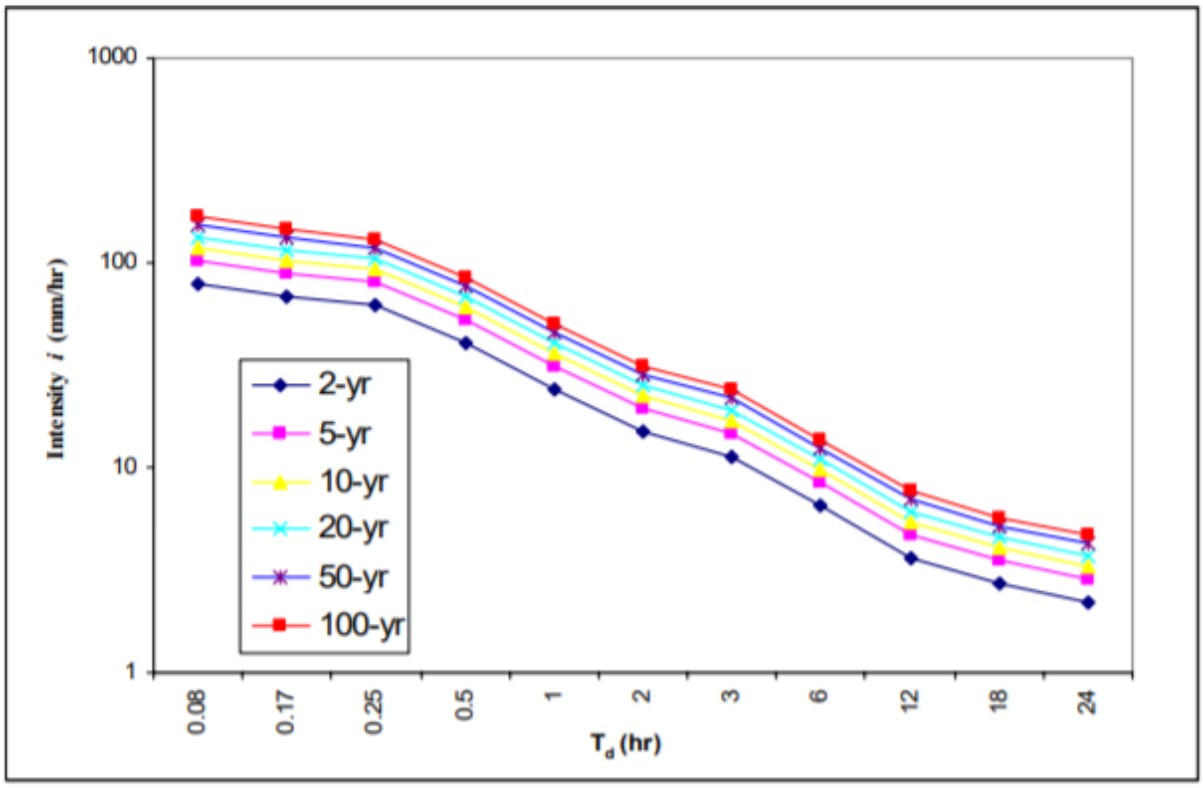


Figure A10 – IDF Curves for Observed Precipitation (1981-2000) at Station G6140954

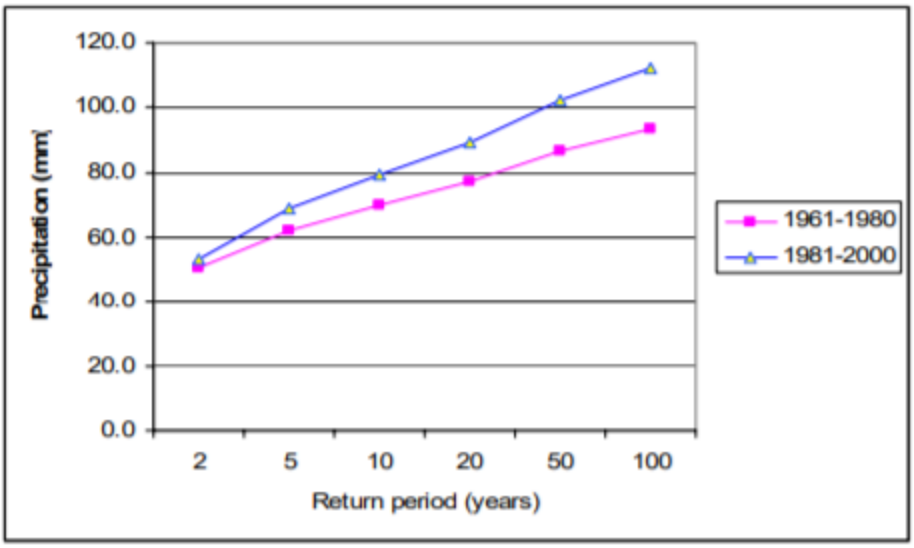


Figure 5 - Comparison of 24-Hour Precipitation Between 1961-1980 and 1981-2000 at Station G6140954

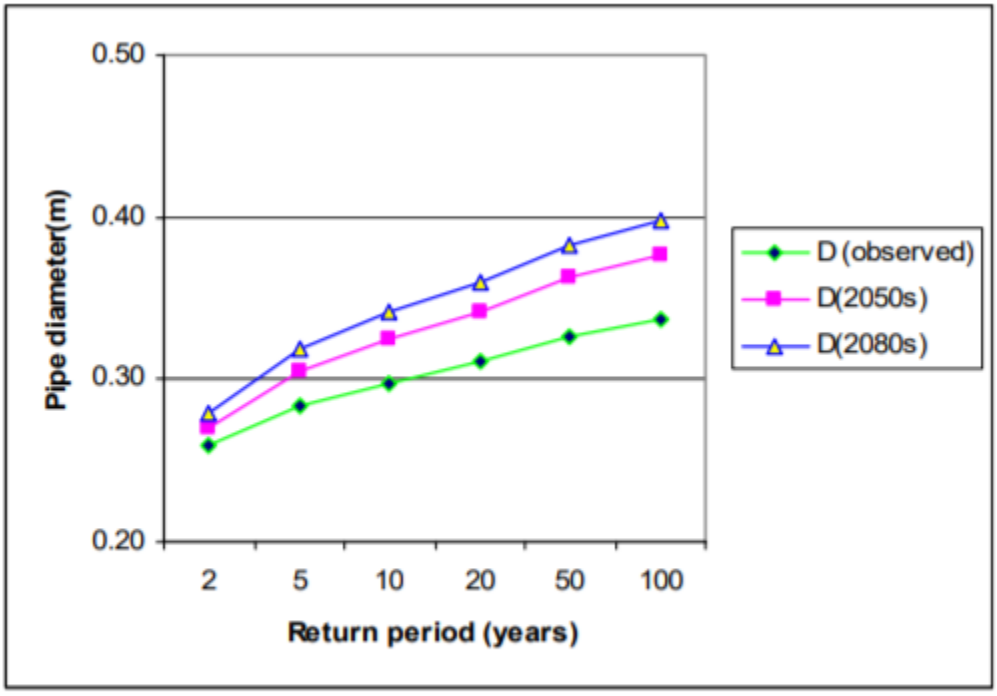
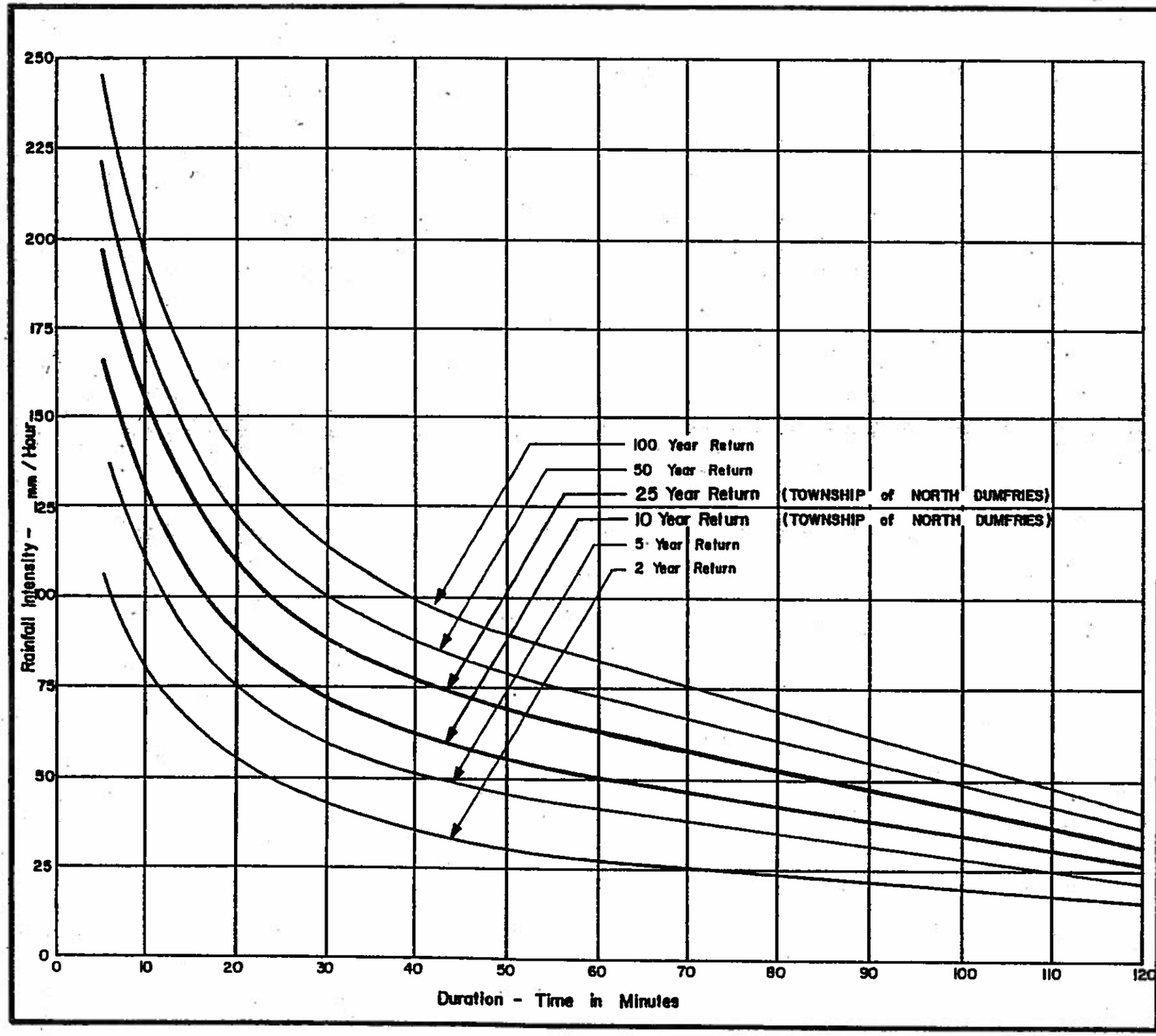


Figure 23 – Estimated Pipe Diameter for 2050s and 2080s Compared with the Current Period in the Grand River Region

Table 16 - Change in Pipe Diameter for 2050s and 2080s Compared with the Current Period in Ontario

Return period (yr)			2	5	10	20	50	100
Change in pipe diameter (%)	Grand River Region	2050s	3.6	7.3	8.9	10.1	11.4	12.1
		2080s	7.5	12.3	14.4	15.9	17.5	18.4
	Kenora and Rainy River Region	2050s	3.6	6.1	7.0	7.5	8.1	8.4
		2080s	9.4	11.7	12.5	13.0	13.5	13.8



INLET TIMES:

ESTATE RESIDENTIAL ——— 15 min.

SUBURBAN RESIDENTIAL ——— 10 min.

SUBURBAN INDUSTRIAL COMMERCIAL ——— 10 min.

URBAN COMMERCIAL MULTIPLE & HIGH DENSITY —— 5 min.

NO.	REVISION	BY	CHKD	DATE
2	REVIEWED	F.P.S.	G.R.S.	4/18/02
1	REVIEWED	F.P.S.	G.R.S.	2/11/90

TOWNSHIP OF

NORTH DUMFRIES

RAINFALL INTENSITY CURVES

SCALE:

DATE: JANUARY 1979

STD. S-1

Franklin A. Lisle

MAYOR

The following storm run-off coefficients 'C' are to be used for storm water design:

LAND USE		RUN-OFF COEFFICIENTS 'C'
Commercial	- Downtown Areas	0.90
	- Suburban, General	0.75
Industrial	- Heavy	0.75
	- Light and General	0.70
Residential	- Apartments and Multi-units	0.60
	- Mixed Residential	0.45
	- Single Family	0.30
	- Estate Residential	0.25
Schools, Churches, Institutions		0.65
Parkland, Cemeteries		
	- Over 5 Hectares	0.15
	- Under 5 Hectares	0.20
Rural Lands	- Woodland (rolling)	0.15 - 0.20
	- Pasture (flat)	0.10 - 0.20
	- Pasture (rolling)	0.15 - 0.35
	- Cultivated (flat)	0.30 - 0.40
	- Cultivated (rolling)	0.35 - 0.50

Watershed run-off 'C' to be a weighted average for area consisting of several distinct zones.

NOTES:

1. Pipe velocity ranges:
   0.75 m/sec. minimum [2.5 ft/sec.] 4.5 m/sec. maximum [15 ft/sec.]
2. Minimum storm pipe 300 mm [12"] diameter.
3. Minimum pipe culvert 375 mm [15"] diameter at private driveways.
4. Minor systems (pipes, conduits) to be designed for 10-year rainfall intensity. Major systems (open channel, creeks, etc.) designed to 25-year rainfall intensity except as otherwise directed.

NO.	REVISION	BY	CHKD	DATE
2	REVIEWED	F. P. S.	G. R. S.	4/18/02
1	REVIEWED	F. P. S.	G. R. S.	2/1/90

TOWNSHIP OF
NORTH DUMFRIES

STORM WATER RUN-OFF DESIGN CRITERIA

SCALE:

DATE: JANUARY 1979

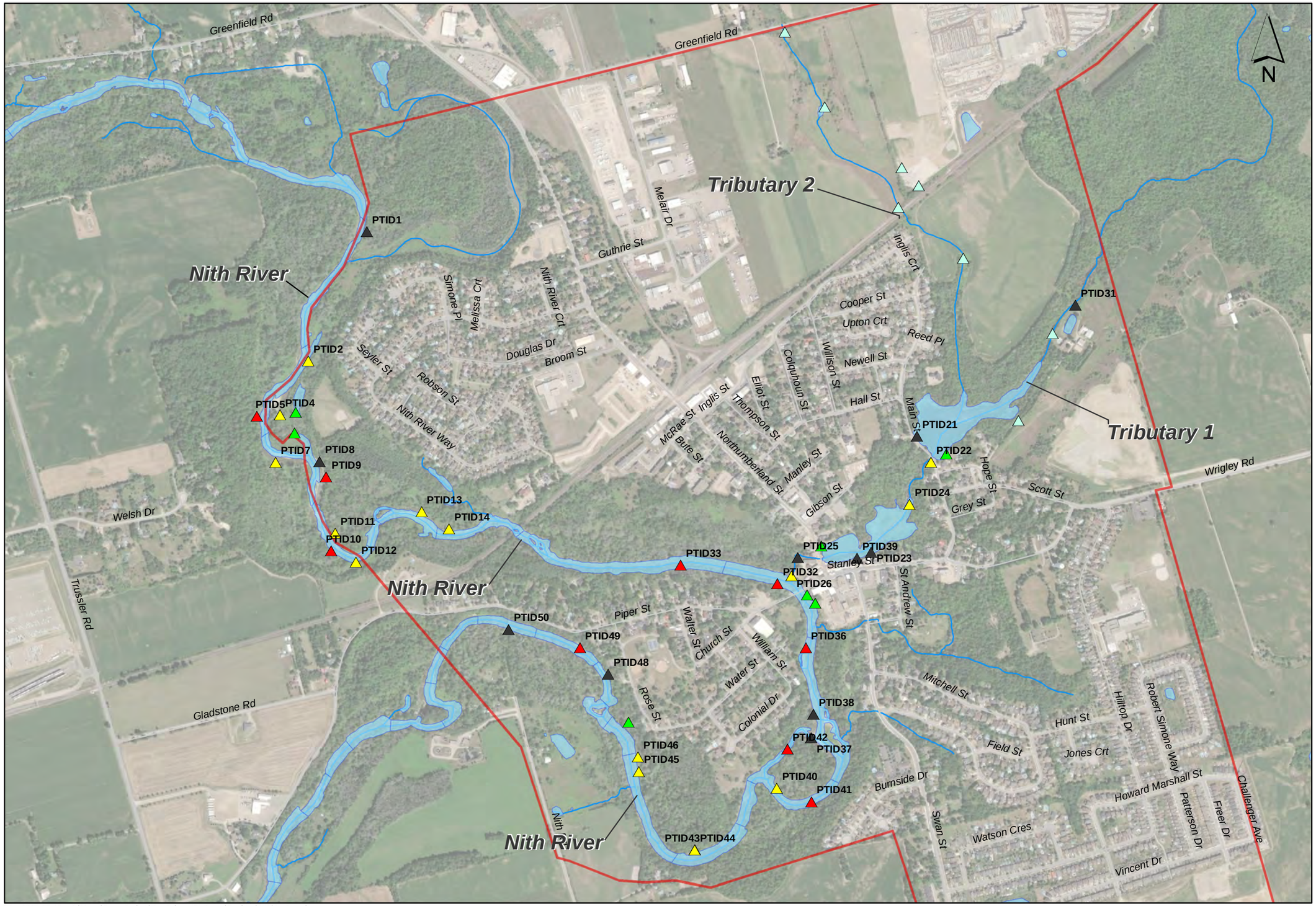
STD. S-2

Frank R. Lisa
MAYOR

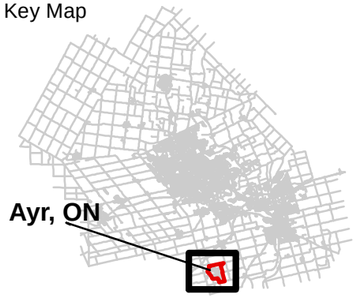
APPENDIX H

Erosion Inventory and Assessment Information

Ayr, ON - Watercourse Erosion Inventory and Assessment



Key Map



Legend

- Ayr_Boundary
- Waterbody
- Watercourse
- Roads

Observed Erosion

Severity Rating

- 1-Minor
- 2-Moderate
- 3-Major
- 4-Safety Hazard
- NA-General Observation

Note: For increased map clarity, only instances of erosion with a rating of 2 -Moderate or greater are labelled.

Watercourse Erosion Inventory and Assessment
Ayr, ON
County of North Dumfries

IBI

Project No.:	Date:
131788	July 2021

CG 2021-07-15 C:\Users\Drew.Corbett\OneDrive - IBI Group\Desktop\GIS\Ayr2.mxd

PTID	Section	Severity Rating	Erosion Type	North	East	Elev
1	NITH 1-1	4 - Safety Hazard	Bank undercutting	4793696.068	543169.087	284.412
2	NITH 1-1	2 - Moderate	Bank undercutting	4793309.132	542993.555	281.755
3	NITH 1-1	1 - Minor	Surface scouring	4793154.787	542955.818	281.599
4	NITH 1-1	2 - Moderate	Lateral bank erosion	4793147.792	542908.792	282.540
5	NITH 1-1	3 - Major	Bank scour, Bank undercutting, Bank slumping	4793143.567	542839.583	281.677
6	NITH 1-2	1 - Minor	bank scour	4793093.277	542951.890	281.572
7	NITH 1-2	2 - Moderate	Bank undercutting	4793004.580	542895.976	280.824
8	NITH 2-1	4 - Safety Hazard	Bank undercutting	4793006.950	543027.407	282.014
9	NITH 2-1	3 - Major	Bank undercutting	4792961.691	543047.495	282.233
10	NITH 2-2	3 - Major	Bank undercutting	4792739.979	543062.418	280.622
11	NITH 2-2	2 - Moderate	Lateral bank erosion	4792791.977	543074.925	281.495
12	NITH 2-2	2 - Moderate	Bank undercutting	4792705.420	543136.643	279.887
13	NITH 2-2	2 - Moderate	Bank undercutting	4792856.950	543333.723	279.792
14	NITH 2-3	2 - Moderate	Bank undercutting, Log debris jam	4792805.523	543415.927	281.997
15	TRIB 2-1	NA	General Observation	4794295.254	544422.644	293.145
16	TRIB 2-1	NA	General Observation	4794070.835	544542.478	292.015
17	TRIB 2-1	NA	General Observation	4793889.915	544773.200	297.782
18	TRIB 2-1	NA	General Observation	4793834.873	544824.406	294.503
19	TRIB 2-1	NA	General Observation	4793770.842	544763.188	289.774
20	TRIB 2-2	NA	General Observation	4793617.356	544957.542	288.635
21	TRIB 2-2	4 - Safety Hazard	Active erosion	4793083.084	544818.674	287.175
22	TRIB1-1	2 - Moderate	Perched culvert	4793005.492	544861.117	286.636
23	TRIB1-2	4 - Safety Hazard	Bank undercutting	4792734.464	544681.583	282.356
24	TRIB1-2	2 - Moderate	Log debris jam	4792878.592	544795.895	282.750
25	TRIB1-2	4 - Safety Hazard	Bank undercutting	4792718.808	544461.634	279.964
26	TRIB1-2	2 - Moderate	Headcutting	4792664.681	544442.511	281.138
27	TRIB1-2	1 - Minor	Bank undercutting	4792753.349	544532.126	283.145
28	TRIB1-1	1 - Minor	Log debris jam	4793030.882	544906.303	287.661
29	TRIB1-1	NA	No erosion - photo documentation	4793130.766	545123.145	291.866
30	TRIB1-1	NA	No erosion - erosion control	4793392.109	545224.842	288.133
31	TRIB1-1	4 - Safety Hazard	Structural damage-bridge	4793476.175	545293.981	287.849
32	NITH 3-1	3 - Major	Bank undercutting	4792640.906	544400.594	283.382
33	NITH 3-1	3 - Major	Bank undercutting	4792696.636	544110.074	281.028
34	NITH 3-2	1 - Minor	Active erosion	4792607.176	544489.251	279.877
35	NITH 3-2	1 - Minor	Log debris jam	4792582.758	544513.978	279.541
36	NITH 3-2	3 - Major	Bank undercutting	4792448.324	544485.574	279.112
37	NITH 4-1	4 - Safety Hazard	Bank undercutting, Log debris jam	4792178.583	544501.532	278.906
38	NITH 4-1	4 - Safety Hazard	Bank undercutting, Log debris jam	4792248.911	544508.290	278.879
39	TRIB 1-2	4 - Safety Hazard	Bank undercutting	4792717.157	544638.685	283.670
40	NITH 4-2	2 - Moderate	Log debris jam	4792027.812	544398.568	278.557
41	NITH 4-2	3 - Major	Bank undercutting	4791987.413	544502.610	278.359
42	NITH 4-2	3 - Major	Bank undercutting	4792144.963	544430.192	277.642
43	NITH 4-3	2 - Moderate	Bank undercutting	4791842.340	544152.765	280.713
44	NITH 4-3	2 - Moderate	Bank undercutting	4791842.379	544152.654	280.700
45	NITH 4-3	2 - Moderate	Bank undercutting	4792077.749	543984.567	278.794
46	NITH 4-3	2 - Moderate	Lateral bank erosion	4792121.773	543982.589	278.221
47	NITH 4-3	1 - Minor	Ponding / pooling	4792225.318	543954.320	n/a*
48	NITH 5-1	4 - Safety Hazard	Active bank erosion	4792369.472	543892.977	n/a*
49	NITH 5-1	3 - Major	Log debris jam, Active bank erosion	4792449.496	543808.214	n/a*
50	NITH 5-1	4 - Safety Hazard	Structural damage-bridge	4792503.588	543594.352	n/a*

Nith River 4-2_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-19

Submission Date:	May 19, 2021 11:36:57 AM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	4
Reference Number:	20210519-18187799857
Location:	20 Colonial Dr, Ayr, ON N0B 1E0, Canada May 19, 2021 11:36:53 AM EDT [View Map]

Photo Set Title Nith River 4-2

.

Nith River 4-2_ Log_Debris Jam _PS(1)_1.jpeg

Nith River 4-2_ Log_Debris Jam _PS(1)_2.jpeg

Nith River 4-2_ Log_Debris Jam _PS(1)_3.jpeg

Additional information Significant build up on both banks- at certain parts, logs jam up ~1/4 of river

width.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Log/Debris Jam	2- Moderate	4792027.81	544398.57	278.557	40

.

Nith River 4-2_Bank Undercutting_PS(2)_1.jpeg

Nith River 4-2_Bank Undercutting_PS(2)_2.jpeg

Additional information undercutting occurs on the south side of the river. river very shallow at this area, ~1/2 foot at deepest.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	3 - Major	4791987.41	544502.61	278.359	41

.

Nith River 4-2_Bank Undercutting_PS(3)_1.jpeg

Nith River 4-2_Bank Undercutting_PS(3)_2.jpeg

Nith River 4-2_Bank Undercutting_PS(3)_3.jpeg

Additional information bank undercutting occurs on both sides of the bank. Northside is connected to homeowner's backyard.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	3-Major	4792144.96	544430.19	277.642	42

Nith River 5-1_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-19

Submission Date:	May 19, 2021 2:47:43 PM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	4
Reference Number:	20210519-18187839132
Location:	286 Piper St, Ayr, ON N0B 1E0, Canada May 19, 2021 2:47:41 PM EDT [View Map]

Photo Set Title Nith River 5-1

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Nift River 4-4_slumping_PS(1)_1.jpeg

Additional information Active erosion, signs of slope instability near backyard of private residence-close to house.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Active Bank Erosion	4- Safety Hazard	4792369.47183	543892.977405		48

.

Nift River 4-4_ Log_Debris Jam _PS(2)_1.jpeg

Nift River 4-4_ Log_Debris Jam _PS(2)_2.jpeg

Nift River 4-4_ Log_Debris Jam _PS(2)_3.jpeg

Nift River 4-4_ Log_Debris Jam _PS(2)_4.jpeg

Additional information log debris take up aproximately 1/3 of the width of the river. Some bank undercutting /active bank erosion also beginning in this location with signs of bank instability.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Log/Debris Jam	3- Major	4792449.49557	543808.213585		49

.

Nift River 4-4_concrete falling apart, tree debris on gabion wall_PS(3)_1.jpeg

Nift River 4-4_concrete falling apart, tree debris on gabion wall_PS(3)_2.jpeg

Nift River 4-4_concrete falling apart, tree debris on gabion wall_PS(3)_3.jpeg

Nift River 4-4_concrete falling apart, tree debris on gabion wall_PS(3)_4.jpeg

.

5-1_concrete eroding_PS(3)_5.jpeg

5-1_concrete eroding_PS(3)_6.jpeg

5-1_concrete eroding_PS(3)_7.jpeg

Additional information Bridge in state of disrepair – structural damage to concrete footings. Tree debris and vegetation taking root on gabion wall on south side of bridge.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Structural damage - bridge	4- Safety Hazard	4792503.58827	543594.352237		50

Nith River Section 1-1_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-07

Submission Date:	May 7, 2021 12:25:40 PM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	2
Reference Number:	20210507-18186234690
Location:	82 Nith River Wy, Ayr, ON N0B 1E0, Canada May 7, 2021 12:25:34 PM EDT [View Map]

Photo Set Title Ayr Section 1-1

.

Ayr Section 1-2_Bank Undercutting_PS(1)_1.jpeg

Ayr Section 1-2_Bank Undercutting_PS(1)_2.jpeg

Additional information Bank undercutting occurring very close to footpath

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	4- Safety Hazard	4793696.07	543169.09	284.412	1

.

Ayr Section 1-2_ Bank Undercutting_PS(2)_1.jpeg

Ayr Section 1-2_ Bank Undercutting _PS(2)_2.jpeg

Ayr Section 1-2_Bank Undercutting_PS(2)_3.jpeg

Additional information Undercutting of bank and dead vegetation / debris falling into main channel. Evidence of river overtopping bank and flowing overland during high water levels, forms seasonal pond at PTID3.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	2- Moderate	4793309.13	542993.56	281.755	2

.

Ayr Section 1-2_Surface Scouring_PS(3)_1.jpeg

Ayr Section 1-2_Surface Scouring_PS(1)_2.jpeg

Additional information First photo facing north depicting inland surface scouring. Second photo facing south- dead vegetation likely resulting from seasonal flooding / high water levels.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Surface Scouring	1- Minor	4793154.79	542955.82	281.599	3

.

Ayr Section 1-1_Lateral Bank Erosion_PS(4)_1.jpeg

Ayr Section 1-1_Lateral Bank Erosion_PS(4)_2.jpeg

Ayr Section 1-1_Lateral Bank Erosion_PS(4)_3.jpeg

Additional information

1st picture facing north depicts main lateral erosion site dead vegetation suggests during high water levels, water flowing overland (south) bypassing main channelized area. See the difference in log colours in photo 1. Dead vegatation unnaturally wraps around trees. Beginning of an outlet may be seen at PTID 6. 2nd and 3rd pictures are facing south.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Lateral Bank Erosion	2- Moderate	4793147.79	542908.79	282.54	4

Ayr Section 1-1_bank undercut, bank slumping, log debris_PS(5)_1.jpeg

Ayr Section 1-1_bank undercut, bank slumping, log debris_PS(5)_2.jpeg

Additional information First picture facing south- bank undercut beginning to show. Second photo

facing NE, opposite bank slumping with fallen log debris collecting within channel. Large trees at top of high bluff getting close to undercutting.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
bank undercut, bank slumping, bank scour, log debris	3 - Major	4793110.23	542872.52	281.677	5

Ayr Section 1-2_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-07

Submission Date:	May 7, 2021 1:09:21 PM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	2
Reference Number:	20210507-18186241070
Location:	30 Simone Pl, Ayr, ON N0B 1E0, Canada May 7, 2021 1:09:12 PM EDT [View Map]

Photo Set Title Ayr Section 1-2

.

Ayr Section 1-1_Bank Scour_PS(1)_1.jpeg

Ayr Section 1-1_Bank Scour_PS(1)_2.jpeg

Additional information Evidence of bank / surface scouring from footpath and sediment deposits in low flow pool (separate from main river). Photos facing south.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Scour	1- Minor	4793093.28	542951.89	281.572	6

Ayr Section 1-1_bank undercut, and log_debris jam_PS(2)_1.jpeg

Additional information Erosion found on south bank of river. Minor log debris fallen into main channel from bank.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercut	2- Moderate	4793022.84	542903.52	280.824	7

Nith River Section 2-1_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-11

Submission Date:	May 11, 2021 10:49:47 AM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	3
Reference Number:	20210511-18186579755
Location:	426 Piper St, Ayr, ON N0B 1E0, Canada May 11, 2021 10:49:41 AM EDT [View Map]

Photo Set Title Nith River Section 2-1

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Nith River Section 2-1_Bank Undercutting_PS(1)_1.jpeg

Nith River Section 2-1_Bank Undercutting_PS(1)_2.jpeg

Nith River Section 2-1_Bank Undercutting_PS(1)_3.jpeg

Additional information Some erosion near and affecting some parts of established pedestrian trail during period of high flow / water level. Unstable ground could be potential safety hazard for trail users.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	4- Safety Hazard	4793006.95	543027.41	282.01	8

.

Nith River Section 2_Bank Undercutting_PS(2)_1.jpeg

Nith River Section 2-1 East Side_ Bank Undercutting _PS(2)_2.jpeg

Nith River Section 2-1_ Bank Undercutting _PS(2)_3.jpeg

Additional information Banks and vegetation are collapsing into the channel. If erosion continues to cut back bank - may affect the established walking trail.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	3 - Major	4792961.69	543047.49	282.23	9

.

Nith River Section 2-1_Bank Undercutting_PS(3)_1.jpeg

Nith River Section 2-1_Bank Undercutting_PS(3)_2.jpeg

Additional information Heavy erosion observed on south side of river eroding due to high flow volume

and flow velocities during wet weather undercutting banks.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	3 - Major	4792764.19	543075.14	280.62	10

Nith River Section 2-2_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-11

Submission Date:	May 11, 2021 11:54:22 AM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	3
Reference Number:	20210511-18186591198
Location:	128 Nith River Wy, Ayr, ON N0B 1E0, Canada May 11, 2021 11:53:57 AM EDT [View Map]

Photo Set Title Nith River Section 2-2

Nith River Section 2-2_Lateral Bank Erosion_PS(1)_1.jpeg

Nith River Section 2-2_Lateral Bank Erosion_PS(1)_2.jpeg

Nith River Section 2-2_Lateral Bank Erosion_PS(1)_3.jpeg

Additional information Inland lateral bank erosion and surface scouring -likely seasonal flood plain with ponding. Possible over land flow bypassing main channel during period of flooding / high flow due to meandering river.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Lateral Bank Erosion	2- Moderate	4792791.98	543074.92	281.5	11

.

Nith River Section 2-2_Bank Undercutting_PS(2)_1.jpeg

Nith River Section 2-2_Bank Undercutting_PS(2)_2.jpeg

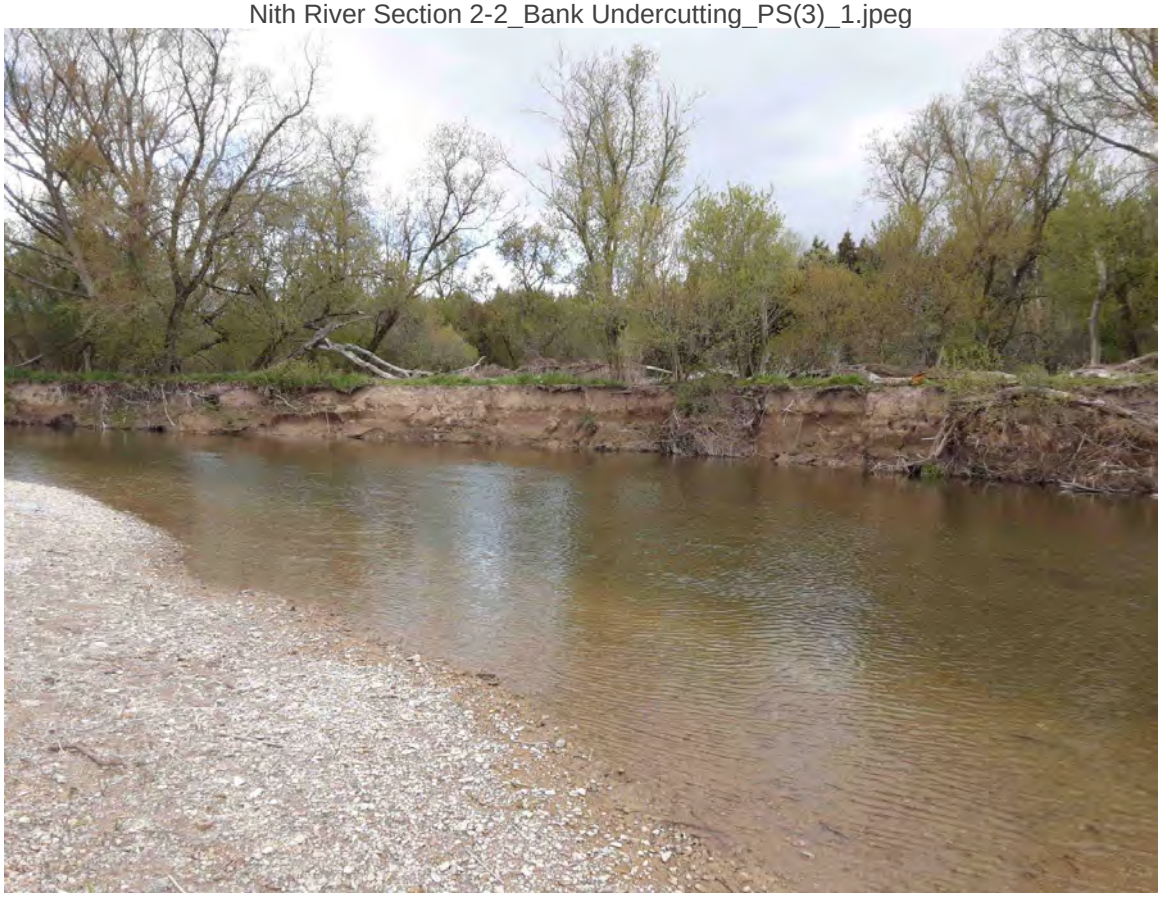
Nith River Section 2-2_Bank Undercutting_PS(2)_3.jpeg

Additional information Bank undercutting due to high flow volume and velocity at tight meander. Log debris in main channel.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	2- Moderate	4792723.28	543137.04	279.89	12

.

Nith River Section 2-2_Bank Undercutting_PS(3)_1.jpeg



Nith River Section 2-2_Bank Undercutting_PS(3)_2.jpeg

Nith River Section 2-2_Bank Undercutting_PS(3)_3.jpeg

Nith River Section 2-2_Bank Undercutting_PS(3)_4.jpeg

Additional information Bank undercutting due to high flow volume and velocity at tight meander. Log debris in main channel. Established pedestrian train on top of bank being impacted by erosion.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	4- Safety Hazard	4792838.43	543322.48	279.79	13

Nith River Section 2-3_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-07-13

Submission Date:	Jul 13, 2021 9:24:42 AM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	3
Reference Number:	20210713-18195584100
Location:	23 Henry Moody Dr, Brampton, ON L7A 0C3, Canada Jul 13, 2021 9:24:40 AM EDT [View Map]

Photo Set Title Nith River Section 2-3 North Side

.

Nith River Section 2-3 North Side_ Log_Debris Jam _PS(1)_1.jpeg

Nith River Section 2-3 North Side_ Log_Debris Jam _PS(1)_2.jpeg

Nith River Section 2-3 North Side_ Log_Debris Jam _PS(1)_3.jpeg

Additional information Trees falling over on north and south side of river will eventually fall in river causing severe blockages. Photos taken on north side. Debris on north side is more severe than south side. Fallen trees on north side are near the public path.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Log/Debris Jam	2 - Moderate	4792805.52	543415.93	281.99	14

Nith River Section 3-1_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-18

Submission Date:	May 18, 2021 11:56:20 AM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	4
Reference Number:	20210518-18187620241
Location:	16 Northumberland St, Ayr, ON N0B 1E0, Canada May 18, 2021 11:56:15 AM EDT [View Map]

Photo Set Title Nith River Section 3-1

.

Nith River Section 3-1_Bank Undercutting_PS(1)_1.jpeg

Nith River Section 3-1_Bank Undercutting_PS(1)_2.jpeg

Nith River Section 3-1_Bank Undercutting_PS(1)_3.jpeg

Nith River Section 3-1_Bank Undercutting_PS(1)_4.jpeg

Additional information Significant bank undercutting. Loose sediment on banks erode with high flows leaving tree roots exposed. Photos taken of trees on south side of river. Man made path on north side of river is also eroding. Doesn't seem to be a public path but there is evidence of pedestrian traffic.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	3 - Major	4792666.79	544428.1	283.38	32

.

Nith River Section 3-1_ Bank Undercutting_LogDebris _PS(2)_1.jpeg

Nith River Section 3-1_Bank Undercutting_LogDebris_PS(2)_2.jpeg

Nith River Section 3-1_ Bank Undercutting_LogDebris _PS(2)_3.jpeg

Nith River Section 3-1_ Bank Undercutting_LogDebris _PS(2)_4.jpeg

Additional information Significant bank undercutting causing tree roots to be exposed. Banks are

undercut throughout this entire section (see PTID32 to the east). North side has fallen trees that have caused some log/debris in river.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting_LogDebris	3 - Major	4792724.41	544108.75	281.03	33

.

Nith River Section 3-1__PS(3)_1.jpeg

Additional information Log debris on north side of river channel.

Nith River Section 3-2_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-18

Submission Date:	May 18, 2021 12:45:47 PM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	4
Reference Number:	20210518-18187629112
Location:	32 William St, Ayr, ON N0B 1E0, Canada May 18, 2021 12:45:41 PM EDT [View Map]

Photo Set Title Nith River Section 3-2

.

Nith River Section 3-2_Active Erosion_PS(1)_1.jpeg

Nith River Section 3-2_Active Erosion_PS(1)_2.jpeg

Nith River Section 3-2_Active Erosion_PS(1)_3.jpeg

Additional information Stones moved out of place likely due to high flows. Tree trunk debris under bridge. Tree growing out of the side of the bridge is growing close to power lines on bridge.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Active Erosion	1- Minor	4792607.17	544489.25	279.88	34

.

Nith River Section 3-2_ Log_Debris Jam _PS(2)_1.jpeg

Nith River Section 3-2_ Log_Debris Jam _PS(2)_2.jpeg

Nith River Section 3-2_ Log_Debris Jam _PS(2)_3.jpeg

Additional information Some debris from banks falling in blocking culvert. Area is adjacent to a parking lot.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Log/Debris Jam	1- Minor	4792582.76	544513.98	279.54	35

.

Nith River Section 3-2_Bank Undercutting_PS(3)_1.jpeg

Nith River Section 3-2_Bank Undercutting_PS(3)_2.jpeg

Additional information High flow eroding and scouring bank on east side of river. Water levels increase

during wet weather and seasonal periods of high water levels on west side of river. Homeowners have seemingly implemented some erosion control measures which may need to be upgraded / improved.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	3 - Major	4792448.32	544485.57	279.11	36

Nith River Section 4-1_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-18

Submission Date:	May 18, 2021 2:30:25 PM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	4
Reference Number:	20210518-18187642065
Location:	50 Stanley St, Ayr, ON N0B 1E0, Canada May 18, 2021 2:30:23 PM EDT [View Map]

Photo Set Title Nith River Section 4-1

.

Nith River Section 4-1_Bank Undercutting and Log Jam _PS(1)_1.jpeg

Nith River Section 4-1_Bank Undercutting and Log Jam _PS(1)_2.jpeg

Additional information High spring flows cause flooding of backyards at properties on Colonial Dr. High flows cause undercutting of bank and have created additional flow paths at meander. Significant flows caused trees to fall into river. Island (where tree debris found) may contribute to river backup into residential backyards.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting and Log Jam	4- Safety Hazard	4792178.58	544501.53	278.9	37

.

Nith River Section 4-1_Bank Undercutting_PS(2)_1.jpeg

Nith River Section 4-1_Bank Undercutting_PS(2)_2.jpeg

Additional information High flows cause bank erosion. Tree roots exposed. Spoke to one of the

homeowners on Colonial Drive and they indicate that they see ice and debris flow in during high velocity wet weather events (mainly during spring melting season). During these events the flow overtops the bank and floods their backyards. Residents also believe the island-like feature just downstream contributes to flooding of their backyards.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	4- Safety Hazard	4792215.83	544546.65	278.88	38

Nith River Section 4-3_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-19

Submission Date:	May 19, 2021 1:53:13 PM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	4
Reference Number:	20210519-18187831242
Location:	72 Water St, Ayr, ON N0B 1E0, Canada May 19, 2021 1:53:07 PM EDT [View Map]

Photo Set Title Nith River Section 4-3

Nith River Section 4-3_Bank Undercutting_PS(1)_1.jpeg

Nith River Section 4-3_Bank Undercutting_PS(1)_2.jpeg

Nith River Section 4-3_Bank Undercutting_PS(1)_3.jpeg

Additional information Erosion is near an ATV trail (possible private trail)

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	2 - Moderate	4791842.38	544152.65	280.7	34 & 44

.

Nith River Section 4-3_Bank Undercutting_PS(2)_1.jpeg

Nith River Section 4-3_Bank Undercutting_PS(2)_2.jpeg

Additional information bank undercutting on opposite side of river.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	2- Moderate	4792077.75	543984.57	278.794	45

.

Nith River Section 4-3_Lateral Bank Erosion_PS(3)_1.jpeg

Additional information possiblely causes flow inland.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Lateral Bank Erosion	2- Moderate	4792121.77	543982.59	278.221	46

.

Nith River Section 4-3_pooling of water occuring_PS(4)_1.jpeg

Nith River Section 4-3_pooling of water occuring_PS(4)_2.jpeg

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Pooling /Ponding	1- Minor	43.2814471	80.4580911	NA	47

Tributary 1-1_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-13

Submission Date:	May 13, 2021 1:45:33 PM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	4
Reference Number:	20210513-18186890932
Location:	30 Scott St, Ayr, ON N0B 1E0, Canada May 13, 2021 1:45:18 PM EDT [View Map]

Photo Set Title Tributary 1-1

Tributary 1-1_Perched Culvert_PS(1)_1.jpeg

Tributary 1-1_Perched Culvert_PS(1)_2.jpeg

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Perched Culvert	2 - Moderate	4793005.49	544861.12	286.636	22

.

Tributary 1-1__PS(2)_1.jpeg

Tributary 1-1__PS(2)_2.jpeg

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
No Eriosion – just photo documentation	NA	4793130.77	545123.14	291.866	29

.

Tributary 1-1_ Log_Debris Jam _PS(3)_1.jpeg

Tributary 1-1_ Log_Debris Jam _PS(3)_2.jpeg

Additional information Large tree has fallen in water may be contributing to small localized band erosion.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Log/Debris Jam	1 - Minor	4793033	544912.39	287.661	28

.

Tributary 1-1__PS(4)_1.jpeg

Tributary 1-1__PS(4)_2.jpeg

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Erosion Control	NA	4793392.11	545224.84	288.133	30

.

Tributary 1-1_Bank Undercutting_structural damage-bridge_PS(5)_1.jpeg

Tributary 1-1_ Bank Undercutting_structural damage-bridge__PS(5)_2.jpeg

Tributary 1-1_ Bank Undercutting_structural damage-bridge__PS(5)_3.jpeg

Additional information Slight undercutting on north side of river. bridge experiencing a slight lean, in poor condition - may be private property / privately owned bridge.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	4 – Safety Hazard	4793476.17	545293.98	287.479	31

Tributary 1-2_____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-13

Submission Date:	May 13, 2021 11:12:38 AM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	4
Reference Number:	20210513-18186874987
Location:	36 Northumberland St, Ayr, ON N0B 1E0, Canada May 13, 2021 11:12:38 AM EDT [View Map]

Photo Set Title Tributary 1-2

Tributary 1-2_Bank Undercutting_PS(1)_1.jpeg

Tributary 1-2_Bank Undercutting_PS(1)_2.jpeg

Tributary 1-2_Bank Undercutting_PS(1)_3.jpeg

Additional information Evidence of active erosion, some bank undercutting beginning to infringe on

back yard of private residences. some trees have fallen over – potential safety hazard

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	4- Safety Hazard	4792760.94	544672.16	282.356	23

.

Tributary 1-2_ Log_Debris Jam _PS(2)_1.jpeg

Tributary 1-2_ Log_Debris Jam _PS(2)_2.jpeg

Additional information many trees in creek that feeds into Watson pond. Evidence of tree buildup from further upstream.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Log/Debris Jam	2- Moderate	4792900.02	544754.36	282.75	24

.

Tributary 1-2_Bank Undercutting_PS(3)_1.jpeg

Tributary 1-2_Bank Undercutting_PS(3)_2.jpeg

Tributary 1-2_Bank Undercutting_PS(3)_3.jpeg

Additional information Evidence of active erosion, some bank undercutting beginning to infringe on back yard of private residences. some trees have fallen over – potential safety hazard

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	4- Safety Hazard	4792718.81	544461.63	279.964	25

.

Tributary 1-2_Headcutting_PS(4)_1.jpeg

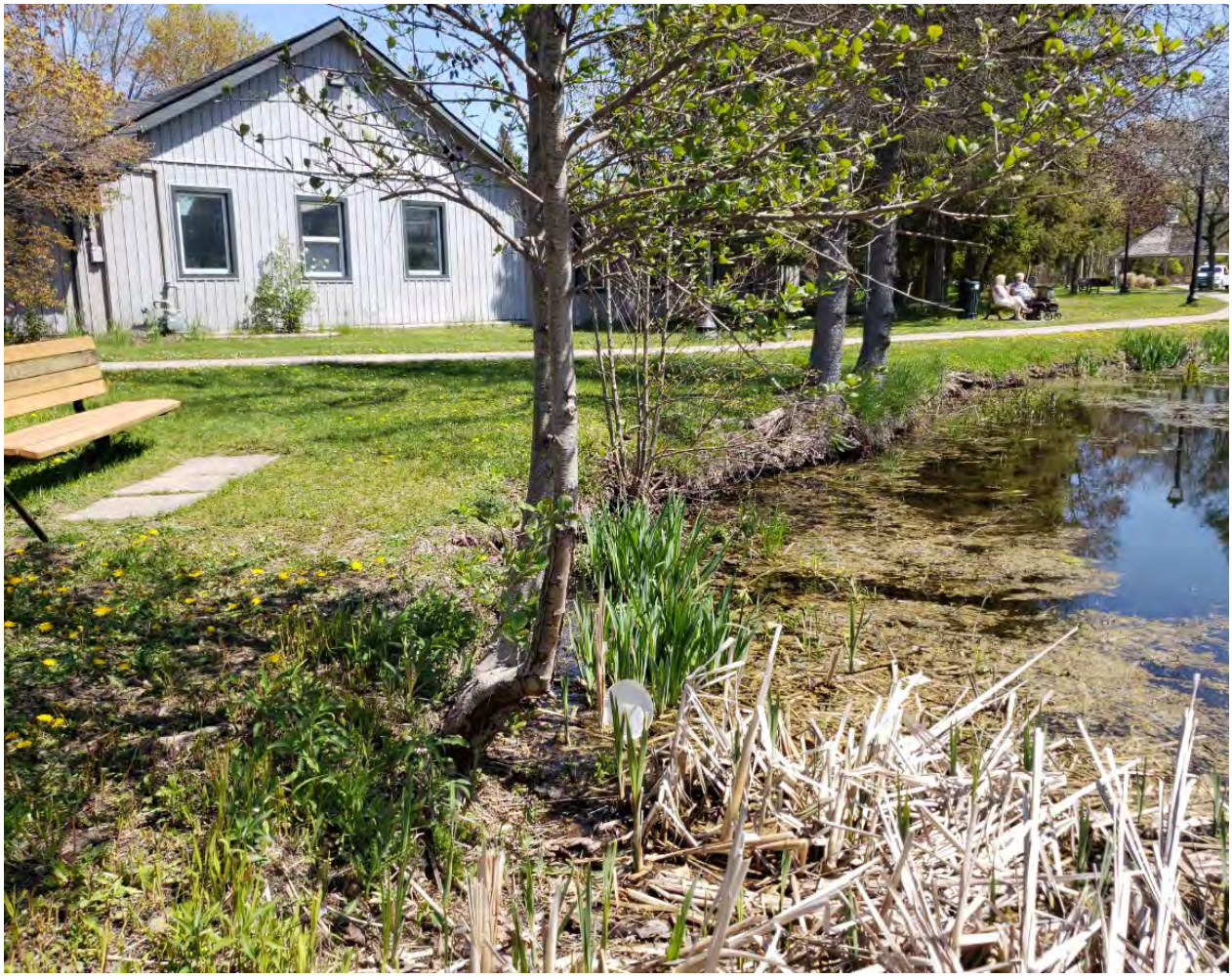
Tributary 1-2_Headcutting_PS(4)_2.jpeg

Tributary 1-2_Headcutting_PS(4)_3.jpeg

Additional information Riffle formation causing greater erosion near / on one side of the bank.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Headcutting	2 - Moderate	4792664.1	54453.91	218.13	26

.



Tributary 1-2_Headcutting_PS(5)_1.jpeg

Additional information Some bank undercutting beginning north shore, close to private residences/walking path.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	1 - Minor	4792753.349	544532.1257	283.1448	27

.

Tributary 1-2_ Bank Undercutting _PS(6)_1.jpeg

Tributary 1-2_ Bank Undercutting _PS(6)_2.jpeg

Additional information Some bank undercutting beginning south shore, close to private residences/property along
This stretch of bank. Bench is not level and deemed safety hazard as it is sloped towards water – likely result of erosion.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Bank Undercutting	4 – Safety Hazard	4792717.157	544638.6852	283.6701	39

Tributary 2-1 _____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-12

Submission Date:	May 12, 2021 11:30:26 AM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	4
Reference Number:	20210512-18186735400
Location:	250 Inglis St, Ayr, ON N0B 1E0, Canada May 12, 2021 11:30:10 AM EDT [View Map]

Photo Set Title Tributary 2-1 No Erosion

.

Tributary 2-1 No Erosion_No Erosion_PS(1)_1.jpeg

Tributary 2-1 No Erosion_No Erosion_PS(1)_2.jpeg

Additional information No erosion found

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
No Erosion	NA	4794295.25	544422.64	293.15	15

.

Tributary 2-1 No Erosion_No evidence of erosion_PS(2)_1.jpeg

Tributary 2-1 No Erosion_No evidence of erosion_PS(2)_2.jpeg

Tributary 2-1 No Erosion_No evidence of erosion_PS(2)_3.jpeg

Additional information Some evidence of lateral erosion likely only occurring during wet weather but the erosion -very minor.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
No evidence of erosion	NA	4794070.84	544542.48	292.01	16

Tributary 2-1 No Erosion_No evidence of erosion _PS(3)_1.jpeg

Tributary 2-1 No Erosion_No evidence of erosion _PS(3)_2.jpeg

Additional information No erosion found

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
No evidence of erosion	NA	4793889.92	544773.2	297.78	17

.

Tributary 2-1 No Erosion_No evidence of erosion _PS(1)_1.jpeg

Tributary 2-1 No Erosion_No evidence of erosion _PS(1)_2.jpeg

Additional information No erosion found. No evidence of erosion near train tracks.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
No evidence of erosion	NA	4793834.87	544824.41	294.5	18

.

Tributary 2-1 No Erosion_No evidence of erosion _PS(2)_1.jpeg

Tributary 2-1 No Erosion_No evidence of erosion _PS(2)_2.jpeg

Tributary 2-1 No Erosion_No evidence of erosion _PS(2)_3.jpeg

Additional information No erosion found. Some debris/twigs/branches blocking culvert but no significant erosion of field or area around train tracks.

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
No evidence of erosion	NA	4793770.84	544763.19	289.77	19

Tributary 2-2 _____
Erosion Inventory & Assessment

Township of North Dumfries
Ayr, Ontario
2021-05-13

Submission Date:	May 13, 2021 7:11:30 AM EDT
Form Name:	EROSION INVENTORY & ASSESSMENT
Form Version:	4
Reference Number:	20210513-18186851036
Location:	Frontenac Dr Stop # 3218, Markham, ON L3R 6H2, Canada May 13, 2021 7:11:27 AM EDT [View Map]

Photo Set Title Tributary 2-2

.

Tributary 2-2 _No evidence of erosion _PS(1)_1.jpeg

Tributary 2-2 _No evidence of erosion _PS(1)_2.jpeg

Additional information some ponding in tributary but no evidence of erosion

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
No evidence of erosion	NA	4793617.36	544957.54	288.64	20

.

Tributary 2-2 _Active Erosion_PS(2)_1.jpeg

Tributary 2-2 _Active Erosion_PS(2)_2.jpeg

Tributary 2-2 _Active Erosion_PS(2)_3.jpeg

Additional information Stones bordering public pond look out are collapsing

EROSION TYPE(S)	SEVERITY	N	E	Z	PTID
Active Erosion	4- Safety Hazard	4793083.08	544818.67	287.17	21

.

Tributary 2-2 _No evidence of erosion _PS(3)_1.jpeg

Tributary 2-2 _No evidence of erosion _PS(3)_2.jpeg

Additional information No signs of erosion

APPENDIX I

Sample SWMF Inspection Checklist

"DRAFT" SWM and LID FACILITY MAINTENANCE CHECKLIST FORM
Township of Ayr – Design Guidelines and Standard Drawings

Form Date:

Form Revision No.:

1. General Details

This Form prepared by : IBI Group

Inspected by:_____

SWM Facility ECA Number:

Date of Inspection:_____

Subdivision / Facility Name:

Rainfall 24 hours prior: _____mm

Location / Intersection:

Rainfall 72 hours prior: _____mm

Discharges to:

Watershed: Grand River

Facility Type:

Wet pond | Wetland | Dry Pond

On-line | Off-line | Sediment Forebay Yes / No

2. Observations:

Water level Reading (from top of HW): ____cm

					Notes
Water Colour:	Clear	Green	Brown	Other	_____
Foul Odour	None	Minor	Moderate	High	_____
Floating Material	None	Minor	Moderate	High	_____
Algae	None	Minor	Moderate	High	_____
Debris	None	Minor	Moderate	High	_____
Oil/Sheen	None	Minor	Moderate	High	_____
Floatables	None	Minor	Moderate	High	_____
Is sediment visible below or above water surface?	Yes	No			_____

Notes:_____

_____

3. Inspection of Structural Components

INLET					Notes
Blockage/Debris	None	Minor	Moderate	High	_____
Sediment Accumulation	None	Minor	Moderate	High	_____
Cracking/damage concrete	None	Minor	Moderate	High	_____
Damage to other components	None	Minor	Moderate	High	_____
Erosion Protection Condition	None	Minor	Moderate	High	_____
Grate secure	Yes		No		_____
Seepage	Yes		No		_____
OUTLET					Notes
Blockage/Debris	None	Minor	Moderate	High	_____
Cracking/damage concrete	None	Minor	Moderate	High	_____
Damage to other components	None	Minor	Moderate	High	_____
Structural damage	None	Minor	Moderate	High	_____
Armour stone damage	None	Minor	Moderate	High	_____
Grate secure	Yes		No		_____
Seepage	Yes		No		_____

Notes:_____

_____

Severity Ranking: None - No issue | Minor - Requires monitoring | Moderate - Requires routine maintenance | High - Requires immediate maintenance

"DRAFT" SWM and LID FACILITY MAINTENANCE CHECKLIST FORM
Town of Ayr – Design Guidelines and Standard Drawings

3. Inspection of Structural Components (continued)

OUTLET SWALE					Notes
Blockage	None	Minor	Moderate	High	_____
Erosion	None	Minor	Moderate	High	_____
Clarity of flow out of pond	Clear	Green	Brown	Other	_____
Sediment Depth in channel	_____ cm				_____
(Depth measurement taken at outfall headwall)					_____
EMERGENCY OVERFLOW					
Erosion	None	Minor	Moderate	High	_____
Evidence of overtopping	Yes		No		_____

Notes:_____

_____

4. Inspection of Vegetation

			Notes
Aquatic	Un-Healthy	Healthy	_____
Shoreline	Un-Healthy	Healthy	_____
Upland	Un-Healthy	Healthy	_____
Trees/Shrubs	Un-Healthy	Healthy	_____

Re-seeding/Replanting Requirements:_____

Notes:_____

_____

5. Overall Conditions

			Notes
Access Roads	Un-Satisfactory	Satisfactory	_____
Fences	Un-Satisfactory	Satisfactory	_____
Gates	Un-Satisfactory	Satisfactory	_____
Locks	Un-Satisfactory	Satisfactory	_____
Signage	Un-Satisfactory	Satisfactory	_____
Evidence of Encroachments	Un-Satisfactory	Satisfactory	_____
Evidence of Beaver Activity	Un-Satisfactory	Satisfactory	_____
Evidence of Waterfowl Activity	Un-Satisfactory	Satisfactory	_____
Evidence of Fish	Un-Satisfactory	Satisfactory	_____

Notes:_____

_____

Comments:_____

_____

_____

_____

_____

_____

Severity Ranking: None - No issue Minor - Requires monitoring Moderate - Requires routine maintenance High - Requires immediate maintenance

APPENDIX J

Sample Operation & Maintenance Report

SWM Pond Maintenance Costs

Name of Subdivision

File No.

Date:

SWM Facility Operation and Maintenace Costs

Based on Table 7.5 MOE 2003

	A	B	C	D	
Type of Maintenance	**Maintenance Interval (yrs)**	**Unit**	**Unit Price**	**Quantity**	**Annual Cost =(C x D) / A**
Litter Removal	1	ha	$ 2,000	0.88	$ 1,760
Grass Cutting	1	ha	$ 250	0.88	$ 220
Weed Control	1	ha	$ 2,500	0.88	$ 2,200
Vegetation Maintenance (Aquatic/ Shoreline Fringe)	5	ha	$ 3,500	0.20	$ 137
Vegetation Maintenance (Upland/Flood Fringe)	5	ha	$ 1,000	0.20	$ 41
Sediment Removal (vacuum truck or manual)	15	m^3	$ 120	1019	$ 8,148
Sediment Testing (lab tests on quality)	15	each	$ 3,000	1	$ 200
Sediment Disposal (off-site landfill)	15	m^3	$ 300	1019	$ 20,370
Sediment Disposal and Landscaping (on-site)	n/a	m^3	$ 5	-	-
Inspection (Inlet/Outlet, etc.)	1	each	$ 100	4	$ 400
Pervious Pipe cleanout (flushing)	5	m	$ 1	10	$ 2
Pervious Pipe cleanout (Radial Washing)	5	m	$ 2	10	$ 4

Total Annual Operation and Maintenance Costs= $ 33,490

PREPARED BY:

COMPANY NAME

"[Name of Primary Author(s)]"
"[Click Position]"

CHECKED BY:

COMPANY NAME

"[Name of QC Checker]"
"[Click Position]"

AUTHORIZED FOR ISSUE BY:

COMPANY NAME

"[Name of Authoritizing Supervisor \"VP/PL\"
"[Click Vice President / Practice Leader]"

Issues and Revisions Registry

Identification	Date	Description of issued and/or revision
Draft Report		For internal review
Draft Report		For client review

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3 Pond Description 1

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APPENDICES

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Appendix C – Annual Maintenance Costs
Appendix D – Statement of Limiting Conditions and Assumptions

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– SWM Pond Details (1 of 2) .....Map Pocket
####– SWM Pond Details (2 of 2) .....Map Pocket

1 Introduction

_____ [Consultant] was retained by _____ (the 'Owner') to undertake the detailed engineering design in support of the _____ [Development], located in the Town of Ayr, Regional Municipality of Waterloo (the 'Region'). As part of the detailed design, a stormwater management (SWM) wet pond facility was proposed to accommodate runoff from the subdivisions, as detailed within the _____ [existing SWM Report]. Within the appendices of this SWM report, an Operations & Maintenance Manual was provided, based on the design volumes of the pond.

The purpose of the following report is to provide a stand-alone Operations & Maintenance manual outlining the operation and maintenance procedures for the subject stormwater management wet pond.

2 Site Location

The _____ Subdivision (Draft Plan No. ####, Registered M Plan No. ####) is located within the Town of Ayr, _____ [description location]. Refer to the Location Plan provided as **Figure 1** following this report.

3 Pond Description

The _____ Subdivision consists primarily of _____ [description of subdivision]. Stormwater runoff from the _____ Subdivision, as well as runoff received from external areas, is accommodated by a stormwater management wet pond facility located at the southwest corner of the NAME subdivision. The total ### ha pond block is situated _____ relative to _____ [Subdivision]. The Town approved design drawings for the SWM Pond are enclosed for reference with this report as **Drawings ### – ####.** Permits and Approvals related to the SWM Pond are provided in **Appendix A**.

A total ### ha drainage area is tributary to the SWM Pond (including external areas), with an average imperviousness of ###%. Refer to **Figures STM-01 and STM-02** enclosed with this report, depicting the post-development drainage areas. The Level 1 Enhanced protection storage volume requirement for ### % impervious is ### m^3/ha, of which ## m^3/ha is the extended detention, leaving ### m^3/ha as the permanent pool requirement in order to achieve 80% removal of total suspended solids (TTS). As such, a permanent pool volume of #### m^3 is required. The constructed SWM Pond provides a total permanent pool volume of #### m^3 and is therefore sufficiently sized in order to provide 80% removal of Total Suspended Solids.

The pond outlet consists of a ### m x ### m concrete box [or other type of structure] outlet control structure. A hickenbottom [or other type] structure fitted with a ### mm diameter reverse-slope pipe conveys flows to the control manhole, where a ### mm diameter orifice (installed at an invert elevation of #### m) controls the extended detention within the pond. A ## m x ## m ditch inlet catch basin (DICB1) and a ##m x ## m ditch inlet catch basin (DICB2) are installed at grate invert elevations of #### m and #### m, respectively. A concrete orifice control wall is constructed within the ## m x ## m box structure [or other type], to provide erosion control (as discussed above) and quantity control of the pond. The concrete orifice control wall houses the ### mm diameter orifice (as mentioned above) as well as a ## m x ## m rectangular orifice at an invert elevation of #### m. **Drawing ####** enclosed with this report depicts details of the orifice control wall. Additionally, a ### m spillway is provided along the ____ side of the pond at an average invert elevation of ##### m.

4 Cleanout Frequency

According to Table 6.3 of the *Ministry of Environment (MOE) SWM Planning & Design (SWMPD) Manual*, the yearly sediment loading for ### % imperviousness is ### m^3/ha of drainage area, resulting in ### m^3/year of sediment accumulation for the ### ha area (### m^3/ha x ### ha = ### m^3/year). Two (2) approaches were considered for calculating the cleanout frequency of the pond. The first calculates the number of years of sediment accumulation which would reduce the sediment forebay volume by 50%, and the second calculates the number of years of sediment accumulation which would reduce the overall permanent pool such that the TSS removal efficiency is reduced by 5% from 80% to 75%.

4.1 Reduction of Sediment Forebay Volume by 50%

The sediment forebay should be able to accumulate sediment for at least 10 years before its volume is reduced by 50% and cleanout is required. The pond provides a sediment forebay volume of #### m^3. Based on the estimated sediment loading rate, established in **Section 4** above, it would take approximately ## years before the sediment forebay volume is reduced by 50% to ### m^3 (#### m^3/ ### m^3/year = ## years).

4.2 Reduction of TSS Removal Efficiency by 5%

The SWM Pond was designed to provide Enhanced (Level 1) Protection as defined by the Ministry of the Environment, Conservation, and Parks (MOECP) Stormwater Management Planning and Design Manual (2003), requiring an 80% removal of Total Suspended Solids (TSS). Therefore, reduction of the sediment removal efficiency by 5% would result in an overall 75% TSS removal efficiency being provided by the SWM Pond. Interpolating between the values provided in MOECP Table 3.2, a 75% TSS removal efficiency (for a tributary drainage area with a ### % imperviousness) requires a ### m^3/ha storage volume. Since 40 m^3/ha of this storage volume is to be accommodated by the extended detention portion of the pond, the remaining ### m^3/ha storage volume requirement is to be provided within the permanent pool portion of the pond. As such, a #### m^3 permanent pool volume (#### ha x ### m^3/ha = ##### m^3) would provide a 75% TSS removal.

The SWM Pond provides a total #### m^3 permanent pool volume. Therefore, in order for the TSS removal efficiency to be reduced by 5% (to an overall 75% TSS removal efficiency), the permanent pool volume would need to be reduced by #### m^3 (#### m^3 – #### m^3 = #### m^3). Based on the annual sediment loading rate of ### m^3/year, it would take approximately ## years for the permanent pool volume to be reduced such that a 5% reduction in TSS removal efficiency occurs.

4.3 Recommended Clean-out Frequency

Based on calculations presented in **Section 4.1** above, it would take approximately ## years for sediment accumulation to reduce the available pond forebay volume by 50%. Calculations presented within **Section 4.2**, determined that it would take approximately ## years for sediment accumulation to reduce the TSS removal efficiency of the pond by 5%. It is therefore recommended that pond cleanouts take place a minimum of once every ## years in order to maintain both the volume capacity of the pond forebay and overall sediment removal capacity within the pond.

4.4 Sediment Removal Operations

Prior to commencing maintenance and sediment removal operations, all applicable permits shall be obtained.

During maintenance and sediment removal operations it is recommended that inflows be diverted around the pond. The pond can then be dewatered via gravity flow to the normal water level of ### m via the ### mm diameter orifice. For the remaining water in the pond which is below the normal water level, portable pumps can be used to facilitate dewatering. The pond forebay is to be pumped from the proposed dewatering sump located in the pond forebay, as shown on **Drawings ####** and **####**. If dewatering of the pond wet cell is required for maintenance purposes, the wet cell can be dewatered by the use of pumps as well, from the hickenbottom structure.

Given space restrictions, there is no area available for spreading and drying of the sediment. In addition, drying sediment may cause odours which are undesirable given adjacent residential land uses. As such, it is recommended that sediment could be removed from the pond by means of an excavator and loaded onto sealed dump trucks to be disposed of at an approved disposal site. Alternatively, sediment could be removed by use of a vacuum truck and disposed of at an approved disposal site. The use of polymer flocculants could reduce the trucking costs by significantly reducing the slump of the sediment.

5 Inspections & Maintenance

Maintenance is an important aspect of SWM pond performance. One of the main reasons for SWM pond failures and/or poor performance is a lack of regular maintenance and cleanout operations.

5.1 Inspections

During the first two (2) years of operation, the facility should be inspected after every significant storm event to ensure proper functioning (average is about four (4) inspections per year). After this initial time period, and confirmation that the wet pond is operating as intended, frequency of inspections may be lessened to once per year (annually). However, if such factors such as upstream development occur, more frequent inspections may need to be carried out due to the potential operation problems this could incur. An inspection report should be filled out during each inspection and kept on file.

5.2 Maintenance Operations

SWM pond inspections determine the extent of required maintenance activities. **Table 4.1** below (adapted from Table 6.1 of the MOECP Stormwater Management Planning and Design Manual, 2003) provides a checklist of typical operation and maintenances activities to be completed for the wet pond.

Table 4.1 Maintenance Checklist

Item No.	Operation or Maintenance Activity	Wet Pond	Table
1	Inspection	■	4x / year for 2 years; after 2 years inspect annually
2	Grass Cutting	□	As Required

Table 4.1 Maintenance Checklist

Item No.	Operation or Maintenance Activity	Wet Pond	Table
3	Weed Control	■	Annually
4	Upland Vegetation Replanting	□	As Required
5	Shoreline Fringe and Flood Fringe Vegetation Replanting	□	As Required
6	Aquatic Vegetation Replanting	□	As Required
7	Removal of Accumulated Sediments	■	Every 15 years
8	Trash Removal	■	Remove trash once during the spring, then based on observation

■ *Normally Required*

□ *May be Required*

5.3 Grass Cutting

Generally, it is recommended that grass-cutting be limited or eliminated around SWM ponds since allowing grass to grow tends to enhance water quality and provide other benefits for wet facilities. For instance, short grass around a wet SWM pond provides an ideal habitat for nuisance species such as geese. Allowing the grass to grow is an effective means of deterring geese.

If grass cutting is required by the Town of Whitchurch-Stouffville, the grass around the SWM pond should not be cut to the edge of the permanent pool. As a safety precaution, cutting should be done parallel to the water with grass clippings being blown upland to reduce the potential for organic loadings to the pond.

5.4 Weed Control

Weeds are generally defined as any kind of vegetation which is unwanted in a particular area. Weeding should be done by hand to prevent the destruction of surrounding vegetation. The use of herbicides and insecticides should be prohibited near the SWM ponds since they create water quality problems. The use of fertilizer should also be restricted to minimize the nutrient loading to the downstream receiving waters.

5.5 Plantings

Upland and flood fringe plantings are generally stable and should require minimum maintenance or re-establishment. Shoreline fringe areas are subject to harsher conditions as a result of the frequent wetting and drying associated with this zone. It is anticipated that vegetation in the aquatic and shoreline fringe zones will require some replanting or enhancement during the first two (2) years of operation of the facility.

5.6 Trash Removal

Trash removal is an integral part of the SWM pond maintenance. Generally, a "spring clean-up" is required to remove trash from all surfaces of the pond. Trash removal is then performed as required based on observation during regular inspections.

6 Annual Maintenance Cost Estimates

The average annual operation and maintenance costs for the pond was calculated to be **$ ####** (see **Appendix C**) which translates to $#####/ha of drainage area. These costs were based on Table 7.5 of the *MOECP 2003 SWMPD Manual*, and do not include costs associated with surveying the sediment depths which would be required prior to sediment removal operations.

The bulk of the annual operation and maintenance cost is associated with the removal and disposal of sediment which would take place approximately once every ## years, but budget provisions should be set on an annual basis to ensure the availability of funds at the time the cleanout is performed.

7 Conclusion

The implementation of a comprehensive operation and maintenance program is an integral part of the design of wet SWM pond and maintenance of minimum permanent pool volumes is required for the proper functioning of the facilities.

Inspections of the pond facility should be carried out after every significant storm event during the first two (2) years of operation and on a yearly basis after that period.

The recommended cleanout frequency for the SWM Pond is ## years. This is the time at which the volume of the sediment forebay is expected to be reduced by 50%, and this will also avoid large cleanout operations involving the whole pond.

APPENDIX K

Public / Agency Consultation Materials

WELCOME TO THE AYR STORMWATER MANAGEMENT MASTER PLAN PUBLIC INFORMATION CENTRE

Purpose of Study

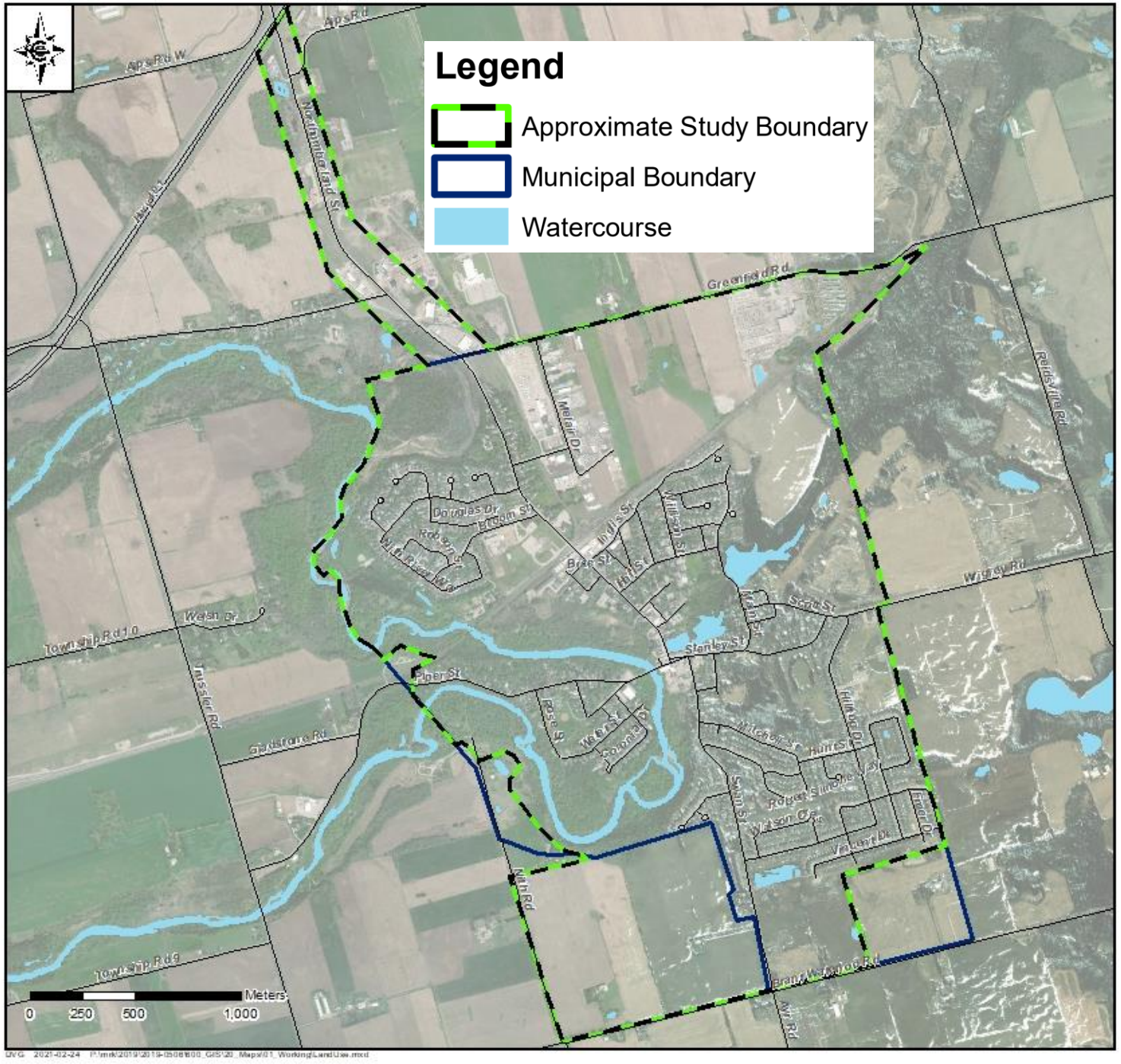
The Community of Ayr requires completion of a Stormwater Management [SWM] Master Plan [SWMMP] following a Master Planning approach in accordance with the Environmental Assessment Act as outlined by the Municipal Engineer's Association Municipal Class Environmental Assessment (MEA), October 2000, as amended.

The SWMMP will serve as a decision support tool, a methodology for the prioritization of works, a means to estimate future SWM requirements and costs and a transparent community process by which the Township can establish stormwater management guidelines and policies for the next ten to fifteen years.

GLOSSARY OF TERMS

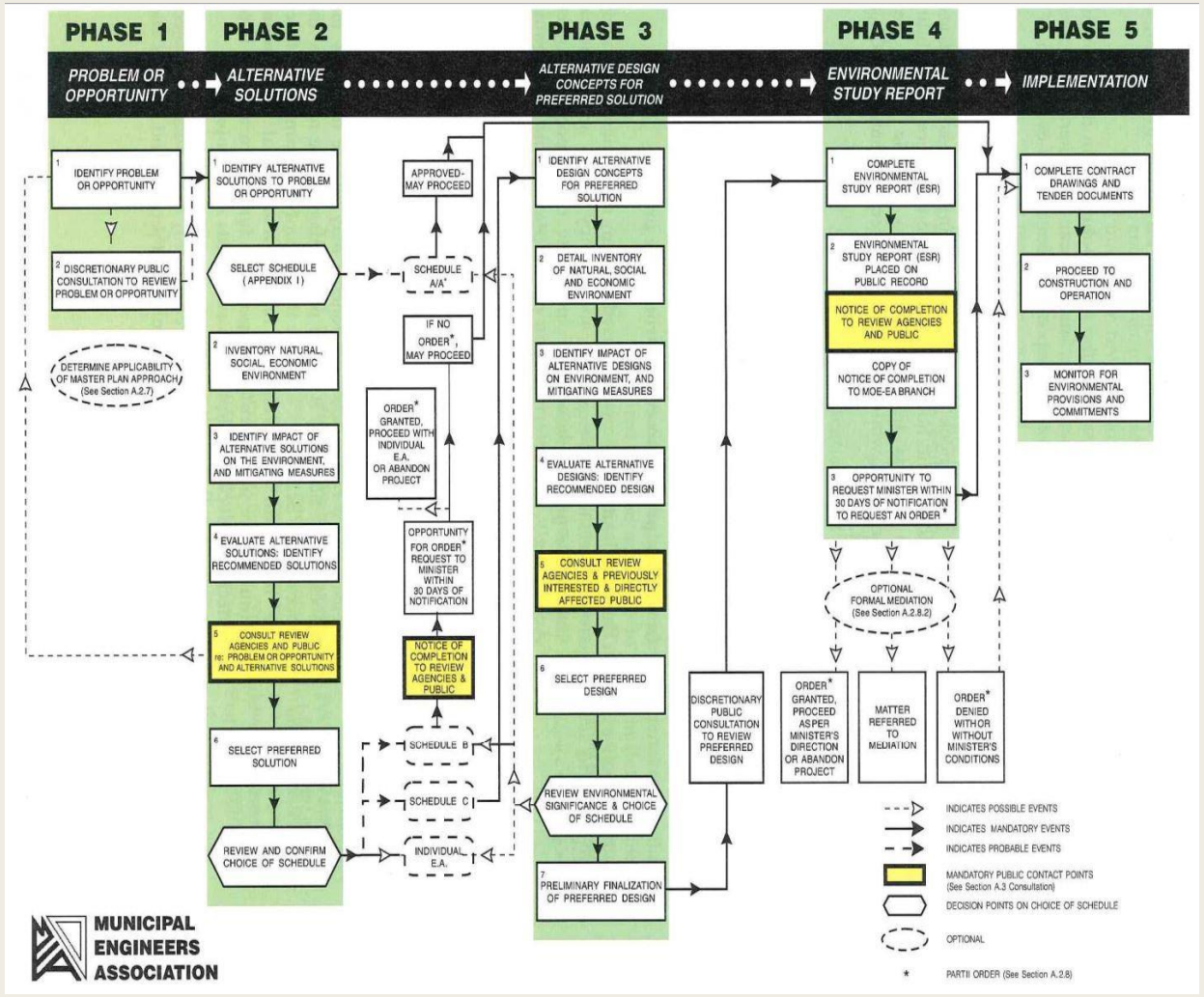
- EA = Environmental Assessment
- GRCA = Grand River Conservation Authority manages water and other natural resources on behalf of 39 municipalities and close to one million residents of the Grand River watershed.
- MECP = Ministry of Environment, Conservation, and Parks
- SPA = Special Policy Areas are areas within flood plain boundaries of a watercourse where exceptions to the development restrictions of the natural hazards policy (3.1) in the Provincial Policy Statement (PPS), 2005, may be permitted in accordance with technical criteria established by the MNR.
- SWM = Stormwater Management
- SWMMP = SWM Master Plan
- TP = Total Phosphorus, consisting of suspended and dissolved phosphorus, is a nutrient which, in excess amounts, has detrimental effects on aquatic health.

Study Area


Legend
Approximate Study Boundary
Municipal Boundary
Watercourse
Aps Rd
Aps Rd W
Northumberland St
Hwy 8
Greenfield Rd
Melaid Dr
Douglas Dr
Ellison St
Robertson Dr
Wilkinson Dr
Bree St
Ellis St
Mill St
Reids Mill Rd
Wilgay Rd
Scott St
Stanley St
Welsh Dr
Township Rd 10
Piper St
Rose St
West St
Poplar Dr
Mitchell Dr
Hunt St
Hillside Dr
Roger Smith Dr
Nelson Dr
Vincent Dr
Fraser Dr
Taylor Rd
Gladstone Rd
Mill Rd
Township Rd 9
Meters
0
250
500
1,000

Municipal Class EA Process

- The project is being conducted as a Schedule B project in accordance with the *Municipal Engineers Association Class Environmental Assessment (October 2000, as amended in 2007, and 2011)*.
- The requirements for Schedule B activities include **Phase 1 (Identification and Description of the Problem) and Phase 2 (Identification/Evaluation of Alternative Solutions to the Problem)** of the planning process of the Class EA and associated consultation.
- Following this Public Consultation and the Class Environmental Study process, the Project File report will be made available for a 30-day public review and comment period.



Purpose of Master Plan

The SWM Master Plan (SWMMP) shall be an integrated approach that considers flood and erosion control, groundwater and surface water quality management, natural heritage environment management and infrastructure. In addition, the plan shall integrate existing policies, regulations, acts and guidelines and where appropriate develop new policies and design guidelines to aid in implementation and shall do so within a water sustainability context. In addition, the SWMMP should provide a framework for the provision of a stormwater utility user fee if desired.

Background

- The Community of Ayr has a population of approximately 5,000 persons and is anticipated to increase to a population of 10,000 to 11,000 persons by 2031, making it a Future Settlement Area.
- Increases in population require residential and employment lands, which increase the impervious cover of existing lands, and the stormwater which runs off during events requires mitigation. The SWMMP will provide specific recommendations for SWM measures to mitigate urban growth in the Study Area.
- The SWMMP will provide guidance for future development in these areas, including an overview of opportunities and constraints for SWM measures.

Localized Flooding

- Ayr does not typically employ traditional storm sewer systems (inlet catchbasins [CBs], manholes, storm sewers, outfalls), and instead has historically employed pervious (open bottom) CBs.
- As the CBs lack a traditional outlet, how fast they can convey stormwater runoff away from streets and yards is limited by the infiltration/percolation rate of the underlying soils and the size of the CB
- This storm management design has led to nuisance flooding.
- This study has an aim of making recommendations to guide solutions to this nuisance flooding.

Source: Photograph of 2016 flood taken by local resident

Stormwater Management Objectives

Based on a review of the available information on the watershed, the following objectives were developed for the SWMMP:

- **Quantity Control**: Control post development to predevelopment levels for all storms up to 100-year return period
- **Erosion Control** – Retain minimum 5 mm on-site, adhere to GRCA requirements
- **Water Balance**: Emulate pre-development water balance infiltration volumes on an annual basis
- **Water Quality**: Provide 80% TSS Removal and phosphorus reduction

Stormwater Management Engineering and Development Standards – Quantity Control

Quantity Control:

Proponents shall demonstrate via appropriate hydrologic modeling (Rational/Modified Rational for Sites less than 5 ha, hydrologic model (ex. VisualOTTHYMO) for Sites larger than 2 ha.

The latest IDF curves from the GRCA shall be used.

Stormwater Management Engineering and Development Standards – Erosion Control

Erosion Control:

Ayr requires on-site retention of the first 5mm of runoff.

If a site drains to a sensitive creek, or if a subwatershed study, MESP or similarly comprehensive study is required, then the proponent must complete a geomorphologic assessment study to determine the appropriate erosion threshold and volume requirement. The geomorphologic assessment should be conducted in consultation with the GRCA to verify critical decisions and to confirm the scope of the analyses outlined above.

For sites with a SWM pond, extended detention of the 25mm event for a period of 48 hours may also be required, depending on the results of an erosion assessment.

Stormwater Management Engineering and Development Standards – Water Balance

Water Balance:

Retain stormwater on-site (retention) to the extent practical to ensure that post-development infiltration volumes on an annual basis meet pre-development rates. Demonstrate using a monthly Thornthwaite-Mather water budget on an average annual basis.

Stormwater Management Engineering and Development Standards – Quality Control

Water Quality (Total Suspended Solids):

The water quality target is the long-term average removal of 80% of Total Suspended Solids (TSS) on an annual loading basis from all runoff leaving the proposed development site based on the post-development level of imperviousness.

Stormwater Management Engineering and Development Standards – Quality Control

Water Quality (Total Phosphorus):

Control post-development total phosphorus annual loading to pre-development levels.

At present, GRCA does not have specific, approved phosphorus loading coefficients. In IBI's sample analysis, we have utilized average values from the NVCA TP Tool.

At detailed design, pre- and post-development P loadings should be calculated using a similar method, along with the required Best Management Practices (BMPs) to meet GRCA targets.

Operation and Maintenance Manuals

At detailed design, the Consultant should provide an Operation & Maintenance Report for any stormwater management pond, underground storage system, or stormwater device along with forecasted costs of maintenance and cleanout.

Alternative Solutions

- **Do Nothing**: With the “Do Nothing” approach, existing SWMFs are left “as is” and Future Settlement Areas are developed without SWM measures. That strategy would result in water balance deficit, reduced baseflows, increased erosion; increased peak flows, and increased phosphorus loading.

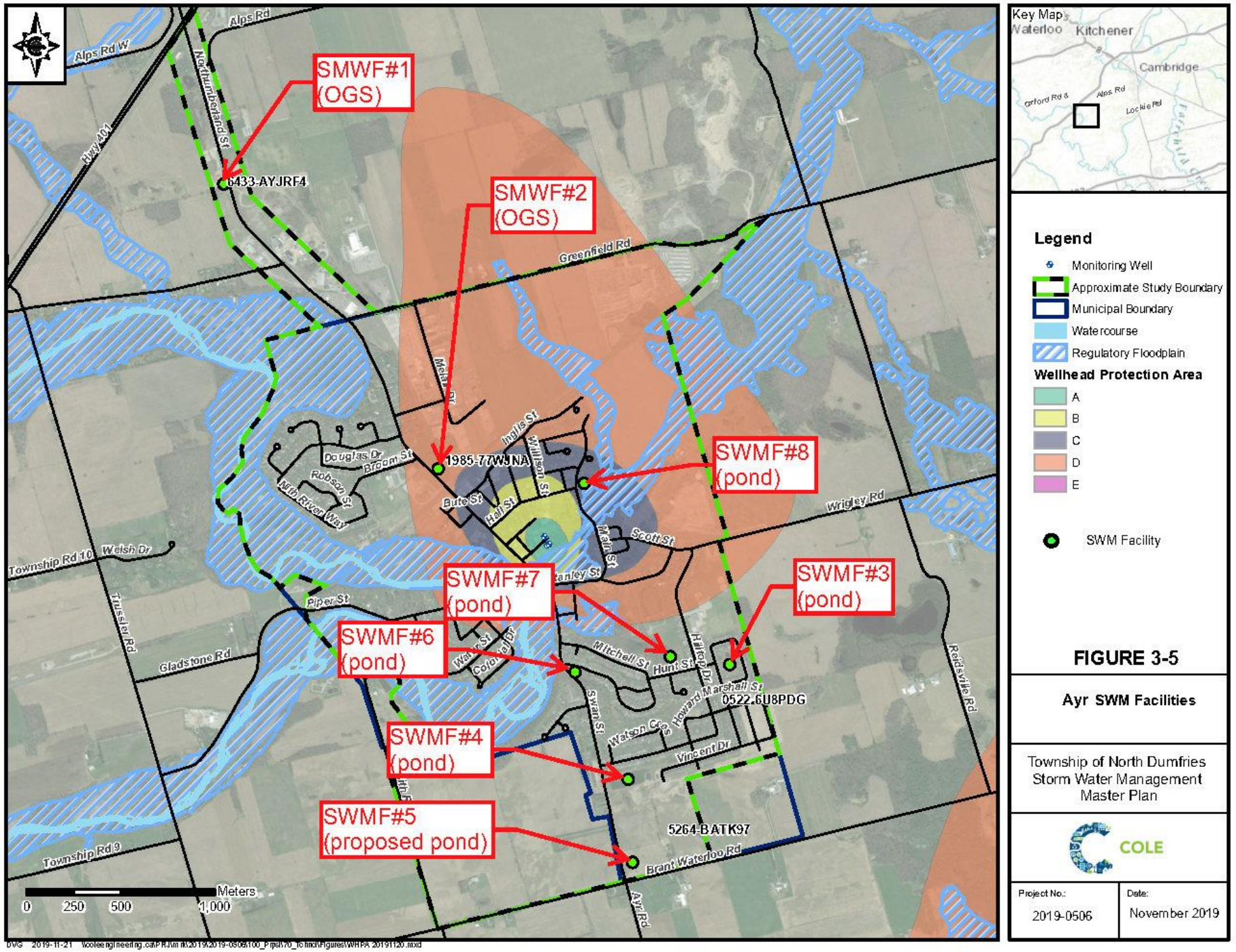
- **Traditional SWM Strategy (Ponds):** Reduces high flow rates and erosion potential and phosphorus loading, therefore reducing damage to the environment and property. Ponds do not increase baseflow, improve infiltration, or reduce runoff volumes

Source: Photograph of Hilltop Community SWM Pond A taken by Cole Engineering Group Ltd.

Alternative Solutions

- **Traditional SWM with Best Management Practices [BMP] Implementation Strategy**: This approach consists of SWM ponds in conjunction with BMPs/Low Impact Developments [LID] for Future Settlement Areas. This combination can reduce water balance deficit, decrease volumetric runoff, increase baseflow, reduce erosion, reduce peak flows, and reduce phosphorus loading.

- **Traditional SWM with Retrofit Strategy**: This approach consists of SWM ponds in conjunction with BMPs/LIDs for Future Settlement Areas; as well as retrofitting of existing SWMFs, or application of BMPs in areas with SWMFs. This combination can reduce water balance deficit, decrease volumetric runoff, increase baseflow, reduce erosion, reduce peak flows, and reduce phosphorus loading



Legend

- Monitoring Well
- Approximate Study Boundary
- Municipal Boundary
- Watercourse
- Regulatory Floodplain

Wellhead Protection Area

- A
- B
- C
- D
- E

SWM Facility

FIGURE 3-5

Ayr SWM Facilities

Township of North Dumfries
Storm Water Management
Master Plan

COLE

Project No.:	Date:
2019-0506	November 2019

DWG 2019-11-21 \\coleengineering.ca\PRJ\mmt\2019\2019-0506\100_Proj\70_Tech\mxd\Figures\WHPA 20191120.mxd

Stormwater Retrofit Opportunities

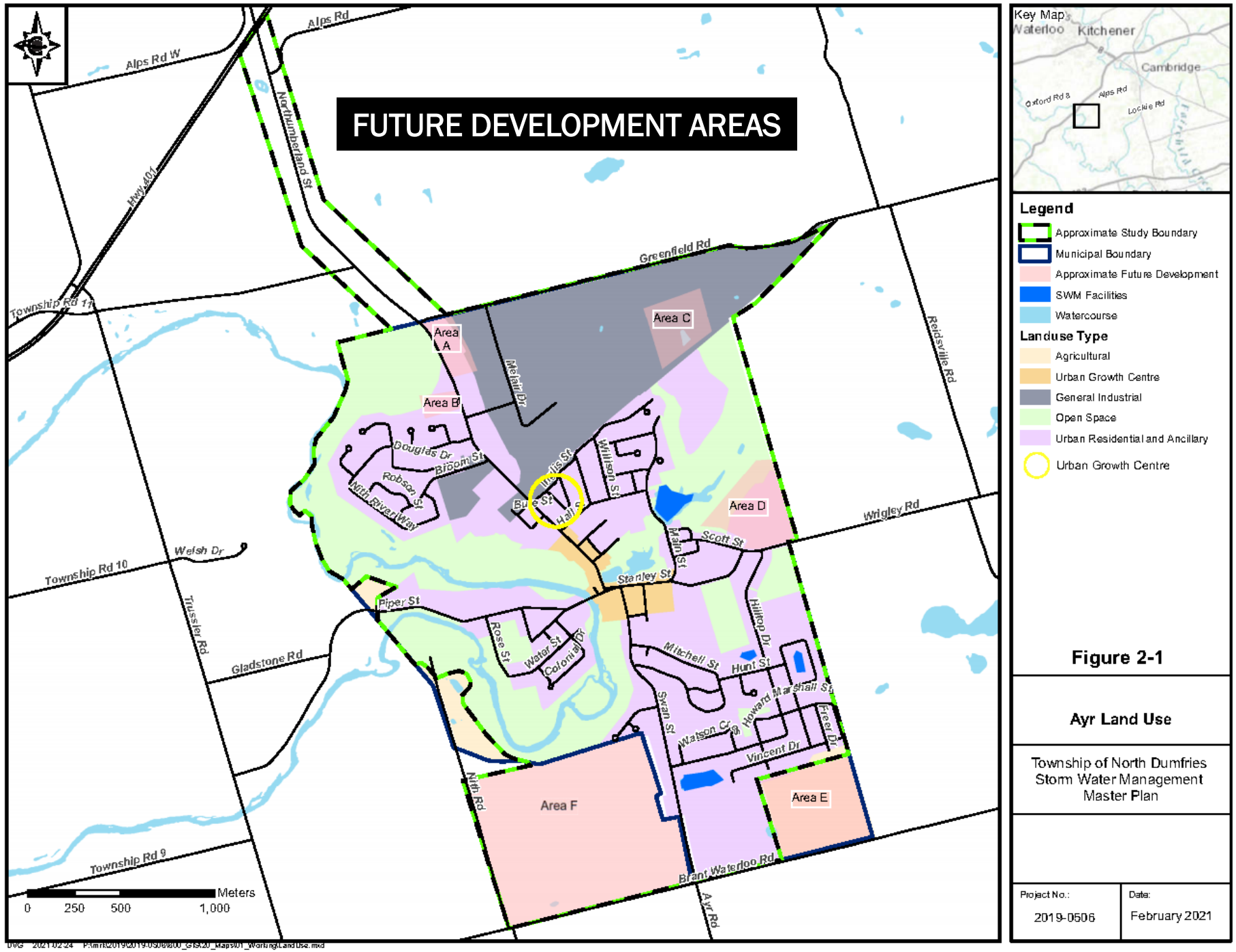
Through inspections by IBI, it was determined that 2 ponds could be considered for retrofit opportunities, SWMF #7 and #8.

From their appearance, it is assumed that these ponds have had little to no maintenance since their construction. They appear to be quantity control only ponds and could, in theory, be retrofitted to provide quality control.

Stormwater Retrofit Opportunities

Further investigation is needed to improve retrofit strategy development. Potential strategies could include:

- Surveys and ‘reverse engineering’ of Ponds 7 and 8 to determine retrofit opportunities to provide quality control;
- Replacement or repairs to pond features such as inlets and outlets;
- Adding a permanent pool/forebay to increase effluent quality;
- Changing capacity of existing pond to correspond to changes in drainage area;


FUTURE DEVELOPMENT AREAS
Alps Rd
Alps Rd W
Northumberland St
Hwy 401
Township Rd 11
Greenfield Rd
Area A
Area B
Area C
Area D
Area E
Area F
Melair Dr
Douglas Dr
Broom St
Robson Dr
North River Way
Bute St
Hall St
Williston St
Reidsville Rd
Wrigley Rd
Scott St
Main St
Stanley St
Township Rd 10
Welsh Dr
Trussler Rd
Piper St
Rose St
Water St
Colonial Dr
Gladstone Rd
Mitchell St
Hunt St
Howard Marshall St
Hilltop Dr
Swan St
Watson Cres
Vincent Dr
Freer Dr
Nith Rd
Brant Waterloo Rd
Township Rd 9
Ayr Rd
Meters
0
250
500
1,000
Key Map
Waterloo
Kitchener
Cambridge
Oxford Rd 8
Alps Rd
Lockie Rd
Legend
Approximate Study Boundary
Municipal Boundary
Approximate Future Development
SWM Facilities
Watercourse
Landuse Type
Agricultural
Urban Growth Centre
General Industrial
Open Space
Urban Residential and Ancillary
Urban Growth Centre
Figure 2-1
Ayr Land Use
Township of North Dumfries
Storm Water Management
Master Plan
Project No.:
2019-0506
Date:
February 2021

Future Development Areas

- **AREA A**: A development of 4.15 ha is proposed which would create an infiltration deficit of 8,604 m3/year without mitigation. This area will need to consider SPA 2.7.11. Stormwater could discharge to the oxbow lake of the Nith River, west of Northumberland St. BMP source/lot level controls and conveyance controls outlined in Section 8.0 could be applied. The largest obstacle appears to be getting the stormwater under the road and overcoming the mild slope towards the train tracks to the west.

- **AREA B**: A development of 1.59 ha is proposed which would create an infiltration deficit of 2,236 m3/year without mitigation. This area will need to consider SPA 2.7.9. Stormwater could be discharged directly to the oxbow lake of the Nith River directly North. BMP source/lot level controls and conveyance controls outlined in Section 8.0 could be applied. The largest obstacle will be ensuring quality measures are in place with the development located adjacent to the watercourse.

Future Development Areas

- **AREA C**: A development of 9.30 ha is proposed which would create an infiltration deficit of 20,664 m3/year without mitigation. This area will need to consider SPA 2.7.7. The area is not adjacent to a watercourse, but there is space for a pond and potential to convey water under the train tracks to the south and into the Jedburgh Pond. From there water moves to the Watson Pond eventually making its way into the Nith River. This area will need to focus on BMP end of pipe controls as outlined in Section 8.0. The largest obstacle will be ensuring quantity control measures are in place with the development.

- **AREA D**: A development of 13.37 ha is proposed which would create an infiltration deficit of 28,204 m3/year without mitigation. There is space for a pond here and it is close enough to discharge into Cedar Creek. BMP source/lot level controls, conveyance controls and end of pipe controls outlined in Section 8.0 could be applied. The largest obstacle will be incorporating these SWM controls during the apparent reclamation process from former aggregate pit.

Future Development Areas

- **AREA E**: A development of 23.22 ha is proposed which should follow a target infiltration deficit of 25,542 m3/year. This area will need to consider SPA 2.7.9. Due to the size of the area, there is potential for a SWM pond and outlet at Charlie Creek to the east. BMP source/lot level controls, conveyance controls and end of pipe controls outlined in Section 8.0 could be applied. The largest obstacle will be providing quality and quantity measures required to outlet to natural watercourse.

- **AREA F**: A development of 83.13 ha is proposed which should follow a target infiltration deficit of 33,455 m3/year. Due to the size of the area, there is potential for a SWM pond and potential to discharge to the Nith River to the north. BMP source/lot level controls, conveyance controls and end of pipe controls outlined in Section 8.0 could be applied. The largest obstacle will be avoiding the wetlands and safely conveying any excess water to the Nith River.

Future Development Areas

- **NORTHUMBERLAND ROAD**: The stretch of Northumberland Road between Greenfield Road and Highway 401 is currently a rural cross-section with some curb and catch basins implemented to the south. At the north there is a pond and a wetland on the west side of the road which begins across from Alps Road and continues south for approximately 300m. The east side has a shallow ditch through this area. Continuing south, both the east and west sides are quite flat, but there appears to be room for a deepening of existing ditch or an infiltration trench. There is a high point south of the gas station, therefore depending on the capacity, all runoff to the north of this point could be directed to the pond and wetland. For the section of Northumberland Road to the south of the gas station, the distance to the closest waterbody is approximately 700m to the south with a natural slope of 0.3%. Conveying the water on the west side could be achieved through grass swale or infiltration trench with subdrain. There are areas with more defined ditches, but some areas face a steep slope at the edge of the ROW. Ultimately culverts would be required under driveways and ultimately the west intersection of Greenfield Road. The east side has sections that are flat while other sections slope away from the road. There is space to implement surface LIDs on this side.

Analysis of Alternative Solutions

- The comparative evaluation of the alternative solutions will be carried out using a systematic approach that fulfills the intent of the Class EA process. The evaluation process will be presented in the form of an evaluation matrix in which alternative is scored or ranked against the other alternatives, with respect to a number of criteria that fall into the following categories:
  - *Environmental criteria: These include potential impacts on natural terrestrial features and aquatic habitat, and will include consideration of net change on hydrologic water balance and pollutant loadings to natural watercourses;*
  - *Financial criteria: Includes initial capital cost including consideration of any need for property acquisition; expected life-cycle costs; and implications for future financing of centralized stormwater facilities that may serve more than one development property;*
  - *Public safety and public acceptability: This category will address potential concerns regarding public safety and health; and how ell proposed facilities may fit into existing or future built-up areas;*
  - *Implementation: Includes consideration of how easily implementation can occur as new land development occurs; and how well the SWM plan integrates with current land-use planning and the development approval process.*

Analysis of Alternative Solutions

Technical
Opportunity to reduce peak flows to Nith River
Opportunity to decrease erosion of watercourses
Opportunity to improve water quality
Opportunity to reduce phosphorus loading in Nith River
Opportunity to mitigate changes in water balance
Natural Heritage Features
Provisions of direct and indirect fish habitat
Potential to improve terrestrial habitat
Impacts to natural hazard features
Social Environment
Ability to improve public health and safety
Impacts to private property
Impacts to public property
Cultural Environment
Impacts to built and cultural heritage landscape
Impacts to archeological resources
Economic Environment
Capital costs
Operation and Maintenance costs
Risk Management
Impact on agricultural land use

Analysis of Alternative Solutions

- As these Future Settlement Areas are designated for Residential development, increasing imperviousness requires peak flow control and erosion control. Mitigation of the infiltration deficit requires infiltration measures.
- Stormwater ponds are well suited for quality (total phosphorus and suspended sediment) and quantity control, but do not provide for increased infiltration/baseflow, and do not, on their own, necessarily achieve full phosphorus reduction.
- The use of Low Impact Development (LID) Best Management Practices (BMPs) at the lot level provides for increased infiltration and baseflow and provide phosphorus removal.
- LIDs could reduce costs over a traditional SWM wet pond, which requires draining, soil testing, hauling, etc. and provides for increased infiltration and baseflow, and provide phosphorus removal. In addition, wet ponds can produce odours, which LID measures can reduce.

	Evalution of Alternatives				
	Evaluation Criteria	Do Nothing	Traditional SWM Strategy	Traditional SWM with BMP	Traditional SWM w/ Retrofit Strategy
TECHNICAL	Opportunity to reduce peak flows to Nith River	0	1	1	1
	Opportuntity to decrease erosion of watercourses	0	1	2	1
	Opportuntity to improve water quality	0	1	1	1
	Opportuntity to reduce phosphorus loading in Nith River	0	1	2	1
	Opportunity to mititgage changes in water balance	0	0	1	1
NATURAL HERITAGE FEATURES	Provisions of direct and indirect fish habitat	0	0	0	1
	Potentital to improve terrestrial habitat	0	1	1	1
	Impacts to natural hazard features	0	0	0	0
SOCIAL ENVIRONMENT	Ability to improve public health and safety	0	1	1	1
	Impacts to private property	-1	1	1	1
	Impacts to public property	-1	1	1	1
CULTURAL ENVIRONMENT	Impacts to built and cultural heritage landscape	0	0	0	0
	Impacts to archeological resources	0	-1	-1	-1
ECONOMIC ENVIRONMENT	Capital costs	0	-1	-1	-2
	Operation and Maintenance costs	0	-1	-1	-1
	Risk Management	0	0	0	0
	Impact on agricultural land use	0	0	0	0
	TOTAL SCORE	**-2**	**5**	**8**	**6**

Scoring System
-2 = greater negative impact
-1 = net negative impact
0 = no impact
1 = positive impact
2 = greater positive impact

Preferred Alternative

- The preferred SWM strategy for this area is the **Traditional SWM with BMP Implementation Strategy** – SWM pond(s) for peak flow control and erosion control, in conjunction with LID BMPs to reduce phosphorus, promote infiltration, and to potentially offset the need for a permanent pool. Where applicable, it is recommended to provide BMPs in areas where soils and groundwater levels permit on a future development basis.

- When SWM Ponds and LID measures are utilized in conjunction with one another (i.e. a treatment train approach), total phosphorus loading can be reduced further over Traditional SWM (Ponds) alone.

IMPLEMENTATION PLAN

- IBI has established a municipality-wide stormwater asset database, which includes catchbasins, oil-grit separators, SWM Ponds.
- IBI will identify the operation and maintenance requirements of each SWM facility and its assets which will allow for forecasting future requirements in terms of capital costs, operation and maintenance costs, and resources required by the Township to maintain its SWM facilities. The life cycle costs of each SWM facility will be calculated based on the forecasted operations and maintenance requirements. This information will be incorporated into the database, allowing Township staff to easily identify and plan yearly costs and resources required for each SWM facility and the overall program.

IMPLEMENTATION PLAN

IBI has provided in the SWMMP a manual that specifies in detail the procedures community staff will need to undertake when monitoring and inspecting the SWM facility and includes the following:

- *Timelines for monitoring, inspections, and maintenance activities;*
- *Monitoring and inspection checklist based on the timelines;*
- *Guidance to interpret the monitoring data;*
- *Recommendations for the various maintenance activities that may be undertaken for each SWM facility based on the monitoring data;*
- *A standardized rating system to assess the priority of the maintenance needs for the various SWM facilities;*
- *Procedures for sediment sampling, removal, and disposal; and,*
- *Procedures for obtaining required approvals for removal and disposal of sediments.*

The above will help the Township ensure that it remains in compliance with the ECAs for its municipal stormwater facilities

Next Steps in EA Process

- Consider input received through the public consultation process on the problem opportunity statement, the evaluation criteria and alternative solutions.
- Analyze the alternative solutions against the evaluation criteria and select the preferred alternative.
- Following Public Consultation and the Class Environmental Study process, the Project File report will be made available for a 30-day public review and comment period.
- This provides the opportunity for interested stakeholders to file a Part II Order request (requests for a bump-up)

THANK YOU!

- Thank you for coming to our Public Information Centre.
- Please let us know what you thought, and if you have any comments or questions.
- **Please email back the comment form by March 31st, 2021.**
- If you have any questions about this study, feel free to ask any member of the Study Team.
- Information requests or questions may be directed to:

Lee Robinson, P. Eng.
Director of Public Works
Township of North Dumfries
North Dumfries Community Complex
2958 Greenfield Rd, PO Box 1060
Ayr, Ontario N0B 1E0
Phone: (519) 632-8800 ext. 108
Fax: (519) 632-8700
Email: publicworks@northdumfries.ca

Roy Johnson, P. Eng.
Team Lead, Water Resources Engineering
IBI Group Ltd.
70 Valleywood Drive
Markham, Ontario L3R 4T5
Phone: (905) 940-6161 ext. 261
Fax: (905) 940-2064
Email: roy.johnson@ibigroup.com

APPENDIX L

PIC Comments

North Dumfries SWMMP PIC Comments

Provided by member of the public John Palmer,
22 Nith River Way
(519) 590 3065
John@2palmers.org

March 24, 2021

These comments are offered following review of the SWMMP PIC pdf file and also reflection on the afternoon ZOOM meeting of March 16th. Based on Roy Johnson's presentation, I expect that some of the following comments, recommendations or observation are already addressed in actual master plan document.

Anyway, Being a resident of Ayr and also retired GRCA water resources engineer with knowledge of the subject matter in general and some particular knowledge of its application in the Township I'd like to offer what I hope are a few helpful comments.

Table 12.1 SWMF#4 Outlet Location: The Swan Street side ditch does not have continuous fall toward the Nith River. The former ditch is now terminated north of the Hilltop Drive intersection quite close to the pond overflow weir. This was the result of recent regional road upgrades. I don't think a ditch inlet to a storm sewer was included in the upgrade.

Any spill from the SWM facility will be conveyed north along Swan Street to a low point where a union gas line crosses between 1154 and 1166 Swan Street. Overland drainage would then spill toward a gulley behind houses on the east side of the road. From there it would flow to SWMF#6. Given the significant height of Swan Street above this SWM facility, it is possible that it can control runoff from a Regulatory Event with gradual release to the Nith. If not, there would be a spill toward buildings located at 1250 Swan Street before entering the Nith River.

During view of Hilltop Subdivision phases that resulted in construction of SWMF#4, then known as SWM Pond B, I recall seeing a drawing with a proposed regulated floodway for protection of properties along the flow path described above. This seems to have fallen through the cracks and may come back as a future problem if not considered in this master plan.

However, to address constraints in the overland flow path to the Nith, there may have been a decision to provide sufficient detention storage in SWMF#4 to control a regional event. Review of the current hydrologic modelling can ascertain whether or not that is so.

I also recall that SWM plans for the earliest phases of the Hilltop Subdivision modelled all drainage conveyed to SWMF#6.

Table 12.1 SWMF#6 Outlet Location: the SWM facility discharges to private property (1250 Swan Street) before reaching the Nith River, not Mitchell Drain.

Table 12.1 SWMF#7 Outlet Location: This facility appears to discharge to an unnamed creek that flows throw culverts under Fowler Street and Swan Street before ultimately entering Nith River .

Stormwater Management Guidelines
The IDF Update: The IDF table in Slide 36 actually represents intensities (mm/h) rather than depths (mm).

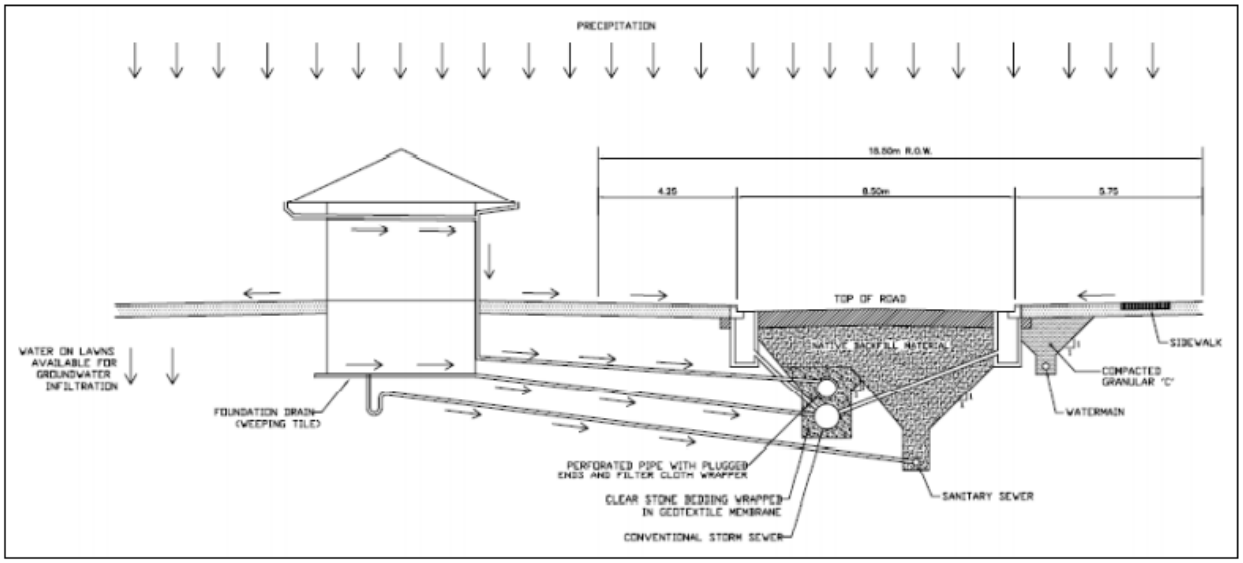
If not already used, you may wish to consider applying the research of UOW Professor Eric Soulis to IDF curve climate change updates.

Stormwater Management Objectives:
Consider perforated pipe storm sewers and third pipes for roof runoff. Both CVC and TRCA have excellent data on runoff reduction and water quality benefits , some of it from studies carried out by J.F. Sabourin and Associates.

As an aside, based on Councillor Rolleman's concerns for home owners filling ditches along Colonial Drive and Lee Robinson's response about future road improvements in the area, I think that it would be a shame to replace this established area's rural section roads with curb and gutter. There are case studies demonstration that a perforated pipe system beneath road side ditches, with inlets that eliminate the need for drive way culverts, can provide adequate drainage to protect road pavement from damage (freeze thaw damage due to a poorly drained road base). They also have water quality benefits for road contaminants other than in the case of salt.

Chapter 4, Section 4.10 (cvc.ca)

Figure 4.10.4 Schematic of a perforated pipe system receiving roof runoff only



Source: Clarifica and Schaeffers, 2005

Future Development Areas

Areas A & B: The PIC describes proposed developments for Areas A and B. However both of these areas have already been serviced, presumable with approved SWM plans. I reviewed the preliminary SWM plan for Area A and based on recent observation of construction activities, it appears that Meritech Engineering did have extensive infiltration galleries installed in low areas beside the rail way spur line. There was no feasibility for discharge to the Nith River oxbow on the west side of Northumberland Street.

Area B also has its street services in place and several homes in an advanced stage of construction. Presumably there was an approved final SWM plan before construction commenced.

Area F: From my recollection of a Stantec topographic survey and existing conditions hydrologic modelling of this development area, land north of the farm driveway (1056 Swan St.) drains under Swan Street, either to the remains of the former ditch or into SWMF#4. While working for Stantec, Scott Robertson, now a senior water resources engineer at GRCA, was the project manager responsible for that modelling.

Scott was also involved in the design of SWMF#5 and a preliminary design to convey controlled discharge of a Regulatory event to the Mitchell Drain.

Although the PIC suggests discharging stormwater northward to the Nith, with the challenge of passing through a wetland, I suspect that the existing lay of the land may result two SWM facilities, one in the east opposite to SWMF#4 and another in the SW corner opposite to SWMF#5.

Northumberland Road: Please consider including the entire property at the SW corner of the Greenfield Rd West and Northumberland Street as a future development area.

As another aside, the Nith River Way neighbourhood has a storm sewer with an outfall to a deteriorating unmaintained detention basin on private property. Based on GRCA WEBGIS mapping, the storm sewer passes between homes at 108 and 110 Nith River Way. The stormwater facility, likely never assumed by the township, is located behind home at 110 to 130 Nith River Way on property belonging to the owners of 180B Nith River Way. It may be wise for planning staff to investigate means of gaining access to this basin for maintenance and a future retrofit.

Smart About Salt

After recent observation of thick layers of road salt in the parking area beside the DriverCheck's building at 53 Northumberland, that have mostly been washed into the Nith during subsequent rainfall, I would like to recommend investigation of incentives or a by-law to have commercial property owners contract snow clearing services that use operators trained and certified though from the Smart About Salt program. For long term protection of Ayrs drinking water supply, this is especially important for properties close to the village's supply wells on Gibson Street.

APPENDIX M

Notice of Commencement Letters

April 14, 2020
Our Ref: 2019-0506

Six Nations of the Grand River
Land Use Unit
2498 Chiefswood Road
PO Box 5000,
Ohsweken, ON N0A 1M0

Attention: Lonny Bomberry
Lands and Resources Director

Re: Township of North Dumfries Stormwater Management [SWM] Plan [SWM-MP]
Ayr Stormwater Management Master Plan, Ayr, ON

The Community of Ayr requires completion of a Stormwater Management [SWM] Master Plan [SWMMP] following a Master Planning approach in accordance with the Environmental Assessment Act as outlined by the Municipal Engineer's Association Municipal Class Environmental Assessment (MEA), October 2000, as amended. First Nations are an essential part of the public consultation process; therefore, this letter is provided to make you aware of the project and the forthcoming public comment phase.

The Study is to focus on the Urban Area of the Community of Ayr (existing and emerging), as illustrated in the Township's Official Plan [AOP]. The Township of North Dumfries also requires an analysis through this Study on the potential urbanization of lands framing the Northumberland Street corridor, extending from Greenfield Road to Highway No. 401. Refer to **Figure 2-1**.

The SWMMP will serve as a decision support tool, a methodology for the prioritization of works, a means to estimate future SWM requirements and costs and a transparent community process by which the Township can establish stormwater management guidelines and policies for the next ten to fifteen years.

The SWM Master Plan shall be an integrated approach that considers flood and erosion control, groundwater and surface water quality management, natural heritage environment management and infrastructure. In addition, the plan shall integrate existing policies, regulations, acts and guidelines and where appropriate develop new policies and design guidelines to aid in implementation and shall do so within a water sustainability context.

COLE ENGINEERING GROUP LTD.
HEAD OFFICE
70 Valleywood Drive, Markham, ON Canada L3R 4T5
T. 905 940 6161 | 416 987 6161 F. 905 940 2064
www.coleengineering.ca

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COLE will be arranging an online Public Information system and the Township will make a public announcement in local newspapers of the date and URL.

Yours sincerely,
COLE ENGINEERING GROUP LTD.

Roy Johnson, P. Eng.
Team Lead- Water Resources

RRJ/kjs

c.: Dawn Laforme (dlaforme@sixnations.ca)
Fawn Sault (Fawn.Sault@mncfn.ca) Consultation Manager,
Department of Consultation and Accommodation, Mississaugas of the Credit First Nation

Encls. Figure 2-1 – Site Map

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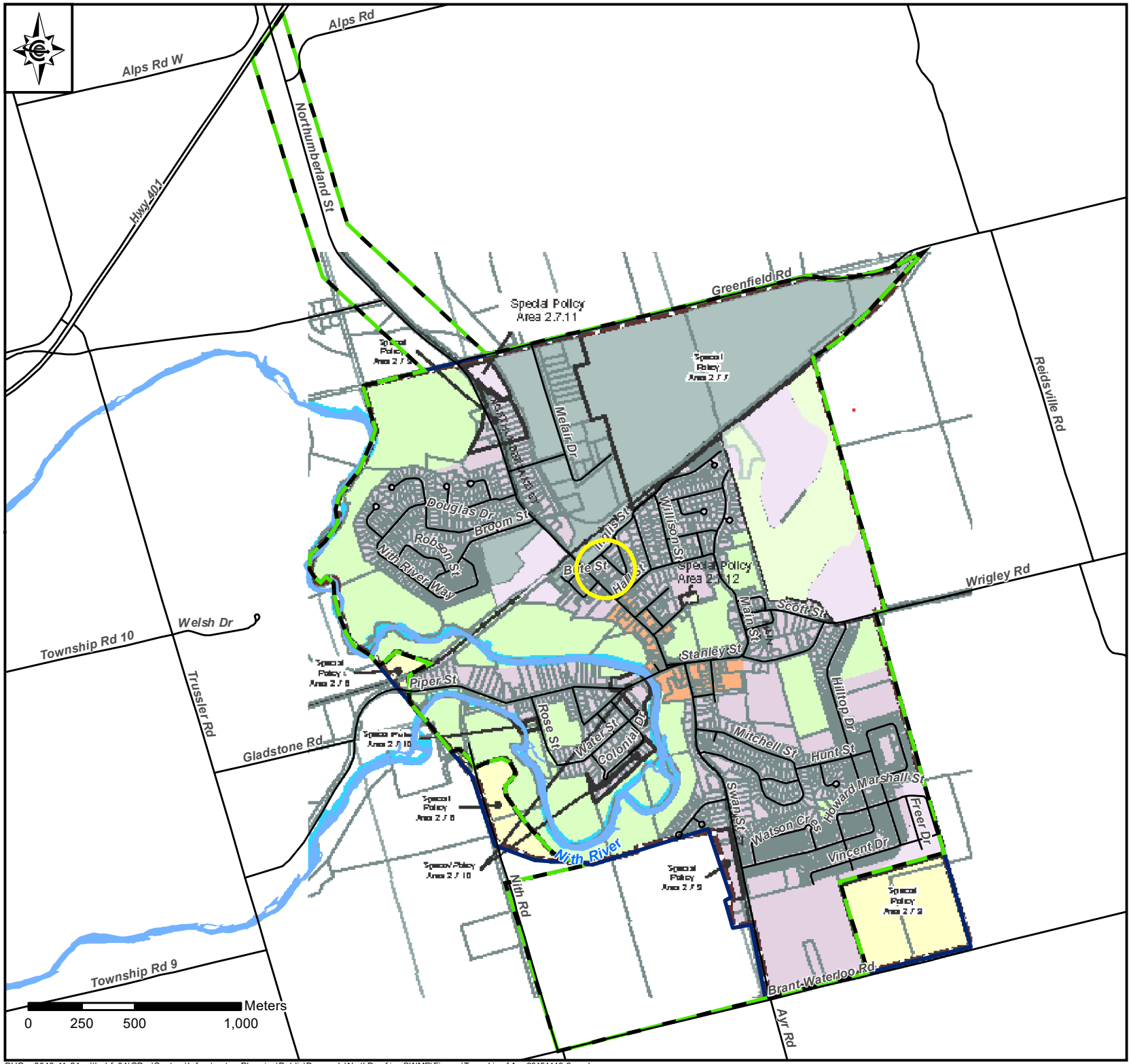

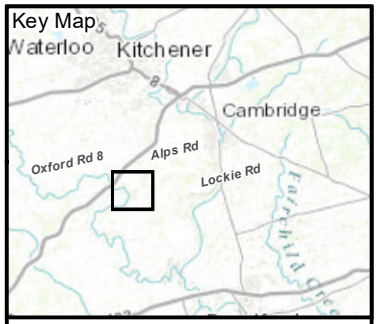

Legend

- Approximate Study Boundary
- Municipal Boundary
- Watercourse

Landuse Type

- Agricultural
- Urban Growth Centre
- General Industrial
- Open Space
- Urban Residential and Ancillary
- Urban Growth Centre

FIGURE 2-1

Ayr Land Use

Township of North Dumfries
Storm Water Management
Master Plan

COLE

Project No.:	Date:
2019-0506	November 2019

DVG 2019-11-21 \\hubfp01\ODrv\Sectors\InfrastructurePlanning\Public\Proposals\NorthDumfries SWMP\Figures\Township of Ayr 20191119v2.mxd

April 15, 2020
Our Ref: 2019-0506
Via-Email

Ministry of Natural Resources and Forestry
Guelph District
Ontario Government Building, 1 Stone Rd W,
Guelph, ON N1G 4Y2

Attention: Tammy Verhaeghe
District Manager

Re: Township of North Dumfries Stormwater Management [SWM] Plan [SWM-MP]
Ayr Stormwater Management Master Plan, Ayr, ON

The Community of Ayr requires completion of a Stormwater Management [SWM] Master Plan [SWMMP] following a Master Planning approach in accordance with the Environmental Assessment Act as outlined by the Municipal Engineer's Association Municipal Class Environmental Assessment (MEA), October 2000, as amended. MNRF is an essential part of the public consultation process; therefore, this letter is provided to make you aware of the project and the forthcoming public comment phase. Attached is a copy of the proposal.

The Study is to focus on the Urban Area of the Community of Ayr (existing and emerging), as illustrated in the Township's Official Plan [AOP]. The Township of North Dumfries also requires an analysis through this Study on the potential urbanization of lands framing the Northumberland Street corridor, extending from Greenfield Road to Highway No. 401. Refer to **Figure 2-1**.

The SWMMP will serve as a decision support tool, a methodology for the prioritization of works, a means to estimate future SWM requirements and costs and a transparent community process by which the Township can establish stormwater management guidelines and policies for the next ten to fifteen years.

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COLE will be arranging an online Public Information system and the Township will make a public announcement in local newspapers of the date and URL.

GRCA provided a response to information request (see attached), noting the following:

- *The MNRF has mapped one unevaluated wetland, east of Swan Street and south of Hilltop Drive. This small wetland is not currently mapped by the GRCA but is considered a regulated*

COLE ENGINEERING GROUP LTD.
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2018 SME CANADA'S TOP SMALL & MEDIUM EMPLOYERS

COLE

wetland. Depending on the outcome of the EA, a site visit during the appropriate time of year may be needed to confirm the presence or absence of this wetland.

- *Two ANSI's are located within or near the study area: Turnbull Lake and McCrone's Lake. Additional detail may be obtained from the MNRF Guelph District Office.*

Can MNRF provide GIS data on these two ANSI's and any other guidance and information the Ministry would find relevant to this study?

Yours sincerely,
COLE ENGINEERING GROUP LTD.

Roy Johnson, P. Eng.
Team Lead- Water Resources

RRJ/kjs

c.: Derek Morningstar, LGL dmorningstar@lgl.com
Barry Myler, Myler Environmental bmyler@cogeco.ca
Andrew McNeely, Chief Administrative Officer, Township of North Dumfries amcneely@northdumfries.ca

Encls. Figure 2-1 – Site Map
Request for Grand River Conservation Authority Input, Ayr SWM Master Plan

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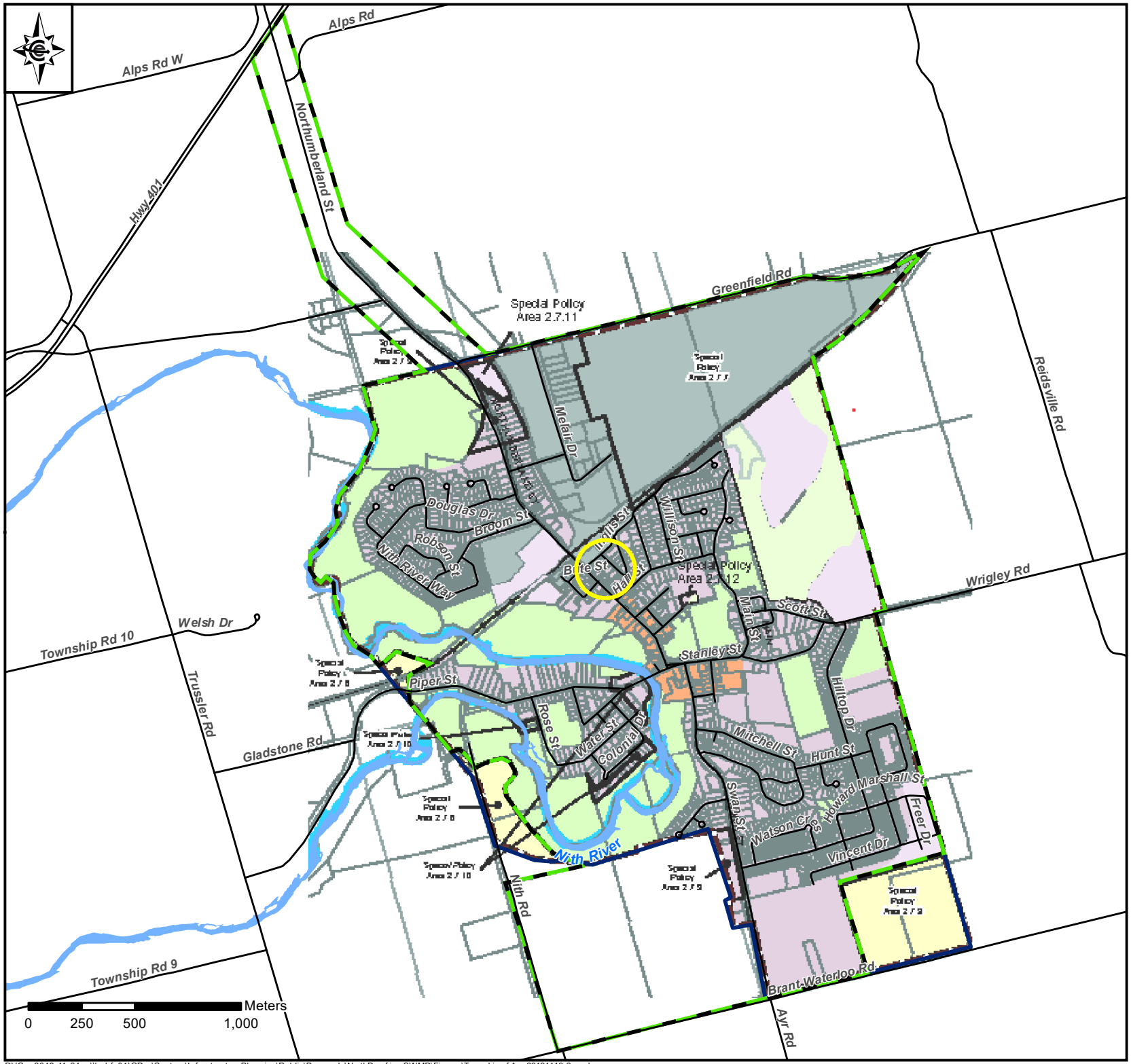

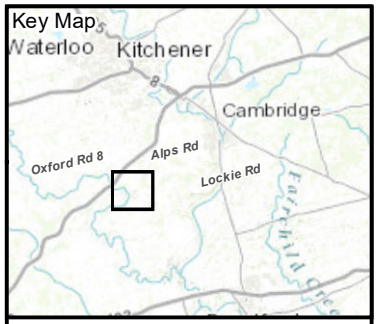

Legend

- Approximate Study Boundary
- Municipal Boundary
- Watercourse

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- Agricultural
- Urban Growth Centre
- General Industrial
- Open Space
- Urban Residential and Ancillary
- Urban Growth Centre

FIGURE 2-1

Ayr Land Use

Township of North Dumfries
Storm Water Management
Master Plan

COLE

Project No.:	Date:
2019-0506	November 2019

DVG 2019-11-21 \\hubfp01\ODrv\Sectors\InfrastructurePlanning\Public\Proposals\NorthDumfries SWMP\Figures\Township of Ayr 20191119v2.mxd

Administration Centre: 400 Clyde Road, P.O. Box 729 Cambridge, ON N1R 5W6

Phone: 519-621-2761 Toll free: 1-866-900-4722 Fax: 519-621-4844 www.grandriver.ca

April 8, 2020

Via Email

Mr. Roy Johnson
Senior Water Resources Engineer-Team Lead
Cole Engineering Group Ltd.
70 Valleywood Drive
Markham, ON L3R 4T5

Dear Mr. Johnson:

Re: **Request for Grand River Conservation Authority Input**
Ayr Stormwater Management Master Plan
Township of North Dumfries

As per your email request of March 25, 2020, the Grand River Conservation Authority (GRCA) has now had an opportunity to review your request to provide background information and input into this study. In support of this request, you have provided the following background information and documentation:

- Request for Proposal (ND-RFP-20-2019), Preparation of a Stormwater Management Master Plan-Community of Ayr and Addenda #1 to 4 (prepared by the Township of North Dumfries); and,
- Response to the Request for Proposal (ND-RFP-20-2019), Preparation of a Stormwater Management Master Plan-Community of Ayr (prepared by Cole Engineering Ltd. and dated January 14, 2020).

General Information and Background

It is our understanding that Cole Engineering was the successful bidder on the Request for Proposal (RFP) to complete a comprehensive Stormwater Management (SWM) Master Plan for the Community of Ayr and were awarded the contract by the Township of North Dumfries. It is our further understanding that aspects of this study will be done under the Class Environmental (EA) process. We further note that the study area includes the entire Village of Ayr plus a corridor along Northumberland Street from Greenfield Road to Highway 401 (refer to the enclosed map).

We note that Cole Engineering is looking for GRCA's input on any specific requirements that should be included in the SWM Master Plan. Further, you have specifically requested the following information:

Member of Conservation Ontario, representing Ontario's 36 Conservation Authorities | The Grand – A Canadian Heritage River

- Input on the rain gauge(s) that the GRCA uses for Ayr and any data associated with them (IDF data, historical records, recommendations on additional gauges, etc.).
- Floodplain mapping along with storm event flows and water levels at Ayr would be useful.
- Contact list for the First Nations so that they can be included as one of the stakeholders.
- Any records or information on the SWM facilities in Ayr.

As you are aware, the GRCA has already provided you with the floodplain models (HecRas) for the Nith River and Cedar Creek and have advised that our GIS mapping is available on our website at https://www.grandriver.ca/en/our-watershed/Maps-and-data.aspx). We have also provided you with a list of First Nations contacts. The GRCA has also advised that we do not have any information on municipally owned infrastructure, such as SWM facilities.

In addition to the floodplains in the Village of Ayr, there are other areas within the study area that are regulated by the GRCA under Ontario Regulation 150/06. The study area is traversed by the Nith River and Cedar Creek and their associated floodplains and areas of steep valley/erosion hazard slopes. Other smaller tributaries of the Nith River are also located within the study area. Further, there are both Provincially Significant Wetlands and other wetlands and their regulated allowances within the study area. Any future development/site alteration within these regulated areas would require the prior issuance of a GRCA permit pursuant to Ontario Regulation 150/06.

The GRCA owns several properties within the study area. The Reinhart, Rear, and Ayr Floodplain properties are 3 of the GRCA's larger landholdings within the study area. Jedburgh and Watson Ponds are part of the GRCA's Upper Mill Pond Property. The GRCA also owns and operates the dam structure on Jedburgh Pond. As such, GRCA property staff may have further comments as the study progresses.

To address your request for rain gauge data and provide input into this study, GRCA staff from Water Resources Engineering, Subwatershed Planning, Natural Heritage Resources, and Water Quality have provided the following comments and information for your review and consideration.

Water Resources Engineering and Subwatershed Planning

- The Township of North Dumfries has asked for a list of approved ETV oil grit separators (ogs). Please make it clear in the report that ETV does not approve ogs', only verifies claims on the ability to remove TSS, and that so far none of the tested ogs' would meet the enhanced criteria, with the exception of filter type units (i.e. jellyfish).

- GRCA will be better able to comment on missing items once a draft report has been circulated for further review and comment.

- The rain gauge in Ayr is problematic and does not have a good enough period of record for IDF data. If you want still want this rain gauge data, please let us know and staff will provide this for you. However, we would suggest that you use an Environment Canada (EC) station for IDF data. For historical data, there is an EC station near Roseville and you should be able to search for the Roseville station using the following link:

  https://climate.weather.gc.ca/historical_data/search_historic_data_e.html

- We can further advise that the climate data set compiled for the Upper Cedar Creek Subwatershed Study (Matrix et al, 2019; as described in section 3.1) is available upon

request. These consist of continuous daily and hourly precipitation and air temperature data from 1950-2016 built using data from Environment Canada's Preston, Waterloo-Wellington, and Roseville climate stations (with gap filling).

- Please note that Cedar Creek, flowing into the Nith River at Ayr, is a cold water stream with brook trout, but the most sensitive reaches of the stream are upstream of the community of Ayr. The consultants have identified the Upper Cedar Creek Subwatershed Study (Matrix et al, 2019) as a resource.

- GRCA-collected aquatic monitoring data for Cedar Creek is available upon request. Data were collected 2015-2018 and include stream levels/flow, stream temperature, surface water chemistry, benthic macroinvertebrates, and fish community. Data 2015-2017 were incorporated into the Upper Cedar Creek Scoped Subwatershed Study (Matrix et al, 2019). There were monitoring sites located up and downstream of the community of Ayr.

- The RFP notes "potential urbanization of lands framing the Northumberland Street corridor, extending from Greenfield Road to Highway No. 401". Some of these lands drain to Eden Creek which has been mapped as cold water. The characterisation phase of the Master Plan should include Eden Creek (the RFP only identifies Nith River and Cedar Creek). A subwatershed study has not been completed for Eden Creek.

- The RFP section on characterisation does not identify Jedburgh or Watson ponds, although they undoubtedly play a role in stormwater management. It is not clear whether they will be considered as "stormwater ponds" for the purposes of the Master Plan. If so, it may be worthwhile engaging one of the Senior Operators in an advisory capacity with respect to operations and maintenance of the Upper Ayr (Jedburgh) Dam. This may warrant clarification with the consultant.

- The RFP lists as an objective "Design and optimize a comprehensive water quality monitoring program based on the existing program". We are not sure what the existing program is. We are not aware of a Township or Regional water quality/stormwater monitoring program. If it's referring to GRCA's program established for the Cedar Creek subwatershed study, they should be advised that water quality sampling was discontinued after 2018 as it was undertaken to support the study and urban area expansions were not anticipated in the near term.

- In addition to the background studies listed in the consultant's email, the following studies are available upon request:

    - Cedar Creek Scoped Subwatershed Study (Phase 1), LGL Environmental, 2002
    - Best Practices Guide for Reducing Urban Non-Point Source Pollution in the Grand River Watershed, AECOM, 2014
    - Grand River Fisheries Management Plan, 2005

<u>Natural Heritage Resources</u>

- In the final paragraph of Section 3.1.2 (Natural Environment) on page 12, Cole has indicated that field investigations to confirm natural heritage feature boundaries are not proposed for this project and has assumed that a desktop review is sufficient. The need for site visits with GRCA staff will depend on the potential for direct impacts on regulated

wetland features and the need to verify wetland boundaries. Recommendations for on-site delineation and verification of wetland boundaries should be made clear in the EA.

- The GRCA's wetland mapping layer should be reviewed in conjunction with the evaluated and unevaluated wetland layer maintained by the Province.

- There is at least one minor wetland mapping discrepancy west of Northumberland Street and south of the RR Tracks. A site visit during the appropriate time of year may be needed to confirm the limits of this wetland. It also appears that a stormwater outlet/outfall has been constructed recently on the north edge of this wetland. It would be helpful to identify any wetlands that have been or could potentially be altered in any way for stormwater management purposes. Wetlands that are now considered to be part of the Township's stormwater management infrastructure should be identified as part of this EA.

- The MNRF has mapped one unevaluated wetland, east of Swan Street and south of Hilltop Drive. This small wetland is not currently mapped by the GRCA but is considered a regulated wetland. Depending on the outcome of the EA, a site visit during the appropriate time of year may be needed to confirm the presence or absence of this wetland.

- With respect to the *Environmental Criteria* described on page 16 of Cole's proposal, we recommend that potential net change on hydrologic water balance and pollutant loadings to natural watercourses **and wetlands** be assessed

Advisory Comments

- Cole Engineering has asked the GRCA to confirm the extent of cold water fish habitat along Cedar Creek. Online mapping information available to the GRCA indicates that the main branch of Cedar Creek and many of its tributaries are currently classified as cold water fish habitat owing to the presence of brook trout and other cold water indicator species such as mottled sculpin. Watson and Jedburgh Ponds are also classified as cold water fish habitat owing to the presence of brown and rainbow trout. Migratory rainbow trout in the Nith River are able to get past the Lower Ayr Dam (privately owned) and into Watson Pond but are not able to get past the GRCA owned and operated Upper Ayr Dam and into Jedburgh Pond. Watson pond is also stocked with brown trout annually by the Ministry of Natural Resources and Forestry (MNRF) for public put-and-take angling. Brook trout are known to spawn above the Upper Mill Pond.

- Fisheries management issues, opportunities and constraints are outlined in the Grand River Fisheries Management Plan Technical Report (GRCA and OMNR 2001), which is available online at:

  https://www.grandriver.ca/en/ourwatershed/resources/Documents/Fishery/Fishery_ManagmentPlan_TechReport.pdf.

  For example, the impact of online ponds and stormwater discharge (i.e. sediment and nutrient loading, thermal impacts) on water quality and cold water fish species in particular is a concern.

- The watercourse associated with the Cedar Creek Tributary and the McCrone's Lake Tributary are classified as warm water fish habitat. Both watercourses appear to be situated outside the current study area.

- Two ANSI's are located within or near the study area: Turnbull Lake and McCrone's Lake. Additional detail may be obtained from the MNRF Guelph District Office.

- For current information on occurrences of Federally- and Provincially-listed Species At Risk, please contact Fisheries and Oceans Canada (DFO) and the Ministry of the Environment, Conservation, and Parks (MECP).

Water Quality

- If the consultant is looking for water quality data, there are two main sources – the MECP and the Region of Waterloo. Water quality data for the Nith River is available from MECP as part of the Provincial Water Quality Monitoring Network (PWQMN) at the website below. The Region of Waterloo also has a comprehensive surface water monitoring network around its wastewater treatment plants and there are some monitoring locations on the Nith River upstream and downstream of the Ayr WWTP, which could be used to inform the background conditions in the receiver. This data would have to be requested from the Region of Waterloo. Further data on water quality monitoring is available through this link:

  https://data.ontario.ca/dataset/provincial-stream-water-quality-monitoring-network

We appreciate the opportunity to provide input into this study. We would further appreciate being involved and participating in the review of this study and EA process going forward. Further, I will be your main contact at the GRCA. If you require any specific items listed above, please let me know and I will make arrangements with the appropriate GRCA staff.

If you have any further questions or require clarification, please do not hesitate to contact me at 519-621-2763 ext. 2233 or jbrum@grandriver.ca.

Yours truly,

John Brum
Resource Planner
Grand River Conservation Authority

JB/

Encl.

cc. Andrew McNeely, Township of North Dumfries (via email)

REQUEST FOR PROPOSAL

Preparation of a Storm Water Management Master Plan - Community of Ayr

The Corporation of the Township of North Dumfries

ND-RFP-20-2019

Closing: 23 December 201915 January 2020 at 2:00:00 PM

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14 January 2020

Ashley Sage, Clerk
Township of North Dumfries
North Dumfries Community Complex
2958 Greenfield Road, P.O. Box 1060
Ayr, Ontario N0B 1E0

Re: Preparation of a Stormwater Management Master Plan - Community of Ayr
ND-RFP-20-2019
DUE Wednesday, January 15, 2020 @ 2:00:00 PM

Dear Ms. Sage;

COLE is pleased to submit 1 original and 2 unbound copies in response to the Request for Proposal for the Preparation of a Stormwater Management Master Plan in the Community of Ayr, Ontario.

In accordance with the Request for Proposal requirements, we have included the following mandatory and non-mandatory requirements in Appendix A:

- Submission Form – Appendix A
- Proof of Ability – Appendix B
- Contractor Health and Safety Form – Appendix B
- AODA Contractor Compliance Forms – Appendix B
- Acknowledgement of receipt of Addenda 1 through 4
- List of Subcontractors – Appendix B
- Schedule of Items & Pricing Response Form – Appendix D

As always, we strive to provide cost-effective engineering services which exceed the high standards our clients have to come to expect. We trust that the information enclosed within this submission meets your approval. We look forward to working with you to achieve your vision.

Yours sincerely,

COLE ENGINEERING GROUP LTD.

Robert McCollum
Chief Operating Officer

Roy Johnson, P.Eng.
Project Manager

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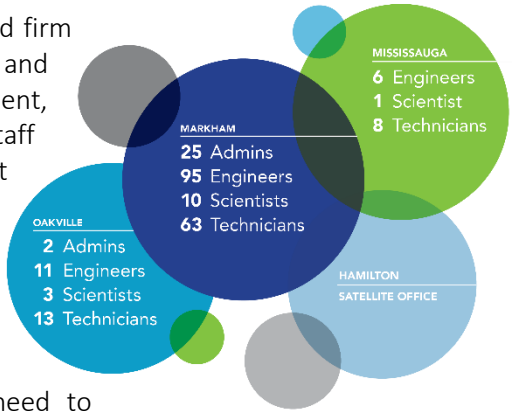
1 Company Profile

Founded in 2003, Cole Engineering Group (COLE) is an employee-owned firm that provides consulting and advisory services in planning, engineering, and public–private partnerships in the water, transportation, urban development, and environmental sectors. With offices across southern Ontario and a staff complement of more than 200, COLE is now one of the largest independent consulting engineering firms in the province.



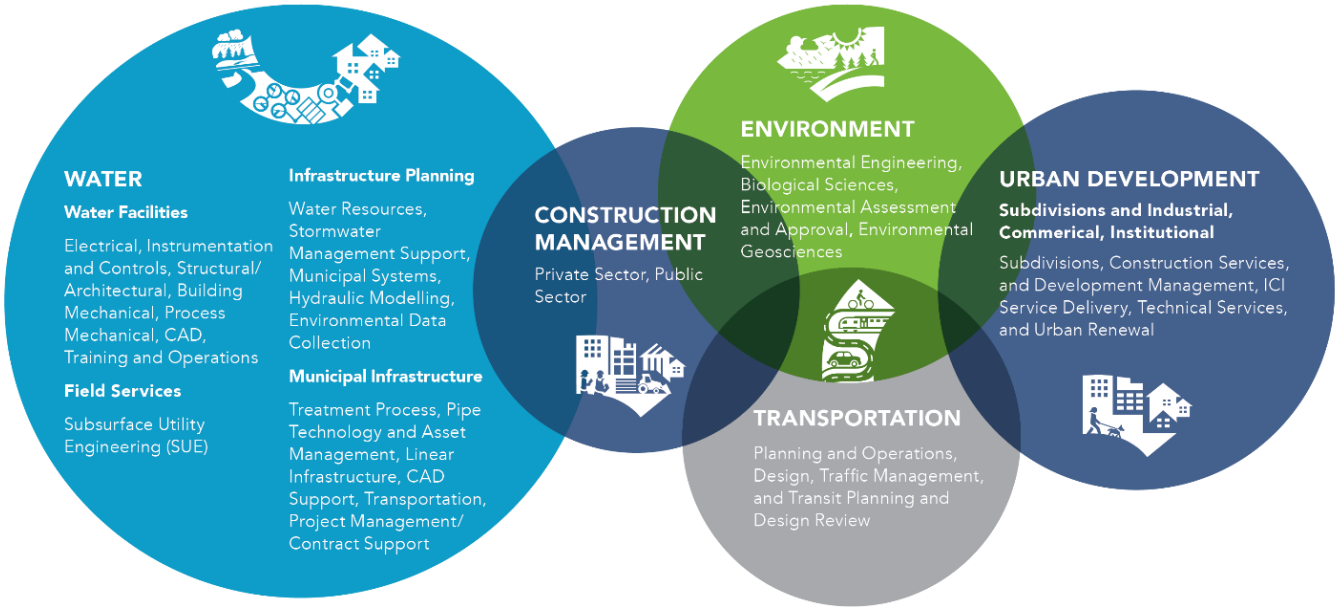
COLE has one of the largest multidisciplinary Ontario-based resource pools in the market, allowing us to provide comprehensive in-house services and expertise for our clients. We also have an end-to-end project management approach which allows us to manage our workload to better prioritize our commitments to our clients, without the need to outsource to third-party companies.

Our Corporate Brochure and copies of Insurance and WSIB certificates are included in Appendix B. Also included in Appendix B are COLE's membership in professional associations and a list of our corporate directors.

Our clients choose COLE to deliver engineering services for our integrated environment, professional approach and dedication to excellence. Our work has involves working with and for other cities and towns throughout Southern Ontario as well as Federal and Provincial Government bodies. Our major public sector clients include:

- Regions of: York, Durham, Halton, Peel, Niagara, Waterloo;
- Cities of: Hamilton, Toronto, Vaughan, Markham, Mississauga, Burlington, Brampton, Guelph, Peterborough;
- Towns of: Richmond Hill, Oakville, Newmarket, Aurora, Caledon;
- Ministries of: Transportation, Natural Resources and Forestry, Environment Conservation and Parks; and
- Authorities of: Toronto and Region Conservation, Lake Simcoe and Region Conservation, Central Lake Ontario Conservation, Credit Valley Conservation.

Our comprehensive multidisciplinary service offerings include the following:



COLE's philosophy is framed by its Mission, Vision, and Values:

COLE Mission

To take pride in providing innovative, sustainable, and value-added solutions to our clients.

COLE Vision

To be the preferred consulting firm and employer of choice.

COLE Values

To ASPIRE to offer our clients and communities the very best in who we are, and what we do, by embracing the values of Accountability, Synergy, Passion, Integrity, Respect, and Excellence.

Our Water Resources group provides a variety of services which position COLE well to undertake this assignment, including:

- Agency approval and permit expediting
- Detailed design of SWM infrastructure
- Drainage Area Studies
- Low impact development modeling and design
- Sewer capacity analysis
- Stormwater Master Planning

1.1 Subconsultants

- Myler Ecological Consulting: Mr. Barry Myler is a fisheries specialist who will be primarily responsible for reviewing existing aquatic habitat conditions across the study area and commenting on how these conditions affect stormwater management planning.
- LGL Limited: LGL will review the existing terrestrial environment and ecology. LGL's effort will be led by Allison Featherstone. This review will help to identify existing natural areas and natural features that will affect siting opportunities for stormwater facilities, and which could affect requirements for maintaining local hydrologic water budgets.

2 Project Understanding

The Community of Ayr requires completion of a Stormwater Management [SWM] Master Plan [SWMMP] following a Master Planning approach in accordance with the Environmental Assessment Act as outlined by the Municipal Engineer's Association Municipal Class Environmental Assessment (MEA), October 2000, as amended.

The Study is to focus on the Urban Area of the Community of Ayr (existing and emerging), as illustrated in the Township's Official Plan [AOP]. The Township also requires an analysis through this Study on the potential urbanization of lands framing the Northumberland Street corridor, extending from Greenfield Road to Highway No. 401. Refer to Figure 2-1.

The SWMMP will serve as a decision support tool, a methodology for the prioritization of works, a means to estimate future SWM requirements and costs and a transparent community process by which the Township can establish stormwater management guidelines and policies for the next ten to fifteen years.

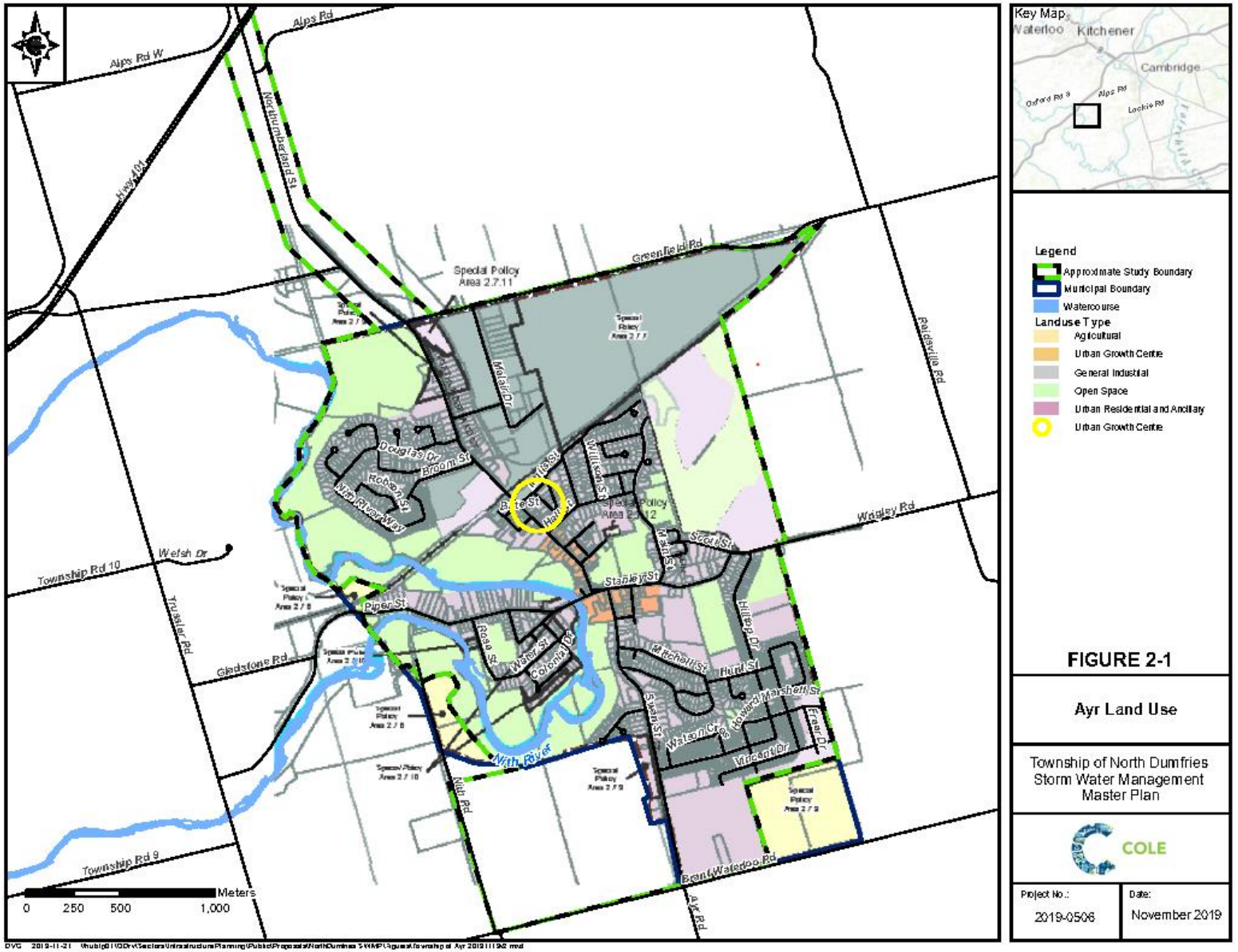


Figure 2-1 Ayr Land Use

The SWM Master Plan shall be an integrated approach that considers flood and erosion control, groundwater and surface water quality management, natural heritage environment management and infrastructure. In addition, the plan shall integrate existing policies, regulations, acts and guidelines and where appropriate develop new policies and design guidelines to aid in implementation and shall do so within a water sustainability context. In addition, the SWMMP should provide a framework for the provision of a stormwater utility tax.

COLE will work closely with the Township to ensure that the goals of the SWMMP can be accomplished in an effective and efficient manner. Based on Addendum #4, there may be challenges working within the budget set out to Council, and COLE will work with the Township to deal with these issues.

2.1 References

In preparing this proposal, we have referenced the following documents:

- *Grand River Watershed Water Management Plan*. 2014. Prepared by the Project Team, Water Management Plan. Grand River Conservation Authority [GRCA], Cambridge, ON [GRWWMP];
- *Nith River Flows*, Grand River Conservation Authority Website;
- *Preparing for Flooding, A Guide for Residents of Ayr*, prepared by GRCA [Ayr Flooding];
- *Township of North Dumfries Official Plan*, Consolidation Date: November 2018 [AOP];
- *Upper Cedar Creek Scoped Subwatershed Study*, prepared by Matrix Solutions Inc. et al, dated October 2019 [UCCSSS];
- *Waterloo Regional Official Plan*, Chapter 8 Consolidated New ROP, 2015 [WROP]; and,
- *Addenda #1-4* provided by the Township.

2.2 Background

The Community of Ayr has a population of approximately 5,000 persons and is anticipated to increase to a population of 10,000 to 11,000 persons by 2031. Increases in population require residential and employment lands, which increase the impervious cover of existing lands, and the stormwater which runs off during events requires mitigation. The SWMMP will provide specific recommendations for SWM measures to mitigate urban growth in the Study Area.

The Ayr Urban Area is designated on Maps 2 and 2.1 of the AOP. This designation is intended to serve as the primary focus for growth and development in the Township to the year 2031. Development within this designation will provide for a range of residential, commercial, employment, recreational and institutional uses. Future development within the Ayr Urban Area will be directed predominantly to the Urban Growth Centre and Designated Greenfield Area.

A goal of the AOP is to concentrate most of the growth in the Township within the Ayr Urban Area, with limited growth in designated Rural Settlement Areas and Rural Employment Area where municipal services can be provided in a cost effective and environmentally responsible manner.

The Township will encourage the provision of new dwelling units in built-up areas in the Ayr Urban Area and existing Rural Settlement Areas, through infill, conversion, intensification or redevelopment compatible with surrounding uses, except where infrastructure is inadequate or there are significant physical constraints.

The SWMMP will provide guidance for future development in these areas, including an overview of opportunities and constraints for SWM measures.

2.3 Surface Water

Ayr lies at the confluence of the Nith River and Cedar Creek, which generally flow north to south. There is a stream flow monitoring station in Ayr upstream of the confluence. Approximately 74.51ha drains to the Cedar Creek at Ayr Gauge. Regional flows at that gauge are 90.35m^3/s, per UCCSSS.

Nith River: The Nith River drains the western part of the Grand River watershed in Waterloo Region as well as Brant and Oxford counties. In the northern part of the river, water runs off the land quickly so flows can rise and fall quickly. Demand for water is high in the southern part of the river where farm irrigation is common. Typical summer flow in the Nith River at Ayr is 2.6m^3/s, with low lying areas flooded at 110m^3/s. Per Ayr Flooding, the Regional event flow is approximately 600-800m^3/s.

Cedar Creek: The UCCSSS is intended to guide and coordinate decision making by the Region, area municipalities, the GRCA and others involved in development planning, subwatershed stewardship and restoration. Cedar Creek supports a coldwater brook trout fishery and drains primarily agricultural lands, remnant natural woodlands, and low-lying wetlands south and west of the Cities of Kitchener and Cambridge, respectively. The northern part of the subwatershed is bisected by the Highway 401 corridor. The main Urban Area is the community of Ayr, in the Township of North Dumfries, located at the confluence of Cedar Creek and a meandering section of the Nith River.

2.4 Upper Cedar Creek Scoped Subwatershed Study (UCCSSS)

2.4.1 Hydrology Modeling

The study completed a continuous simulation using a calibrated GAWSER hydrologic model which applied the precipitation and temperature data from the Roseville Gauge.

The report makes various recommendations for SWM mitigation, including:

- Any potential development should be required, at a minimum, to maintain existing groundwater recharge rates.
- Potential urban developments shall only discharge stormwater offsite at an approximately similar frequency, rate, and volume as is occurring under baseline conditions. Stormwater that is not discharged offsite should be infiltrated.
- Potential urban developments shall only discharge stormwater offsite at an approximately similar frequency, rate, and volume as is occurring under baseline conditions.
- Infiltration of potentially contaminated water shall only be performed in areas where there is a lessor chance of the contaminated water reaching the municipal supply aquifer. Runoff from areas that are more likely to be contaminated (e.g., roads, sidewalks, parking spaces) should be directed toward end-of-pipe recharge facilities that are sited outside those lands that contribute recharge to AFD1. Water entering these facilities should undergo appropriate quality treatment prior to infiltration. This quality treatment may include capturing spring freshet flows to capture salt-laden water for subsequent pumping to the sanitary system or evaporate during the following summer months.

2.4.2 Existing Concerns

Per the GRWWMP and Ayr Flooding, Ayr is located within an Existing Flood Damage Centre (a community that has several structures located within the floodplain). Ayr experiences frequent nuisance flooding.

An initial review of flooding in Ayr suggests that there are few practical options to reduce flooding to the most frequently flooded properties along Tanner Street. Next steps will focus on flood preparedness,

implementing flood inundation mapping and increasing awareness of those residents located in the floodplain. Damages to property and a risk to life can occur during significant flood events. Therefore, the GRWWMP Team recommends that additional ways to reduce the flood damage potential in the community of Ayr be investigated.

2.5 Source Water Protection

Based on Map 4 Source Water Protection Areas, AOP, there are three Municipal Wellheads in Ayr. Ayr is not located in a Regional Recharge Area. The downtown core, including the Urban Growth Centre is within WPSA-4, with the remainder of the northeast portions of Ayr located in WPSA-5. Refer to Figure 2-2.

Per the WROP, those areas are defined as:

- WSPA-4: delineates medium sensitivity areas found within the two year time of travel to a municipal drinking-water supply well; and
- WSPA-5: delineates medium sensitivity areas found outside of the two year, but within the ten year time of travel to a municipal drinking-water supply well.

Development applications within all Source Water Protection Area designations will comply with the following:

(a) Employment uses that would direct infiltration of stormwater run-off without pre-treatment through the use of drywells or artificial/enhanced recharge will not be permitted; and

(b) Employment uses that would require new water taking for industrial/commercial purposes and/or for irrigation purposes, except for water taking associated with mineral aggregate operations will not be permitted.

Development applications within the WPSA 4 designation will comply with the following: underground parking garages, individual wastewater treatment systems, private wells, pipelines, sewers, stormwater management ponds (or other ponds) and plans of subdivision or vacant land condominiums may be permitted subject to further study in accordance with Policy 8.A.4.

Development applications within the WPSA 5 designation will comply with the following: Category 'D' uses and plans of subdivision or vacant land condominiums may be permitted subject to further study in accordance with Policy 8.A.4.

Based on the foregoing, stormwater infiltration may not be allowed in some areas. SWM most comply with Policy 8.A.4. The studies requested will vary based on the location of the development application relative to the sensitivity of the Source Water Protection Area and its proximity to a municipal drinking-water supply well or surface water intake. Studies submitted by the owner/applicant will demonstrate that the proposed use will not negatively impact the quantity and/or quality of drinking-water resources in Source Water Protection Areas for the development application to receive approval.

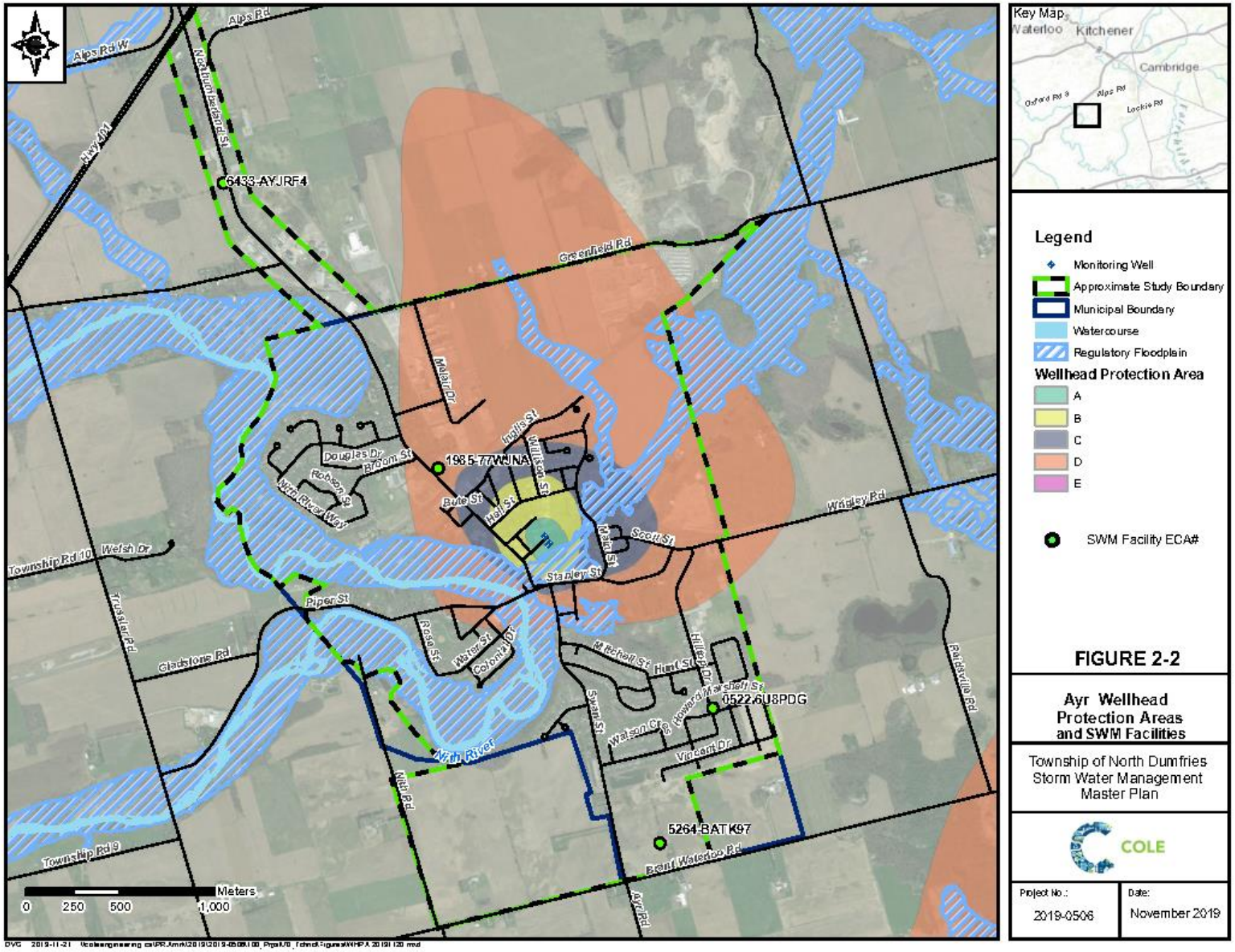


Figure 2-2 Ayr Wellhead Protection Areas and SWM Facilities

3 Approach / Methodology

COLE, after review of the RFP, has developed a detailed methodology to complete the proposed assignment. Our proposed time task matrix, indicating the time that each proposed team member will spend on the project, is located in Appendix E. The following section discusses the approach proposed by the Project Team. In order to keep our submission brief, we have focused on the key aspects of the project and we confirm that we will comply with all requirements as outlined in the RFP document.

In all respects, COLE's skills and experience will meet the needs of this project. Our team's general approach to managing this project will be based upon the following cornerstones:

- Proactive Communication between the Township and Cole Engineering Project Manager: Given the demanding timelines and the complexity of the work, timely and effective communication between the COLE Project Manager and the Township's Project Manager is mandatory. Our approach to managing this challenge is to schedule in advance regular (bi-monthly (once every two months)) progress meetings with the Project Manager. These meetings will provide a status report on the work, deliverables, and potential issues and how they are being managed. These are recommended to be conference calls.
- Ongoing Internal Co-ordination: The Project Manager and senior Cole Engineering staff will oversee the timely delivery of all aspects of the project.
- Pre-Set Milestone Delivery Dates: Co-ordination of client meetings, presentations and agency meetings often become the critical path for delivery of engineering design and environmental study products. A cornerstone of our schedule management will be to lock in dates for these meetings at the project outset. Combined consultant/client commitment to these dates will focus energies on delivering high quality design/environmental products to meet the pre-determined deadlines.
- Proactive Issue Identification and Management: We will anticipate, seek out, listen and manage client, agency and stakeholder's concerns as an integral part of our work. The depth and breadth of skill and experience of the senior members of our team, will allow us to effectively work together in this way.
- Effective Use of Senior Consultant Resources and Use of a Project Advisor: In order to ensure that the project will remain on track and will be completed efficiently, members of the Project Team will have clearly defined roles and will delegate with accountability of responsibilities. There will be a high level of back-up bench strength to protect the project interests in the event of unforeseen availability of a key team member or an unanticipated issue requiring urgent attention.

The Project Advisor, Harold Chard, M.Sc., P.Eng., will act in support of the Project Manager, Roy Johnson. Should the Project Manager be unavailable for any critical events, Harold can act as a substitute on a temporary basis.

QA/ QC Project Specific Plan

COLE will develop and implement a project specific QA/QC Plan to address all aspects of the project. All engineering deliverables will be sealed by a Professional Engineer. The QA/QC plan will address the following points:

- Control of non-conforming work
- Control of technical work
- Corrective actions
- Document control
- Document quality system
- Management responsibility and commitment
- Quality audits
- Quality milestone reviews
- Quality records
- Quality technical reviews

Will Heywood, P.Eng., will be responsible for enforcement of the QA/QC plan. At a minimum, he will review all major deliverables, and submit a signed checklist to the Township advising of the results of his review.

Schedule Control

Our proposed Project Schedule is enclosed in Appendix C. COLE's Project Manager, Roy Johnson, with the support of the Project Team, will enforce internal deadlines and notify the Township of any delays in obtaining requested information. Delays caused by the Township and/or other outside parties will be immediately brought to the attention of the Township and reflected on the project schedule. In consultation with the Township's Project Manager, contingency plans will be developed and, where possible, additional qualified staff will be utilized to overcome any delays. Other options to address delays will also be considered including recognizing the problem at an early stage and undertaking some components of the project simultaneously.

Meeting Class EA Requirements

COLE's approach to completing a Class EA, is one of open involvement of all affected stakeholders early in the process. It is therefore proposed to inform the public through multiple points of contact, exceeding the requirements under the Class EA process.

Stakeholder List

A first step in the project will be to prepare a comprehensive list of stakeholders to consult to fulfill the Class EA Master Plan process. This list will be based on parties identified by the Township as being interested in this or similar projects, as well as approval agencies and First Nations. During the full course of the project, the project stakeholder list will be maintained, and interested parties will be added for future mailings. We have assumed that the cost of publishing all notices in local newspapers and the cost of facilities for public meetings will be paid directly by the Township.

Notice of Commencement

A Notice of Commencement to be published on the Township's website and in local newspapers. The notice will also be directly mailed to the stakeholders list. A draft notice will be developed immediately after contract award and will be provided to the Township for review at the project kick-off meeting. The notice will contain the problem/opportunity statement for the project and invite the public to comment and/or join the project mailing list.

Notices of Public Information Centres

The RFP requires that three Public Information Centres (PICs) be held through the course of this project. Notices of PICs will be published approximately four (4) weeks in advance of the PIC. The notice will also be directly mailed to individuals and organizations on the stakeholder list. COLE will prepare draft notices for review by Township staff.

Public Information Centre

Given the scope of the work (equivalent to a Schedule B Class EA) and the scheduling noted in Addendum #3, COLE recommends that only two PICs be held to provide the public with an opportunity to review the problem/opportunity statement, potential alternative solutions, our proposed evaluation criteria and, finally, our recommended preferred solution. It is anticipated that each of the PICs will be an "open house" come-and-go format, with a presentation at a scheduled time.

Opinions and information gathered from this PIC will serve to guide the Master Planning process into the final stages of alternative consolidation and prioritization.

Notice of Completion

A Notice of Completion will be developed to provide the public with a final opportunity to comment on the project. The Notice will indicate the conclusions of the Master Planning/EA process, and will indicate where copies of the Master Plan can be reviewed. The Master Plan must be completed to document the Class EA process and must be filed for a 30-calendar day public review.

3.1 Task 1: Study Area Characterization

The project initiation will include a start-up meeting with the Township's staff. At this meeting the proposed work plan and project schedule will be confirmed.

3.1.1 Information Gathering and Review

Prior to the meeting, a list of information and existing data required by the Project Team will be developed and provided to the Township so that the required exchange can occur at the start-up meeting.

It is assumed that the Township will provide, according to the RFP documents:

- GIS Mapping layers, including watercourses, property boundaries, existing and/or future Official Plan land use; natural features mapping; natural hazard areas or zones including regulatory floodplain zones; and any other relevant GIS layers that the Township can supply.;
- LIDAR and/or existing digital elevation models for the Study Area;
- Stormwater Management Reports for any developed areas with the Study Areas;
- List of stakeholders
- Available record drawings, base plans, reports, digital ortho photography, and other relevant existing information.
- Existing SWM pond assessments with their respective design reports, as available.

We will review the information supplied by the Township and identify any significant gaps in the available information that could affect this project. We will then discuss with Township staff the most practical way to address these gaps. Examples of potential data gaps are:

- Existing storm sewer information;
- Drainage area information outside of settlement areas;
- Drainage areas to oil grit separators;
- Drainage areas to uncontrolled outlets; and,
- Existing SWM Pond IDs and reports.

As noted in Addendum #3, the Township does not have GIS information on existing storm sewers. As a result, no analysis of the system can be completed without a survey or other information on how the existing system was designed or built. This is critical to meeting the timelines outlined herein.

In preparing this proposal, the Ministry of the Environment, Conservation and Parks [MECP] Access Environment website was used to search for Environmental Compliance Approval (ECAs) in the Study Area. We located two Oil-Grit Separator (OGS) ECAs, and three SWM Facility ECAs. The MECP should also be consulted for possible additional ECAs. We understand from Addendum #3 that there are four SWMFs. Refer to Figure 2-1.

The SWMMP shall include an evaluation of the cumulative environmental impact of stormwater from existing and planned development. Existing and proposed land use within the Township can be classified

into several categories, including: parks, open space, recreational mixed areas, residential, institutional, commercial, and employment. Those areas will be assessed via hydrologic modeling for changes in runoff quantity and quality for existing and proposed conditions. We will review that available land-use mapping to determine whether it is adequate to support the required hydrologic analyses. If necessary, the mapping of existing land use will be refined based on review of available aerial photography.

The most significant water quality issue in the Grand River Watershed is the eutrophication of the river from both anthropogenic and natural sources. Eutrophication results from excessive loadings of nutrients, specifically nitrogen, phosphorus and/or carbon to freshwaters, resulting in increased growth of aquatic plants and algae. It is our understanding that in the case of the Grand River, the nutrient of most concern in phosphorus.

We will review the available information and develop estimates of existing phosphorus loadings to the Nith River attributable to existing stormwater discharges, and the potential change in loadings that might result from the foreseeable land development. This will help put future development in context and help to define what mitigation measures may be required as part of the overall SWM strategy.

3.1.2 Natural Environment

Desktop assessments of the natural environment will be completed by terrestrial and aquatic biologists. COLE's team includes the following sub-consultants who will be responsible for these reviews:

- Myler Ecological Consulting: Mr. Barry Myler is a fisheries specialist who will be primarily responsible for reviewing existing aquatic habitat conditions across the study area and commenting on how these conditions affect stormwater management planning.
- LGL Limited: LGL will review the existing terrestrial environment and ecology. LGL's effort will be led by Allison Featherstone. This review will help to identify existing natural areas and natural features that will affect siting opportunities for stormwater facilities and which could affect requirements for maintaining local hydrologic water budgets.

The main natural heritage features in the study area are the Nith River, Cedar Creek and several wetlands such as the Turnbull Lake Charlie Creek Wetland Complex, the Roseville Swamp and Cedar Creek Wetland Complex, and the Greenfield Swamp, all of which are provincially significant. Little Turnbull Lake Wetland is provincially significant and is also an Area of Natural and Scientific Interest (ANSI). In addition to designated features, several Species at Risk (SAR) in the study area. These include, but are not limited to:

- Blanding's Turtle;
- Bobolink;
- Eastern Meadowlark; and
- Eastern Ribbonsnake.

Through the Master Planning process the potential for impacts to terrestrial natural heritage components within the project area will be identified as part of the evaluation of the existing conditions as well as the evaluation of alternative solutions for the management of stormwater. The focus will be on screening to document site conditions and recommending any mitigation measures that may be required for the preferred SWM strategies. We will also identify any other studies that may be required at future phases of the Master Plan.

Our approach to the evaluation of natural heritage features will be to review, from a desktop basis, all natural heritage features that can be taken into consideration in early planning stages. The desktop review will focus on collection of available information from Grand River Conservation Authority (GRCA), Department of Fisheries and Oceans (DFO), and Ministry of Natural Resources and Forestry (MNRF) through

access to online resources and formal GIS data requests to agencies. Background data collection will include a review of available data such as designated natural features, vegetation communities, vascular plant lists, records for rare plants, atlases etc. A high level Ecological Land Classification (ELC) of vegetation communities will be completed using ortho-imagery. The ELC will then be used as part of the wildlife habitat characterization. Available background information will be used to characterize the wildlife habitat and communities in the project area and compile a summary species list for the study area.

In order to address the most current species at risk (SAR) requirements, LGL proposes to complete a SAR Screening, whereby consultation with the MECP will be undertaken to confirm a current SAR list for the project area and identify any known concerns regarding SAR. Species identified as endangered or threatened under the Species at Risk in Ontario (SARO) list are afforded protection under the Endangered Species Act, 2007 (ESA). The purpose of efforts with regard to SAR during the Master Plan preparation will be to first identify potential concerns early in the process to avoid impacts to these species through site selection and/or mitigation to the extent possible. Where SAR and their habitat cannot be avoided, LGL will identify potential impacts associated with the proposed strategies to ensure consideration for mitigation and recommendations for permits/approvals (if necessary) specific to SAR are carried through to future phases of the project.

Field investigations to confirm the limits and extents of natural heritage features documented through the background review, are not proposed for this project. It is assumed that a desktop screening is sufficient.

3.2 Task 2: Analysis and Assessment of SWM System

The information gathering and review completed under Task 1 will feed directly into Task 2. The RFP has set out clear requirements for Task 2, and the following describes COLE's approach.

3.2.1 Storm Sewer

To assess the existing capacity of the municipal storm drainage system, COLE will develop a hydrologic model using PCSWMM or Rational Method, as determined through consultation with the Township. That is, it will include the municipal storm sewer pipe network and its inlet, and will also include the overland flow pathways as conduits within the model.

- The storm pipe network and inlet types and locations will be based on available geodatabase information supplied by the Township, supplemented by some review of available record drawings to fill in missing pipe information as needed to complete a working model.
- Overland flow pathways and conduits will be developed based on review and processing of the available LiDAR dataset to be supplied by the Township.
- Inlet capture capacities will be based on available information sources such as MTO's Drainage Manual; supplemented by field reconnaissance by COLE staff to confirm the catchbasin grate types currently in place.
- Surface runoff catchment areas draining onto roadways or into specific inlets will be delineated within the available mapping and Li9DAR information, with catchment imperviousness based on available land-use mapping supplemented by sampling of selected representative areas using the available aerial photography.

Once the model has been built, it will be tested to ensure that internal connectivities are appropriate, and that the model is providing what can be considered reasonable results when rain events such as the 2-year, 5-year, 25-year and 100-year events are applied to the model.

3.2.2 Climate Change

Climate change refers to the long-term trend in the change of the world's weather patterns, including changes in average temperature and rainfall distribution. Stormwater runoff is intrinsically a function of rainfall, therefore change in the intensity, duration, and frequency of rainfall events has an impact on runoff, and the response of stormwater systems. Aquatic habitat health is also linked to temperature. The impacts of unmitigated climate change on storm infrastructure will be assessed.

For this Study, we could investigate using Station G6140954 (in the Grand River Region) as a basis for comparison, then modifying the existing Township IDF curves by applying the percent change in rainfall intensities used in Sta G6140954. We could then develop updated IDF curves for the 5-year and 100-year return periods for future conditions. Then, the effects of climate change on conveyance systems could be assessed by comparing future rainfall intensities to existing, specifically, comparing the 5-year intensities with an inlet time of 10 minutes, as these are representative of minor system conveyance structure requirements.

The potential effects of climate change on rainfall intensity-duration-frequency (IDF) statistics across southern Ontario have been explored by various researchers. The MECP has created the Ontario Climate Change Data Portal (http://ontarioccdp.ca/) that provides project changes in air temperature statistics and rainfall IDF curves for a set of 25km x 25km map grid squares that cover the Province. This provides a valuable resource of information that can be used to assess the potential impacts of increased frequency or intensity of heavy rainfall within and around Ayr. COLE's proposed approach will be to extract future IDF curves from the OCCDP and apply them within the PCSWMM model. A particular issue is what change might be expected in the magnitude of the 100-year rain event, and resulting impact on local flooding issues and stormwater system capacity.

3.2.3 Erosion Assessment

The RFP set out clear requirements about identifying existing erosion sites (by creek reach). This will feed into evaluating level of risk to public health and safety and environment, and alternatives for restoration.

COLE staff will complete a site walk of the relevant Reaches within the Study Area to identify potential areas of erosion concern and prepare a photo log to illustrate and describe any erosion sites. COLE will identify erosion sites based on the site visit and summarize them in a table.

Any sites that may affect public safety will be identified, and the Township so advised; and in such cases we would recommend further evaluations be undertaken for the Township by geotechnical specialists to better define the level of risk and advise the Township accordingly.

Priority areas of concern will be identified, including debris jams within the channel that could cause channel flows to back up into nearby residential/commercial properties, causing flooding concerns; perched culverts that have the have potential to cause problems with structural integrity of the road material, etc. Given the size of the Nith River and Cedar Creek, outfall erosion may be of greater concern than the watercourses themselves, given the large upstream areas contributing flow.

Recommendations will be developed for future development purposes to ensure that the erosion control component of ponds will be sufficient. These may include completing a detailed fluvial assessment in problem reaches, including cross-sectional surveys, establishment of erosion thresholds, and identification of critical reaches/flows; developing an erosion model to determine if retrofits to existing facilities would be effective at mitigating existing erosion issues; using the erosion model developed above to evaluate impacts of development and whether extended detention levels provided by the ponds would be enough to mitigate the erosive effect, or if additional LIDs would be required.

3.2.4 Stormwater Management Facility Assessment

A main component of the Project includes an assessment of the Township's current stormwater infrastructure. This assessment will require a visual inspection of stormwater ponds, including all 4 SWM ponds. The objective of this stage is to produce all necessary field data to be used in subsequent stages of the project.

Using data gathered from the background review and field investigations, the needs of each stormwater management facility will be assessed. Obvious maintenance requirements such as deteriorated structures, eroded slopes or outlets and adverse sediment accumulation will be determined and reported in this step.

Rain Gauge Network

A rain gauge monitoring plan will be developed to provide the Township with a well distributed, and easily maintainable gauge network. Appropriate locations for monitoring will be identified allowing for sufficient data coverage and will be selected based on the suitability of potential sites for monitoring equipment installation and maintenance. Careful location planning and equipment selection will allow for an efficient, cost-effective maintenance plan and will maximize the likelihood of successful data collection.

COLE has extensive experience in this field having developed, installed, and maintained many permanent and temporary rain gauge networks ranging from 1 to 20 telemetered and logged gauge locations within an individual municipality. Gauge locations have been planned and operated throughout Toronto, Mississauga, Brampton, Hamilton, Guelph, Peterborough, Barrie, Wellington North, Cannington, Sunderland, and more.

Field Assessments

All field work will be completed by Cole Engineering staff. We own all necessary equipment and have fully trained staff that will complete all field work. Our field staff has inspected over 200 facilities in the past few years and are very familiar with data collection and facility component assessment.

Two people will visit each of the ponds to perform a visual inspection of the general condition of the pond, access roads, vegetation, overland flow routes, inlet/outlet headwalls. Access requirements (keys, arranging field meetings with Township staff, etc.) will be discussed with Township staff at the onset of the study.

The facilities condition will be documented using the field forms as well as dated digital photographs. Digital geo-referenced photos will also be taken of the periphery land use and general facility layout for inclusion into the SWM facility database. The initial condition assessment will include condition rating of all assets as documented during the field inspection and confirmed by our Project Engineer and Project Manager.

The field data will be collected by qualified one or two-person team equipped with either a GPS or total station, inspection forms, digital camera, and other necessary field, as required.

Aquatic Habitat

Aquatic habitat within the Ayr SWMMP study area includes a reach of the Nith River and the lowermost portion of Cedar Creek above its confluence with the Nith River, including the online Jedburgh and Watson ponds. The Nith River supports a diverse warmwater fish community. Cedar Creek's fish community includes the native coldwater Brook Trout. In addition to review of existing watershed/subwatershed studies that have been prepared for the Nith River and Cedar Creek, GRCA will be contacted for fisheries and aquatic habitat information, issues, opportunities and constraints specific to the study area. For instance, the extent of Cedar Creek coldwater habitat into the study area will be confirmed with GRCA.

Aquatic Species at Risk mapping identifies two provincially and federally designated Threatened fish species (Black Redhorse and Silver Shiner) and one provincially and federally designated Special Concern mussel species (Rainbow) within the study area. Mapping does not indicate designated Critical Habitat of these at-risk species, but it is understood that the Ontario Ministry of Natural Resources and Forestry had designated portions of the Nith River as "sensitive environment" in relation to Black Redhorse, the potential occurrence and extent of which will be determined for the study area.

Policy and regulations relevant to fisheries and aquatic habitat include the federal Fisheries Act and Species at Risk Act, and the provincial Endangered Species Act, provisions of which will be identified and incorporated into the SWM Master Plan.

3.3 Task 3: Evaluation of Alternatives

Several alternative solutions for SWM measures for the existing and future land uses within the Township that consist mainly of urban areas shall be developed. The approach for developing and evaluating alternatives shall be consistent with the requirements of the planning and design process for Master Planning projects described in the Municipal Class EA (Municipal Engineers Association, June, 2000; amended 2007, 2011). It involves reviewing Phase 1 work (i.e. Identification of the Problem) and undertaking Phase 2 (i.e. Establishing Existing Conditions, Identification of Long List of Alternatives, Development and Assessment of Alternative Management Strategies and Selection of a Preferred Strategy). In addition, consultation with stakeholders is a necessary step in this process.

The MECP divides SWM measures into three broad categories:

1. Source/lot level controls;
2. Conveyance controls; and
3. End of pipe controls.

The preferred SWM strategy is to provide an integrated treatment train approach to water management based on providing control at the lot level and in conveyance (to the extent feasible) followed by end-of-pipe controls. This combination of controls is typically the only means of meeting the multiple criteria for water balance, water quality, erosion control, and water quantity.

The reasoning behind that approach is to maximize the benefits from the combination of those elements, including:

- More effective SWM;
- Reduction in land area required to implement end-of-pipe solutions;
- Enhanced opportunities to integrate SWMPs effectively as amenities;
- Decreased total cost when land value is factored in; and,
- Increased level of public awareness and involvement in the implementation and management of SWM initiatives.

A preferred SWM Strategy will then be developed by the synthesis of the inter-disciplinary inputs to the project, including computer modeling, terrestrial and aquatic habitat assessments, water balance and hydrogeology, social, cultural, and economic considerations. The approach in developing and evaluating the alternative shall be generally consistent with the Class EA planning/design process for Master Planning project.

Using the initial set of developed evaluation criteria, and incorporating public comments as appropriate, the Project Team will apply a net effects analysis to the preliminary list of alternative solutions which will involve the following steps:

- Identification of potential effects;
- Develop and apply mitigation/compensation/enhancement measures; and,
- Determine net effects after mitigation measures have been applied.

The Township would like to explore the opportunities for innovative approaches such as Low Impact Development (LID) and green infrastructure for lot level controls, conveyance controls and end of pipe facilities. To assess the most applicable alternatives, COLE will review available information regarding Site setting that could influence the infiltration capacity of each area. This will include a review of the surficial geology, topography, depth to groundwater, depth to overburden, soil cover etc. In addition, available Source Water Protection ("SWP") mapping and SWP plans will be reviewed to understand if there are any constraints regarding LIDs within Wellhead Protection Areas (WHPAs) or other SWP vulnerable areas.

In addition, a water balance will be completed using the Thornthwaite and Mather methodology to compare pre-development and post-development hydrologic recharge of groundwater. This information will aid in assessing the list of alternatives and assess the suitability of various LID measures that could be completed.

The comparative evaluation of the alternative solutions will be carried out using a systematic approach that fulfills the intent of the Class EA process. The evaluation process will be presented in the form of an evaluation matrix in which alternative is scored or ranked against the other alternatives, with respect to a number of criteria that fall into the following categories:

- Environmental criteria: These include potential impacts on natural terrestrial features and aquatic habitat, and will include consideration of net change on hydrologic water balance and pollutant loadings to natural watercourses;
- Financial criteria: Includes initial capital cost including consideration of any need for property acquisition; expected life-cycle costs; and implications for future financing of centralized stormwater facilities that may serve more than one development property;
- Public safety and public acceptability: This category will address potential concerns regarding public safety and health; and how ell proposed facilities may fit into existing or future built-up areas;
- Implementation: Includes consideration of how easily implementation can occur as new land development occurs; and how well the SWM plan integrates with current land-use planning and the development approval process.

Evaluation of the alternatives will be undertaken in consultation with the Project Team and the Township's Project Manager. Our Project Ecologist will also contribute to the evaluation of alternatives, particularly about potential impacts to the environment both during and after construction.

3.4 Task 4: Preferred SWM Strategy

The preferred SWM strategy will be comprised of several elements. These may include replacement of existing storm pipes and culverts; erosion abatement projects; construction of new storm pond/wetland facilities or other types of centralized stormwater management such as infiltration facilities; and recommendations regarding stormwater design practices within new developments to minimize stormwater volume at the source and achieve objectives for preserving existing local hydrology.

We will clearly define each separate component of the preferred strategy and identify what the implementation sequence needs to be. We will identify all projects that are to be the responsibility of the Township, and identify what future Class EA requirements may apply, and what the regulatory approval

requirements are, for each component project. As noted in the RFP, for those projects identified as Class EA "Schedule B" projects, the Master Plan document will demonstrate that the Schedule B requirements have been fulfilled, as we will have followed Approach 2 in completing the Master Plan.

The preferred strategy will include recommendations regarding existing municipal drainage infrastructure assets, to provide the Township with a prioritized list of needs.

Existing data incorporated into the database and each component will be categorized into one of the following groups:

- Excellent: Component is in a "new" condition without any visible deficiencies;
- Satisfactory: Component is functioning within normal parameters but visible signs of wear are present;
- Attention Required: Component is no longer working as designed and requires maintenance, however, maintenance actions are minor (e.g. cleaning or debris removal);
- Non-Functional: Component is not functioning and requires more immediate maintenance (e.g. pond is full of sediment, inlet is blocked, spillway is eroded, etc.); and,
- Safety Hazard: Component presents a safety hazard to the public and should be repaired immediately (e.g. grate on large inlet pipe is open or missing allowing ingress, manhole cover missing, etc.).

Once each component has been entered into the system, any components with a rating of three (3) or higher will be given maintenance tasks as well as tasks added for inspection, as deemed appropriate. This will form the basis for the maintenance and budget needs for each facility, helping to evaluate and prioritize implementation requirements.

3.5 Task 5: Implementation Plan

3.5.1 Asset Monitoring, Management and Maintenance Program

COLE will establish a City-wide stormwater asset database and to identify any components that require maintenance.

Upon analysis of the stormwater management facility assessment results, Cole Engineering will prepare a long-term stormwater asset maintenance program, which will help to guide Public Works staff in the overall operation of the stormwater infrastructure. The maintenance program will be incorporated into the Master Plan and will include cost estimates as well as relevant regulations and processes for operations and maintenance activities.

The deliverable for this stage of the project will include a complete database, along with an operation and maintenance standard operating procedure manual, which the Township may use to guide its Public Works staff.

3.5.2 Operation and Maintenance Procedures

COLE will be able to identify the operation and maintenance requirements of each SWM facility and its assets which will allow for forecasting future requirements in terms of capital costs, operation and maintenance costs, and resources required by the Township to maintain its SWM facilities. The life cycle costs of each SWM facility will be calculated based on the forecasted operations and maintenance requirements. This information will be incorporated into the database, allowing Township staff to easily identify and plan yearly costs and resources required for each SWM facility and the overall program.

After completing an inventory of the SWM facilities and their assets within the Township, we will be able to develop an inspection and maintenance approach. The approach will be documented with an operation and maintenance standard operating procedure manual that will outline how to monitor, inspect, and maintain the SWM facilities and their assets. The manual will specify in detail the procedures Township staff will need to undertake when monitoring and inspecting the SWM facility and will include the following:

- Timelines for monitoring, inspections, and maintenance activities;
- Monitoring and inspection checklist based on the timelines;
- Guidance to interpret the monitoring data;
- Recommendations for the various maintenance activities that may be undertaken for each SWM facility based on the monitoring data;
- A standardized rating system to assess the priority of the maintenance needs for the various SWM facilities;
- Procedures for sediment sampling, removal, and disposal; and,
- Procedures for obtaining required approvals for removal and disposal of sediments.

The above will help the Township ensure that it remains in compliance with the ECAs for its municipal stormwater facilities.

In prioritizing the proposed solutions, considerations will be made for future implementation of the solutions, which is outside of the scope of this project. This may include the consideration of staging plans, property acquisition, easements, utility relocation, or any other timing or physical constraints the City may encounter. The Project Team will strive to present solutions capable of achieving the highest water quality results, while simultaneously thinking of the practical aspects the City will face beyond the life of Phases I and II of this Class EA project

3.5.3 Stormwater Quality Management Strategy

The Master Plan will include a stormwater quality management strategy.

The focus will be on promoting measures that reduce stormwater pollution at source. Measures that may be included are as follows:

- Encouragement of lot level improvements on public and private property, such as:
  - Soakaway pits;
  - Roof leader splashpads;
  - Oil / grit separators;
  - Pervious pavement; and,
  - Green roof technology.
- Implementation of conveyance enhancements on municipal rights-of-way, such as:
  - Pervious piping;
  - Bioswales; and,
  - Dryswales.

3.5.4 Policy Recommendations

In addition to providing physical solutions in the stormwater quality management strategy, the Project Team will also recommend policies based on review of other local municipal, provincial, or other agency documents. The recommendations for incorporation to Township policies will be detailed in the Master Plan document. Policy recommendations will include, but not be limited to:

- Municipal standards, operations, maintenance and design practices;
- Infill development SWM practices; and,
- Disposal of material removed from municipal stormwater treatment facilities.

Municipal Standards, Operations, Maintenance and Design Practices

Comparable municipal guidelines, such as the City of Barrie's *Storm Drainage and Stormwater Management Policies and Guidelines*, 2009, or the City of Toronto's *Wet Weather Flow Management Guidelines*, 2007, will be reviewed to ensure the Township maintains current standards in stormwater maintenance and design. Review of various municipal perspectives will allow for optimization of the Township own practices.

Infill Development SWM Practices

Comparable infill development guidelines, such as the City of Ottawa's Urban Design Guidelines for Low-Medium Density Infill Housing Update, 2009, will be reviewed to ensure the Township maintains current standards in infill stormwater management maintenance and design. Review of various municipal and provincial perspectives will allow for optimization of the Township's own practices.

Disposal of Materials Removed from Municipal Stormwater Facilities

COLE will provide the Township with advice on to how to deal with material that is occasionally removed from stormwater facilities such as storm ponds. Clean-out of accumulated sediments from storm ponds is needed from time to time, to maintain ECA compliance. Disposal of that material is an important cost consideration for pond clean-outs. We will review and summarize current regulatory requirements in this regard, and provide the Township with a step-by-step procedure for designing a pond clean-out.

3.6 Task 6: Master Plan Document

The Master Plan document will be the key deliverable for the project for the implementation of future works. The document will provide the planning rationale and EA documentation required to proceed with detailed design of the recommended works. The Master Plan is expected to contain, at a minimum:

- Problem/Opportunity statement;
- Documentation of all public, agency, and First Nations comments and responses;
- Review of best practices and minimum design guidelines;
- Rationale for evaluation criteria;
- Summary evaluation of alternatives;
- Summary of preferred solution prioritization;
- Implementation, feasibility and staging recommendations;
- Supporting technical memoranda (in appendices), including:
    - Results of field data investigation of stormwater management infrastructure;
    - Maintenance program for individual stormwater assets;
    - Recommendations for stormwater management policies to be developed by others;
- Cost estimates;
- SWM Pond Long-Term Maintenance Program;
- Recommendations for Township Design Guidelines;
- Mitigation measures and commitments;
- Sufficient information to formulate a framework for stormwater utility tax;
- Operations and maintenance costs;
- Prioritization of works;

- Provide a basis for future investigations for the specific Schedule C projects identified within it, i.e. identify everything the Township needs for the first five years after study completion and complete all the site specific work required, including public consultation to meet Municipal Class EA requirements for Schedule A and B projects;
- SWM Policy for integration into Development Manual and,
- Water Resources Monitoring Program.

It is expected that the draft Master Plan document will be submitted in black and white with the exception of relevant figures. The draft Master Plan will be presented to the Township's staff for review and comment. After receipt of the Township's comments on the Master Plan, the draft will be finalized and delivered to the Township. The Master Plan will be made available for public review at selected Township facilities.

The Master Plan document will include an Executive Summary that provides a clear picture of the recommendations, and a description of how those recommendations were arrived at.

As needed, the final document will be formatted to meet the Township's AODA requirements or policies.

4 Schedule

Appendix C presents our overall detailed resource loaded, critical path project schedule. Based on Addendum #3, the Township would like a preliminary overview / assessment by March 30th, 2020 with a completed Study by June 15th, 2020. Given the scope and identified data gaps, a more reasonable time for a completed Study is early October. If the assignment is awarded and starts by February 3rd, 2020, COLE is able to provide our preliminary findings (Tasks 1 and 2) by end of March 2020.

We understand that project schedule is critical and that timelines must be met. To that end, our approach to schedule management will be as follows:

→ Immediately upon notification of award, we will prepare a baseline schedule to align the project start date and completion dates. The baseline schedule will be broken down to define timelines for sub-activities and will highlight the critical path. The baseline schedule will be included in our Project Management Plan.

→ Complete a monthly Project Progress Report, which will include an updated project schedule. We will track all dates against the baseline schedule to ensure that we are continuing to meet timelines. We will pay attention to our critical path and dedicate the resources necessary to meet these timelines.

→ Should we find that our work on a task extends beyond the completion date, we will consider options to accelerate specific activities to return to our schedule. If these tasks are on the critical path, we will consider assigning additional resources to meet timelines. Our Project Manager has the authority to assign additional staff from COLE. Where this is necessary, we will inform the Township. Where these activities are not on the critical path, we will assess the impact of schedule delays on the overall schedule and develop an approach to return to the baseline schedule.

The following Table 4.1 outlines critical areas of our schedule review:

Table 4.1 Project Schedule Summary

Task	Activity	Completion Date
-	Closing Date	January 15, 2020
-	Estimated Project Award	January 29, 2020
-	Estimated Start Date	January 30, 2020
1	Task 1 Project Start-up Meeting	February 3, 2020
2	Project Management Plan/Gantt Chart of key milestones	February 5, 2020
3	Summarize Data Gaps to Project Team	February 14, 2020
4	Public Consultation Plan	February 14, 2020
5	Task 2 Meeting	March 10, 2020
6	Task 2 PIC Meeting 1	April 22, 2020
7	Task 2 Draft SWMMP (30%)	May 6, 2020
8	Task 3 Meeting	June 1, 2020
9	Task 3 PIC Meeting 2	June 24, 2020
10	Task 3 Draft SWMMP (60%)	July 31, 2020
11	Task 4 Meeting	August 7, 2020
12	Task 4 Asset Management Planning Meeting	August 24, 2020
13	Task 5 Draft SWMMP (90%) – agency review	August 31, 2020
14	Task 5 EA Report Meeting – Project Team	September 14, 2020
15	Task 5 EA Report Meeting – Township Council	September 30, 2020
16	Final SWWMP (100%)	October 7, 2020

Note: All Report Submission dates subject to confirmation with Township Project Team and can be moved as required.
Review time assumed 2 weeks per submission, time noted under "Agency Review" in "SUBCONSULTANTS" column of TTM

5 Experience and References

COLE brings forward a project team with extensive master planning team experience. Staff proposed on our team have a long working relationship on similar assignments including: the Uxbridge Comprehensive Stormwater Management Master Plan, the Town of Newmarket Water and Wastewater Master Plan, Toronto Waterfront Sanitary Master Plan EA, the Town of Markham Water and Wastewater Master Plan, and York Region's Water and Wastewater Master Plan.

The following project descriptions and references demonstrate relevant experience of COLE to undertake this assignment. Each of the projects presented have involved project team members named in this proposal.

Table 5.1 lists 3 corporate projects demonstrates recent relevant projects (last 5 years) in which COLE successfully delivers (or is currently delivering) similar investigative services. Additional details of these and other similar projects are included in Appendix B. The Township of North Dumfries' Schedule "C" – Reference Form is included in Appendix A.

Table 5.1 Project References

#1 CITY OF TORONTO BASEMENT FLOODING REMEDIATION & WATER QUALITY IMPROVEMENTS MASTER PLAN CLASS EA, AREA 36 (AREAS 30, 7-12, 1-2, 4-6, 36)	
COMPANY NAME:	City of Toronto
ADDRESS:	100 Queen St. W.
CITY/PROV/POSTAL CODE:	Toronto, ON M5H 2N2
CONTACT PERSON/TITLE/PHONE NUMBER AND E-MAIL ADDRESS:	Kirill Cheiko, P.Eng./Capital Works Delivery, Toronto Water T: 416-338-5556 | E: kcheiko@toronto.ca
Scope: The COLE team has completed 14 basement flooding studies and is currently near completion of a 14th area and is starting on another three areas coving downtown Toronto. Each of the studies have flowed a similar work scope. The Master Plan Class EA studies are part of the City of Toronto's extensive basement flooding protection program, and are completed to provide the City with comprehensive basement flooding solutions. The projects aim to determine the primary cause and mechanisms which cause basement flooding in the study areas, and develop cost effective flood and water quality remedial measures that meet the level of service criteria and other goals of the City. COLE's involvement in the Toronto Basement Flooding Program is as a trusted consultant to the City. The projects involve many of the key work items identified in this Roster Category including all aspects of infrastructure planning including background review, field investigations, hydraulic model development and application, wastewater flow monitoring data analysis, alternatives development, constructability, developing SQL tools, developing webapps including ArcCollector and ArcSurvey, groundwater data analysis, and the EA process (public and stakeholder consultation). **Project Value and Schedule:** $ 1.0M; Completed 2019	

#2 CITY OF OTTAWA – HALIFAX AND VALLEY DRIVE DUAL DRAINAGE STUDY	
COMPANY NAME:	City of Ottawa
ADDRESS:	100 Constellation Crescent, 6th Floor East
CITY/PROV/POSTAL CODE:	Ottawa, ON K2G 6J8
CONTACT PERSON/TITLE/PHONE NUMBER AND E-MAIL ADDRESS:	Hiran Sandanayake, P.Eng./Senior Engineer, Water Resources T: 613-580-2424 X13848 | E: hiran.sandanayake@ottawa.ca
Scope: The Halifax and Valley Drive area of Ottawa is primarily residential with commercial development on the main roadways. The area is approximately 860ha. The storm system in the area was not designed using modern dual drainage principles and is known to surcharge in the 2-year design storm as well as result in overland flooding that has led to basement flooding. In 2015, the City developed a dual drainage model. A key component of this assignment was to expand the existing model to include additional area and to include more detail delineation of drainage features and systems. The existing PCSWMM model was expanded to include additional areas and in doing so the original model was also validated. Flow monitoring data and field investigations were undertaken to confirm data and connection anomalies. With the completion of the model, the storm system assessment looked at a range of design and historical events, including the City's climate change events. An objective of the study is to develop a conceptual Inlet Control Device (ICD) plan to improve overland and sewer performance (optimize major and minor systems) as an early action imitative followed by identifying opportunities for short- and long-term infrastructure replacement and rehabilitation. **Project Schedule:** Completed 2019	

Table 5.1 Project References

OAKVILLE PART III MIDTOWN EA – STORMWATER MANAGEMENT (SWM)	
COMPANY NAME:	Town of Oakville
ADDRESS:	1225 Trafalgar Road
CITY/PROV/POSTAL CODE:	Oakville, ON L6H 0H3
CONTACT PERSON/TITLE/PHONE NUMBER AND E-MAIL ADDRESS:	Kristina Parker, Water Resources Engineer; T: (905) 845-6601, x3889| E: Kristina.parker@oakville.ca
Scope: Schedule 'C' Municipal Class EA and preliminary design for road, transit, and stormwater infrastructure for Midtown Oakville, a designated urban growth centre adjacent to 400 series highway and GO Rail corridor. COLE completed the SWM Report as part of a Municipal Class EA of proposed transportation improvements within Midtown Oakville. The stormwater component of this EA study included hydrologic analysis, hydraulic analysis and development of future SWM criteria in support of the proposed major transportation improvements. Project complications included unsteady modelling of the Morrison-Wedgewood Diversion Channel, assessment of flooding potential at 12 culvert crossings and within several residential areas previously identified as being flood prone. **Project Value and Schedule:** $380,000; 2012 - May 2015.	

5.1 Additional Relevant Project Experience

To demonstrate the depth of our experience in all areas of this assignment, we have included additional relevant projects in each topic area. Each of the projects presented below have involved project team members named in this proposal.

MARKHAM VILLAGE AND UNIONVILLE FLOODING STUDY | CITY OF MARKHAM. The COLE project team is tasked with completing a full assessment of all storm drainage systems in two areas of the City of Markham: Markham Village and Unionville. Markham Village is comprised of 21 neighbourhoods, while the Unionville area is one storm system that can be affected by the local receiving stream (Fonthill Creek) and is a Special Policy Area (SPA). The outcome of this project will be a comprehensive Flood Remediation Plan for both areas to address the primary cause of and reduce the risk of flooding. (Ongoing)

CITY OF VAUGHAN STORMWATER MANAGEMENT (SWM) MASTER PLAN. Development of a Storm Drainage / Storm Water Management Master Plan. The project was city-wide with a specific focus on new growth and secondary plan areas in addition to areas of intensification. The project followed the Master Planning process established by the Municipal Class Environmental Assessment Phases 1 and 2 and included public consultation through two Public Information Centres, coordination with the public, and a technical advisory committee developed in partnership with the relevant review agencies. (2014)

CITY OF PETERBOROUGH STORMWATER QUALITY MASTER PLAN. Master Plan for the management of stormwater quality. The study was carried out as a Master Plan in accordance with Ontario's Municipal Class Environmental Assessment process. The study provided the City with a long-term strategy for reducing the amount of pollution reaching local waterways. (2014)

CITY OF GUELPH DOWNTOWN SERIVICING STUDY. In preparing the Downtown Servicing Study, COLE looked at the alternative water, wastewater and stormwater servicing strategies to make efficient use of existing municipal water, wastewater and stormwater services to support growth, while considering other factors that affect municipal servicing and the community such as climate change, adaptability, infrastructure security, low impact development, and conservation. (2017-Ongoing)

6 Team Structure / Staff Qualifications

6.1 Structured for Program Delivery

To structure the COLE team to ensure successful delivery, on-time of the project, we selected experienced Program Manager (PM) Roy Johnson supported by a strong Technical Team. Together they will focus on the critical factors of leadership, resources, and quality. The qualifications and dedication of the team members, as shown in the organization chart in Figure 6-1 is critical to this assignment. CVs are provided in Appendix D.

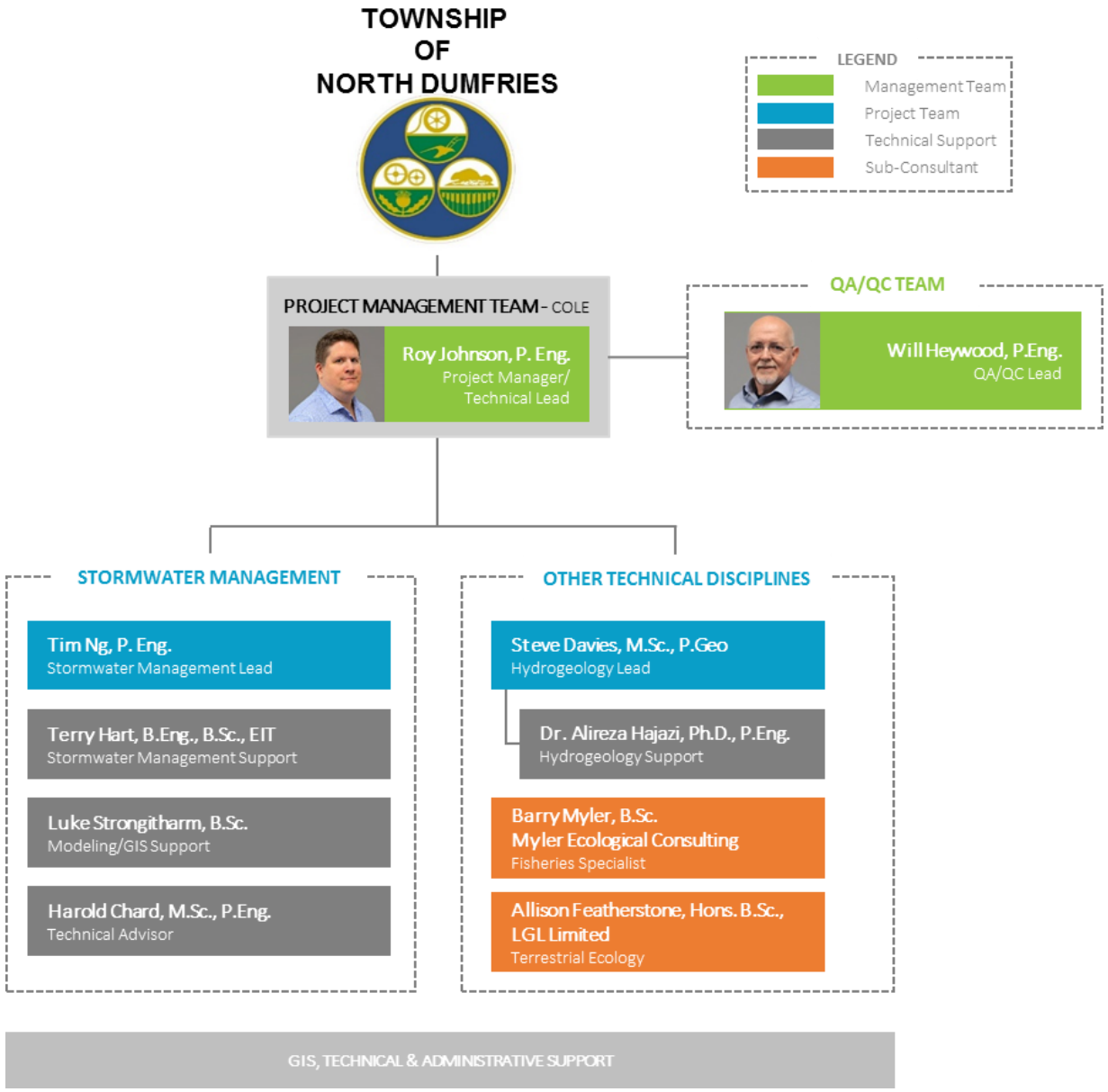


Figure 6-1 Organization Chart

The COLE team is structured to respond to the Township's vision for the program and includes Management and Technical teams. The Management Team leads the project, serving as a point of contact for the Township and the Township's Senior PM. They provide consistency through the project and are dedicated for its duration to manage contract strategies, develop cost estimates and schedules, facilitate meetings, initiate technical input, drive the permit process, and assure conformance with the Township's objectives and standards. This team monitors progress to proactively address schedule concerns and serve as the Township's liaison or communications officer with stakeholders. COLE recognizes that priorities change. The COLE team is structured to work with the Township to develop a work plan to drive schedule that will accomplish the Township of North Dumfries's objectives within a flexible framework that allows for modifications as appropriate to account for changing priorities.

The Technical Team gathers and reviews the data collection, conducts field verifications, ensures all necessary approvals. COLE has the bench strength to provide the Township confidence that our team has adequate resources and will deliver consistent quality throughout the length of the Program.

6.2 Stormwater Management Planning and Design, Including Preparation of Master Drainage Plans

Our team has extensive experience in the preparation of master drainage plans. For each project, we take into consideration the future needs of the study area and closely document the existing stormwater management facilities, flood risk zones, and sewer conditions. Our staff is also specialized in conducting micro-drainage studies by analyzing dual drainage systems using advanced hydrologic modelling techniques.

6.3 Expertise in Hydrologic and Hydraulic Modelling and Design

Each of the staff members of the Water Resources team are involved in hydrologic and/or hydraulic modeling using a broad range of software. Our combined staff are well-versed in Visual OTTHYMO and HEC-RAS, but is also experienced in modeling and analysis with MIKE URBAN, InfoWorks, PCSWMM, QUALHYMO, DDSWMM, XPSWMM, Flow 2D, WABAS, AutoCAD Civil 3D and other software.

In-house tools have been developed specifically for stormwater applications in AutoCAD Civil 3D to simplify hydrologic and hydraulic processes, such as the digital mapping of floodlines. Many of our projects have been completed by first establishing the baseline existing conditions in order to assess the impacts of difference design alternatives. All of our hydrologic and Hydraulic models can be prepared using the "what if" scenarios. Our staff has completed a number of pipe capacity studies, where existing sanitary and stormwater infrastructure is assessed to determine their capacity under different development scenarios.

6.4 Experience and Knowledge of the Municipal Class Environmental Assessment process and other Regulatory Requirements for Stormwater Management Projects

The COLE team has undertaken the Class Environmental Assessment process many times and is confident in leading every phase of a Class EA project. Our staff is familiar with both the Municipal Class EA process as well as the Conservation Ontario Class EA process to complete stormwater management projects. From junior staff to project managers, our team is technically skilled to provide feasible design alternatives while still being able to communicate various facets of the designs effectively through reports and presentations at Public Information Centres for all stakeholders. Experience in Processing Permit Applications and Complying with Acts and Regulations

The proposed team is highly experienced in identifying and acquiring all permits and approvals required to complete water resources and stormwater management projects. Immediately after project commencement, our project teams will begin the consultation process with approval agencies and identify required permits and approvals. This approach has been highly effective at mitigating the risk to the project from unexpected approval issues. We are highly experienced with the approval process of the Ministry of Natural Resources and Forestry, Ministry of Environment Conservation and Parks, Department of Fisheries and Ocean and the local conservation authorities, and has the contacts with agency staff to assist in expediting approvals when required.

6.5 Experience in Using Technical & Stormwater Management Modelling Tools

We confirm that our staff have extensive experience in using technical and stormwater management software and models as part of the design process: including but not limited to: MIKE URBAN, InfoWorks ICM, Visual OTTHYMO, PCSWMM, CulvertMaster / HY8, FlowMaster, HEC-RAS, GeoHEC-RAS and other associated software.

6.6 Project Management

ROY JOHNSON, P.ENG. — PROJECT MANAGER / TECHNICAL LEAD

Roy Johnson is a Senior Project Manager in COLE's Infrastructure Planning Group with over 17 years of experience in the planning, analysis, and design of stormwater management systems. He is an experienced Project Manager and has successfully completed various master plan Class EAs.

As a Water Resources Project Manager, Roy has overseen and developed hydrologic and hydraulic computer models for use in flood plain studies and stormwater management planning; led multidisciplinary teams to prepare comprehensive Master Environmental Servicing Plans, Functional Servicing Plans, Stormwater Management Plans, and other technical and environmental initiatives; and has also interpreted various municipal, provincial, and federal regulations to ensure design compliance and oversee permit application processes. Roy has been effective in ensuring all multi-discipline objectives are met to deliver a quality project. He establishes meaningful communication structures with our clients, safeguards staff engagement, and ensures that all budget and schedule control targets are met.

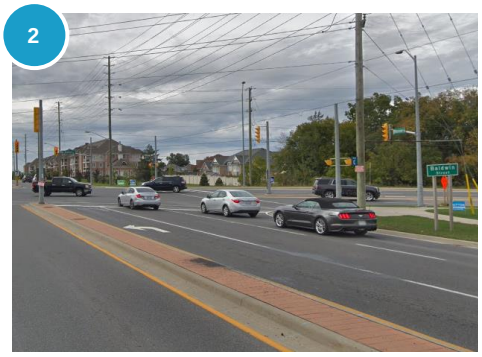
Roy has additional recent experience acting as Project Manager and Technical Lead at Stantec for the following projects:

1

Uxbridge Comprehensive Stormwater Management Master Plan, Township of Uxbridge, ON

Senior Water Resources Engineer/Project Manager responsible for the preparation

2



Winchester Road Reconstruction and Widening, Town of Whitby. Brooklyn, ON.

Stormwater Management Reviewer. Detailed design for the proposed reconstruction and widening of

3

Rodick Road/Miller Avenue Stormwater Management Options Assessment, City of Markham, ON.

Stormwater Management Engineer. As part of the development of the Miller

of a Comprehensive Stormwater Management (SWM) Master Plan for the Uxbridge Urban Area and Hamlet of Coppin's Corner in in accordance with the Comprehensive SWM Master Plan Guidelines, prepared by the LSRCA and the Municipal Class EA process. Through the Class EA Master Plan process, planning and technical review, several 'preferred alternatives' were established with respect to the existing natural environment; provided the design criteria for future new development, redevelopment, and/or the upgrading or replacement of existing infrastructure. SWM design criteria as it relates to water quality, water quantity, water balance, and erosion controls were established for both Uxbridge and Coppin's Corners. The Master Plan also provided recommendations for SWM implementation approaches and ongoing inspection/ maintenance considerations. Completion Date: 2015.	Winchester Road (Regional Road 3) through the Community of Brooklin including reconstruction and widening of Thickson Road (Regional Road 26) in the vicinity of Winchester Road. The approximate project limits for this assignment extend on Winchester Road from Baldwin Street to 200m east of Garrard Road and on Thickson Road from 400m south of Winchester Road to 350m north of Winchester Road in the Town of Whitby. The drainage work consists of the preparation a Drainage and Stormwater Management Report, building on the report prepared during the EA, describing existing and proposed conditions for roadway drainage, transverse drainage crossings and stormwater management. Completion Date: 2018	lands near Rodick Road, a stormwater management pond was proposed to be located on City lands, currently used as their snow dumping Site. The project included the evaluation of various options to eliminate the pond, including on-site detention, oil-grit separators, etc. One option was using StormTrap products in place of the pond. The project also included the coordination with the manufacturer to develop a conceptual design of the StormTrap system, including costs of materials, construction, and maintenance. Also provided the City with a matrix of solutions, including costs, likelihood of approval, degree to which criteria are met, and a preferred solution. Completion Date: 2015

Roy will be our Project Manager as well as the Technical Lead. He was Project Manager for the Township of Uxbridge's Comprehensive Stormwater Master Plan.

WILLIAM HEYWOOD, P.ENG. — QA/QC REVIEWER

Quality Management promotes consistency and delivery of the highest quality products. William, with **over 30 years** of infrastructure master planning and EA experience will lead the QA/QC review process. He will undertake QA/QC review of key project deliverables and assign an experienced discipline-specific professional to review technical deliverables. Will is very familiar with the quality expectations of our clients and will be able to guide the QA/QC team in their activities. Will is familiar with similar projects through his work on the following project:

- Project Manager for Storm Runoff Water Quality and Investigation of Basement Flooding Areas 41, 40 and 34, City of Toronto
- Project Manager and Technical Lead for Black Creek Sanitary Drainage Area Servicing Improvements Class EA Study, City of Toronto
- Project Manager and Technical Lead for Emery Creek Quality Control Plans Design, City of Toronto
- Project Manager and Technical Lead for Churchill Park Redevelopment Phase 1 where rain gardens were incorporated into stormwater management system using a treatment train approach, City of Hamilton.
- Project Manager and Technical Lead for Glynwood Tributary Area Sewer Surcharge and Flood Remediation Class EA, City of Markham.

William will provide senior technical review of all deliverables to the Township.

6.7 Project Team

The team members listed below have critical roles in the development and completion of this project and were chosen for their area of expertise. All our team members will be available for the duration of the project and/or the phase of work to which they are assigned.

6.7.1 Stormwater Management Team Members

TIMOTHY NG, P.ENG. — **STORMWATER MANAGEMENT LEAD**

Timothy is a Water Resources Engineer at COLE and has over 6 years of experience in hydraulic and hydrologic analyses, water permitting, stormwater management systems, pond design, water quality analysis and erosion and sediment control. Tim has prepared and provided technical input on various Stormwater Management (SWM) Reports, Functional Servicing Reports (FSR), Master Environmental Servicing Plans (MESP), and Stormwater Master Drainage Plans for several commercial, industrial and residential development designs within Ontario. Tim has also prepared several stormwater related peer reviews for several municipalities.

Some of Tim's recent relevant experience includes:

- Water Resources Designer for the Uxbridge Comprehensive Stormwater Management Plan, Township of Uxbridge
- Water Resources Designer for the South Sharon (Green Lane MESP and FSR) Modelling and Pond Design, Baif Developments, East Gwillimbury, ON.

Tim will provide technical guidance to junior staff.

TERENCE HART, B.ENG., B.SC., EIT — **STORMWATER MANAGEMENT SUPPORT**

Terence has over 1 year of experience in Water Resources Engineering and has been involved in a variety of projects focusing on stormwater management, highway drainage, floodplain impact analysis, tree protection and erosion and sediment controls. He has made site inspections and assisted with topographic and tree surveys. Terence has applied AutoCad Civil 3D, Visual HYMO Suite, GeoHEC-RAS, Bentley FlowMaster and CulvertMaster software to support his work in analysis, detailed design, report writing and tender preparation. Some of Terence's recent relevant experience includes:

- Drinkwater Pond Outfall Rehabilitation and Retrofit, City of Brampton – Water Resources Designer
- Environmental and Climate Change, North Harbour Sediment Management Options, Thunder Bay – Water Resources Designer
- West Whitby Holdings, West Whitby Holdings Inc. Whitby – Water Resources Designer
- Detail Design at Various Sewage Pumping Stations, Regional Municipality of Peel – Water Resources Designer

Terrence will provide technical analysis and report writing.

LUKE STRONGITHARM, B.SC., — **MODELLING/GIS SUPPORT**

Luke Strongitharm is a Geographical Information Systems Specialist and Hydraulic Model Developer with over 18 years of experience in spatial analysis, data implementation and visualization. He has led several large engineering projects coordinating data collection, organization and analysis. Luke has significant technical knowledge of ArcGIS, InfoNet, InfoWorks, databases and many other software projects. Luke has done similar work for the Township of Markham to reconcile various data sources to develop population and flow projections/demands for the Township of Markham water and wastewater servicing study, as well as for the Township of Toronto, York Region, and Peel Region. Other project roles are to manage all data

from the Township, undertake a critical review of GIS data, support project team modelling needs, and prepare study graphics for reports and meetings. His relevant project experience includes:

- Technical Lead for GIS and Data Analysis for the Basement Flooding Remediation and Water Quality Improvements Master Plan Class EA for Areas 1, 2, 4, 5, 6, 7, 8, 9, 11, 12, 30, 36, 45, and now 42, 44 and 62 City of Toronto
- GIS Analysis for West Thornhill Flood Control Implementation Refinement, City of Markham.
- Technical Lead for Update and Calibration of Peel Region's Wastewater Hydraulic Model, Region of Peel
- GIS Specialist for Stormwater Quality Management Master Plan Class EA, City of Peterborough

Luke will lead and direct all GIS analyses completed as part of this project.

HAROLD CHARD, M.Sc., P.Eng. — TECHNICAL ADVISOR

Harold Chard has over 30 years of experience in planning and design of municipal stormwater management facilities, combined sewer overflow control facilities, and storm and sanitary sewer systems. He has extensive experience in hydrologic and hydraulic modelling of pipe systems and watercourses as needed for infrastructure planning, watershed studies, and pollution control studies. Harold has broad experience in preparation of Provincial and Federal environmental assessment (EA) documents, public presentations, and technical reports for support of urban planning initiates. His projects include:

- Stormwater Quality Management Master Plan, City of Peterborough – Project Manager
- Water Resource Protection Funding Feasibility Study, City of Peterborough – Project Manager
- Basement Flood Remediation Areas #42, #44 and #62, City of Toronto – Technical Advisor
- Pollution Control Plan Update, City of Cornwall – Project Manager

Harold will act as technical advisor to the Project Manager, Roy Johnson, and input on operation and maintenance costs.

6.7.2 Hydrogeological Team Members

STEVE DAVIES, M.Sc., P.Geo. — HYDROGEOLOGY LEAD

Steve is a Senior Hydrogeologist and Team Leader at COLE with over 25 years of diverse experience in the private and public sectors leading multi-disciplinary teams of geoscientists, ecologists and engineers. Extensive experience with source water protection studies, groundwater supply investigations, municipal infrastructure studies, land development studies, Environmental Impact Studies (EISs), mining studies, Environmental Site Assessments (ESAs), and remediation projects. He works closely with various stakeholders to resolve permitting requirements, estimate construction dewatering requirements, assess potential impacts to the natural environment and other users of water, and to develop effective environmental monitoring and management plans. He acts as a third party reviewer for various municipalities for various development applications and ESAs. Steve has also appeared before the Ontario Municipal Board (OMB) as an expert witness in hydrogeology. His relevant experience includes:

- Sustainable Halton Water and Wastewater Master Plan, Regional Municipality of Halton. Halton Hills – Hydrogeology Lead
- Clair-Maltby Master Environmental Servicing Plan, City of Guelph – Hydrogeological Lead
- Southwest Georgetown Secondary Plan Subwatershed Management Strategy, Town of Halton Hills – Hydrogeological Lead

For this project, Steve will senior input and review of hydrogeology tasks

ALIREZA HEJAZI, PH.D., P.ENG. — HYDROGEOLOGY SUPPORT

Dr. Hejazi is an Environmental Engineer and Hydrogeologist with over **10 years** of experience in groundwater hydrology, physical hydrogeology, groundwater flow and contaminant transport modeling. His areas of expertise include conducting and organizing groundwater engineering projects, managing and analyzing soil and groundwater data, and developing and implementing comprehensive groundwater and surface water monitoring program. Dr. Hejazi has expertise in conducting and analyzing infiltration testing, water balance assessments, LID assessments and Source Water Protection studies. Similar relevant project experience includes:

Dr. Hejazi's will provide technical analysis of water balance and other hydrogeology input to the report.

6.7.3 Subconsultants

MYLER ECOLOGICAL CONSULTING – FISHERIES

Barry Myler, B.Sc., is a consulting Fisheries Biologist with over **26 years** of experience. He has addressed Federal Fisheries Act compliance and both Federal Species at Risk Act and Provincial Endangered Species Act compliance for aquatic Species at Risk for a wide variety of public and private sector clients and project types. Barry will conduct a desktop analysis and prepare an existing conditions summary of fisheries and aquatic Species at Risk constraints and opportunities within the Nith River and Cedar Creek reaches in the Ayr SWMMP study area, including reference to pertinent policy and regulatory requirements. He will contribute to the evaluation of identified erosion sites, development of assessment criteria for SWM alternatives and preparation of summary subwatershed factsheets.

LGL LIMITED - NATURAL HERITAGE AND PROTECTION MEASURES

LGL Limited is an environmental research and consulting firm specializing in environmental assessment and planning, and terrestrial, aquatic, wetland and marine ecology. LGL was founded in 1971, and is Canadian-owned and operated by its employees. A copy of their corporation information can be found in Appendix B.

Allison Featherstone, Hons.B.Sc. Vice-President, Senior Planning Ecologist
Project Role: Project Manager, Ecologist, SAR Specialist

Allison Featherstone is a Senior Manager and Ecologist at LGL Limited environmental research associates, where she leads a team of ecologists, biologists and planners. Since joining LGL in June 2003, Allison has been involved with over 150 natural heritage investigations in support of infrastructure, Renewable and Clean Energy Projects, Comprehensive Broad Scale Environmental Studies and Environmental Assessments/Environmental Impact Statements. She regularly represents LGL at project team meetings, agency meetings, technical and stakeholder advisory committee, public and stakeholder consultation, and consultation with First Nations and Métis. Allison's community involvement includes participation as a member (2007-2018) and Chair (2014-2018) of the Region of Waterloo's Ecological and Environmental Advisory Committee, where she also served as a member on the Region of Waterloo Technical Advisory Committee for Wastewater Master Plan, the Region of Waterloo Transportation Master Plan Stakeholder Advisory Committee, and the Climate Change Adaptation Committee.

Allison has considerable experience navigating the Endangered Species Act, 2007 and has direct experience with the species identified in the Ayr study area. Allison participated in several peer reviews of studies in the Ayr study area as part of her role on EEAC, in addition to direct project experience with LGL in Ayr for Northumberland Road, Stanley Street and Swan Street EA, and has participated in all aspects of the Surface Water Quality Monitoring Program.

Allison will provide support to the project team by providing expertise in natural heritage issues and protection measures that arise during this project.

7 Project Cost

Our copy of the Schedule of Items & Pricing Response Form (Appendix D of the RFP) is included in Appendix A. Our detailed Time-Task Matrix and Cost Breakdown for the proposed Stormwater Management Master Plan is included in Appendix E.

8 Closing

We look forward to working with the Township on this project that will provide long term stormwater planning solutions for the community. COLE is willing to discuss budget and scope of work with the Township to ensure your needs are met.

Yours sincerely,

COLE ENGINEERING GROUP LTD.

Roy Johnson, P.Eng.
Project Manager

April 22, 2020
Our Ref: 2019-0506
Via-Email

Ministry of Environment, Conservation and Parks
Guelph MECP District
Ontario Government Building, 1 Stone Rd W,
Guelph, ON N1G 4Y2

Attention: Amy Shaw
Manager

Re: Township of North Dumfries Stormwater Management [SWM] Plan [SWM-MP]
Ayr Stormwater Management Master Plan, Ayr, ON

The Community of Ayr requires completion of a Stormwater Management [SWM] Master Plan [SWMMP] following a Master Planning approach in accordance with the Environmental Assessment Act as outlined by the Municipal Engineer's Association Municipal Class Environmental Assessment (MEA), October 2000, as amended. MECP is an essential part of the public consultation process; therefore, this letter is provided to make you aware of the project and the forthcoming public comment phase. Attached is a copy of the proposal.

The Study is to focus on the Urban Area of the Community of Ayr (existing and emerging), as illustrated in the Township's Official Plan [AOP]. The Township of North Dumfries also requires an analysis through this Study on the potential urbanization of lands framing the Northumberland Street corridor, extending from Greenfield Road to Highway No. 401. Refer to **Figure 2-1**.

The SWMMP will serve as a decision support tool, a methodology for the prioritization of works, a means to estimate future SWM requirements and costs and a transparent community process by which the Township can establish stormwater management guidelines and policies for the next ten to fifteen years.

The SWM Master Plan shall be an integrated approach that considers flood and erosion control, groundwater and surface water quality management, natural heritage environment management and infrastructure. In addition, the plan shall integrate existing policies, regulations, acts and guidelines and where appropriate develop new policies and design guidelines to aid in implementation and shall do so within a water sustainability context.

COLE ENGINEERING GROUP LTD.
HEAD OFFICE
70 Valleywood Drive, Markham, ON Canada L3R 4T5
T. 905 940 6161 | 416 987 6161 F. 905 940 2064
www.coleengineering.ca

2018 SME CANADA'S TOP SMALL & MEDIUM EMPLOYERS

COLE will be arranging an online Public Information system and the Township will make a public announcement in local newspapers of the date and URL.

Can MECP provide any guidance on Study requirements and information the Ministry would find relevant to this study?

Yours sincerely,
COLE ENGINEERING GROUP LTD.

Roy Johnson, P. Eng.
Team Lead- Water Resources

RRJ/kjs

c.: Aziz Ahmed, MECP Manager, Municipal Water and Wastewater Permissions
aziz.ahmed@ontario.ca
Andrew McNeely, Chief Administrative Officer, Township of North Dumfries
amcneely@northdumfries.ca

Encls. Figure 2-1 – Site Map
RFP, COLE Proposal

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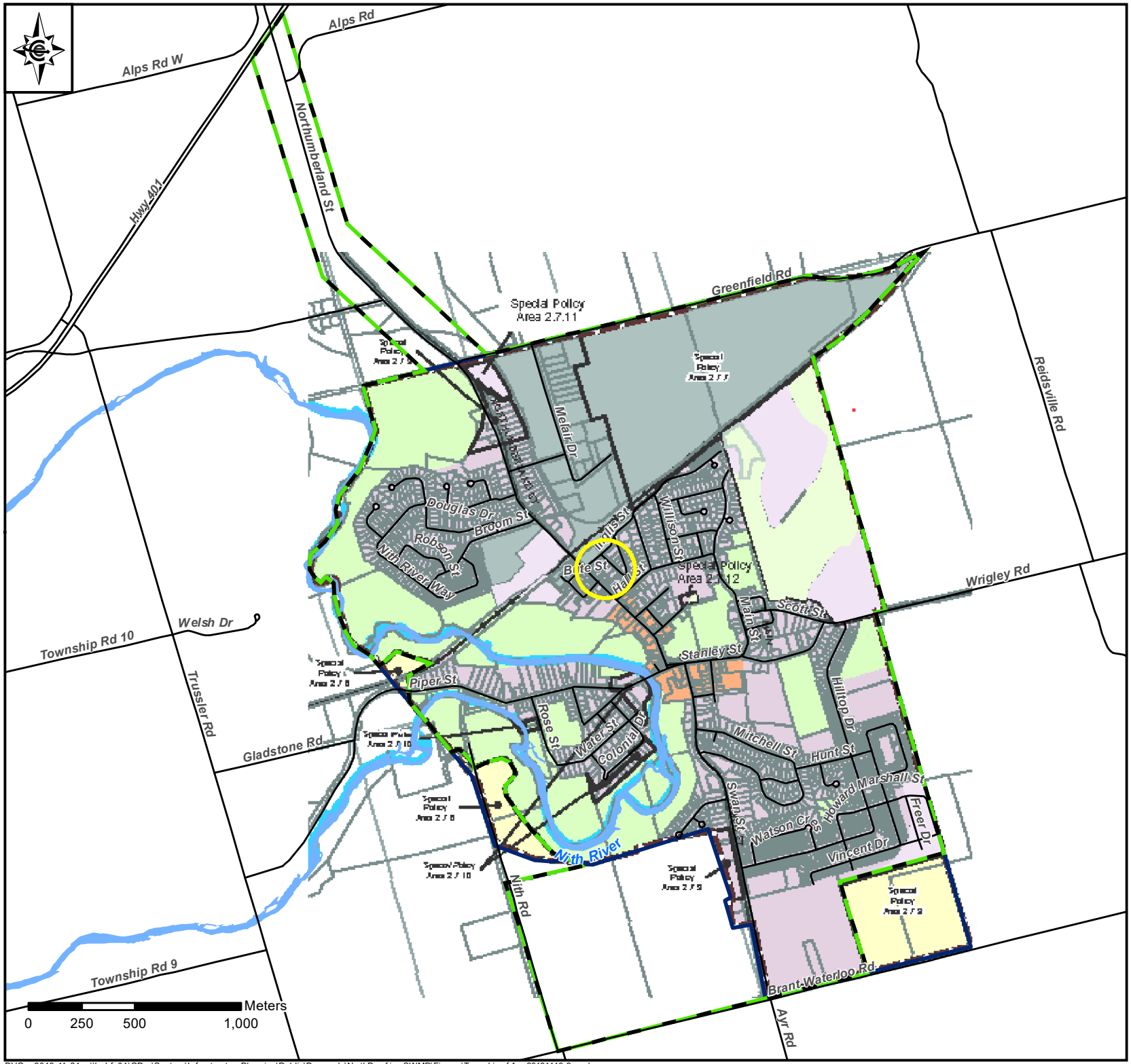

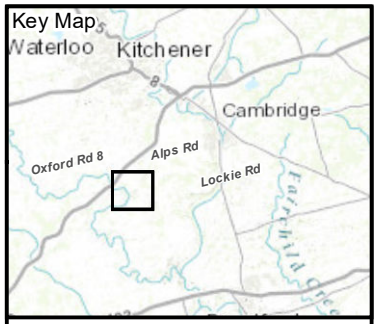

Legend

- Approximate Study Boundary
- Municipal Boundary
- Watercourse

Landuse Type

- Agricultural
- Urban Growth Centre
- General Industrial
- Open Space
- Urban Residential and Ancillary
- Urban Growth Centre

FIGURE 2-1

Ayr Land Use

Township of North Dumfries
Storm Water Management
Master Plan

COLE

Project No.:	Date:
2019-0506	November 2019

DVG 2019-11-21 \\hubfp01\ODrv\Sectors\InfrastructurePlanning\Public\Proposals\NorthDumfries SWMP\Figures\Township of Ayr 20191119v2.mxd

Administration Centre: 400 Clyde Road, P.O. Box 729 Cambridge, ON N1R 5W6

Phone: 519-621-2761 Toll free: 1-866-900-4722 Fax: 519-621-4844 www.grandriver.ca

April 8, 2020

Via Email

Mr. Roy Johnson
Senior Water Resources Engineer-Team Lead
Cole Engineering Group Ltd.
70 Valleywood Drive
Markham, ON L3R 4T5

Dear Mr. Johnson:

Re: **Request for Grand River Conservation Authority Input**
Ayr Stormwater Management Master Plan
Township of North Dumfries

As per your email request of March 25, 2020, the Grand River Conservation Authority (GRCA) has now had an opportunity to review your request to provide background information and input into this study. In support of this request, you have provided the following background information and documentation:

- Request for Proposal (ND-RFP-20-2019), Preparation of a Stormwater Management Master Plan-Community of Ayr and Addenda #1 to 4 (prepared by the Township of North Dumfries); and,
- Response to the Request for Proposal (ND-RFP-20-2019), Preparation of a Stormwater Management Master Plan-Community of Ayr (prepared by Cole Engineering Ltd. and dated January 14, 2020).

General Information and Background

It is our understanding that Cole Engineering was the successful bidder on the Request for Proposal (RFP) to complete a comprehensive Stormwater Management (SWM) Master Plan for the Community of Ayr and were awarded the contract by the Township of North Dumfries. It is our further understanding that aspects of this study will be done under the Class Environmental (EA) process. We further note that the study area includes the entire Village of Ayr plus a corridor along Northumberland Street from Greenfield Road to Highway 401 (refer to the enclosed map).

We note that Cole Engineering is looking for GRCA's input on any specific requirements that should be included in the SWM Master Plan. Further, you have specifically requested the following information:

Member of Conservation Ontario, representing Ontario's 36 Conservation Authorities | The Grand – A Canadian Heritage River

- Input on the rain gauge(s) that the GRCA uses for Ayr and any data associated with them (IDF data, historical records, recommendations on additional gauges, etc.).
- Floodplain mapping along with storm event flows and water levels at Ayr would be useful.
- Contact list for the First Nations so that they can be included as one of the stakeholders.
- Any records or information on the SWM facilities in Ayr.

As you are aware, the GRCA has already provided you with the floodplain models (HecRas) for the Nith River and Cedar Creek and have advised that our GIS mapping is available on our website at https://www.grandriver.ca/en/our-watershed/Maps-and-data.aspx). We have also provided you with a list of First Nations contacts. The GRCA has also advised that we do not have any information on municipally owned infrastructure, such as SWM facilities.

In addition to the floodplains in the Village of Ayr, there are other areas within the study area that are regulated by the GRCA under Ontario Regulation 150/06. The study area is traversed by the Nith River and Cedar Creek and their associated floodplains and areas of steep valley/erosion hazard slopes. Other smaller tributaries of the Nith River are also located within the study area. Further, there are both Provincially Significant Wetlands and other wetlands and their regulated allowances within the study area. Any future development/site alteration within these regulated areas would require the prior issuance of a GRCA permit pursuant to Ontario Regulation 150/06.

The GRCA owns several properties within the study area. The Reinhart, Rear, and Ayr Floodplain properties are 3 of the GRCA's larger landholdings within the study area. Jedburgh and Watson Ponds are part of the GRCA's Upper Mill Pond Property. The GRCA also owns and operates the dam structure on Jedburgh Pond. As such, GRCA property staff may have further comments as the study progresses.

To address your request for rain gauge data and provide input into this study, GRCA staff from Water Resources Engineering, Subwatershed Planning, Natural Heritage Resources, and Water Quality have provided the following comments and information for your review and consideration.

Water Resources Engineering and Subwatershed Planning

- The Township of North Dumfries has asked for a list of approved ETV oil grit separators (ogs). Please make it clear in the report that ETV does not approve ogs', only verifies claims on the ability to remove TSS, and that so far none of the tested ogs' would meet the enhanced criteria, with the exception of filter type units (i.e. jellyfish).

- GRCA will be better able to comment on missing items once a draft report has been circulated for further review and comment.

- The rain gauge in Ayr is problematic and does not have a good enough period of record for IDF data. If you want still want this rain gauge data, please let us know and staff will provide this for you. However, we would suggest that you use an Environment Canada (EC) station for IDF data. For historical data, there is an EC station near Roseville and you should be able to search for the Roseville station using the following link:

  https://climate.weather.gc.ca/historical_data/search_historic_data_e.html

- We can further advise that the climate data set compiled for the Upper Cedar Creek Subwatershed Study (Matrix et al, 2019; as described in section 3.1) is available upon

request. These consist of continuous daily and hourly precipitation and air temperature data from 1950-2016 built using data from Environment Canada's Preston, Waterloo-Wellington, and Roseville climate stations (with gap filling).

- Please note that Cedar Creek, flowing into the Nith River at Ayr, is a cold water stream with brook trout, but the most sensitive reaches of the stream are upstream of the community of Ayr. The consultants have identified the Upper Cedar Creek Subwatershed Study (Matrix et al, 2019) as a resource.

- GRCA-collected aquatic monitoring data for Cedar Creek is available upon request. Data were collected 2015-2018 and include stream levels/flow, stream temperature, surface water chemistry, benthic macroinvertebrates, and fish community. Data 2015-2017 were incorporated into the Upper Cedar Creek Scoped Subwatershed Study (Matrix et al, 2019). There were monitoring sites located up and downstream of the community of Ayr.

- The RFP notes "potential urbanization of lands framing the Northumberland Street corridor, extending from Greenfield Road to Highway No. 401". Some of these lands drain to Eden Creek which has been mapped as cold water. The characterisation phase of the Master Plan should include Eden Creek (the RFP only identifies Nith River and Cedar Creek). A subwatershed study has not been completed for Eden Creek.

- The RFP section on characterisation does not identify Jedburgh or Watson ponds, although they undoubtedly play a role in stormwater management. It is not clear whether they will be considered as "stormwater ponds" for the purposes of the Master Plan. If so, it may be worthwhile engaging one of the Senior Operators in an advisory capacity with respect to operations and maintenance of the Upper Ayr (Jedburgh) Dam. This may warrant clarification with the consultant.

- The RFP lists as an objective "Design and optimize a comprehensive water quality monitoring program based on the existing program". We are not sure what the existing program is. We are not aware of a Township or Regional water quality/stormwater monitoring program. If it's referring to GRCA's program established for the Cedar Creek subwatershed study, they should be advised that water quality sampling was discontinued after 2018 as it was undertaken to support the study and urban area expansions were not anticipated in the near term.

- In addition to the background studies listed in the consultant's email, the following studies are available upon request:

    - Cedar Creek Scoped Subwatershed Study (Phase 1), LGL Environmental, 2002
    - Best Practices Guide for Reducing Urban Non-Point Source Pollution in the Grand River Watershed, AECOM, 2014
    - Grand River Fisheries Management Plan, 2005

<u>Natural Heritage Resources</u>

- In the final paragraph of Section 3.1.2 (Natural Environment) on page 12, Cole has indicated that field investigations to confirm natural heritage feature boundaries are not proposed for this project and has assumed that a desktop review is sufficient. The need for site visits with GRCA staff will depend on the potential for direct impacts on regulated

wetland features and the need to verify wetland boundaries. Recommendations for on-site delineation and verification of wetland boundaries should be made clear in the EA.

- The GRCA's wetland mapping layer should be reviewed in conjunction with the evaluated and unevaluated wetland layer maintained by the Province.

- There is at least one minor wetland mapping discrepancy west of Northumberland Street and south of the RR Tracks. A site visit during the appropriate time of year may be needed to confirm the limits of this wetland. It also appears that a stormwater outlet/outfall has been constructed recently on the north edge of this wetland. It would be helpful to identify any wetlands that have been or could potentially be altered in any way for stormwater management purposes. Wetlands that are now considered to be part of the Township's stormwater management infrastructure should be identified as part of this EA.

- The MNRF has mapped one unevaluated wetland, east of Swan Street and south of Hilltop Drive. This small wetland is not currently mapped by the GRCA but is considered a regulated wetland. Depending on the outcome of the EA, a site visit during the appropriate time of year may be needed to confirm the presence or absence of this wetland.

- With respect to the *Environmental Criteria* described on page 16 of Cole's proposal, we recommend that potential net change on hydrologic water balance and pollutant loadings to natural watercourses **and wetlands** be assessed

Advisory Comments

- Cole Engineering has asked the GRCA to confirm the extent of cold water fish habitat along Cedar Creek. Online mapping information available to the GRCA indicates that the main branch of Cedar Creek and many of its tributaries are currently classified as cold water fish habitat owing to the presence of brook trout and other cold water indicator species such as mottled sculpin. Watson and Jedburgh Ponds are also classified as cold water fish habitat owing to the presence of brown and rainbow trout. Migratory rainbow trout in the Nith River are able to get past the Lower Ayr Dam (privately owned) and into Watson Pond but are not able to get past the GRCA owned and operated Upper Ayr Dam and into Jedburgh Pond. Watson pond is also stocked with brown trout annually by the Ministry of Natural Resources and Forestry (MNRF) for public put-and-take angling. Brook trout are known to spawn above the Upper Mill Pond.

- Fisheries management issues, opportunities and constraints are outlined in the Grand River Fisheries Management Plan Technical Report (GRCA and OMNR 2001), which is available online at:

  https://www.grandriver.ca/en/ourwatershed/resources/Documents/Fishery/Fishery_ManagmentPlan_TechReport.pdf.

  For example, the impact of online ponds and stormwater discharge (i.e. sediment and nutrient loading, thermal impacts) on water quality and cold water fish species in particular is a concern.

- The watercourse associated with the Cedar Creek Tributary and the McCrone's Lake Tributary are classified as warm water fish habitat. Both watercourses appear to be situated outside the current study area.

- Two ANSI's are located within or near the study area: Turnbull Lake and McCrone's Lake. Additional detail may be obtained from the MNRF Guelph District Office.

- For current information on occurrences of Federally- and Provincially-listed Species At Risk, please contact Fisheries and Oceans Canada (DFO) and the Ministry of the Environment, Conservation, and Parks (MECP).

Water Quality

- If the consultant is looking for water quality data, there are two main sources – the MECP and the Region of Waterloo. Water quality data for the Nith River is available from MECP as part of the Provincial Water Quality Monitoring Network (PWQMN) at the website below. The Region of Waterloo also has a comprehensive surface water monitoring network around its wastewater treatment plants and there are some monitoring locations on the Nith River upstream and downstream of the Ayr WWTP, which could be used to inform the background conditions in the receiver. This data would have to be requested from the Region of Waterloo. Further data on water quality monitoring is available through this link:

  https://data.ontario.ca/dataset/provincial-stream-water-quality-monitoring-network

We appreciate the opportunity to provide input into this study. We would further appreciate being involved and participating in the review of this study and EA process going forward. Further, I will be your main contact at the GRCA. If you require any specific items listed above, please let me know and I will make arrangements with the appropriate GRCA staff.

If you have any further questions or require clarification, please do not hesitate to contact me at 519-621-2763 ext. 2233 or jbrum@grandriver.ca.

Yours truly,

John Brum
Resource Planner
Grand River Conservation Authority

JB/

Encl.

cc. Andrew McNeely, Township of North Dumfries (via email)

REQUEST FOR PROPOSAL

Preparation of a Storm Water Management Master Plan - Community of Ayr

The Corporation of the Township of North Dumfries

ND-RFP-20-2019

Closing: 23 December 201915 January 2020 at 2:00:00 PM

OFFICE

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DELIVERY ON-TIME: QUALITY LEADERSHIP RESOURCES

COLE

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14 January 2020

Ashley Sage, Clerk
Township of North Dumfries
North Dumfries Community Complex
2958 Greenfield Road, P.O. Box 1060
Ayr, Ontario N0B 1E0

Re: Preparation of a Stormwater Management Master Plan - Community of Ayr
ND-RFP-20-2019
DUE Wednesday, January 15, 2020 @ 2:00:00 PM

Dear Ms. Sage;

COLE is pleased to submit 1 original and 2 unbound copies in response to the Request for Proposal for the Preparation of a Stormwater Management Master Plan in the Community of Ayr, Ontario.

In accordance with the Request for Proposal requirements, we have included the following mandatory and non-mandatory requirements in Appendix A:

- Submission Form – Appendix A
- Proof of Ability – Appendix B
- Contractor Health and Safety Form – Appendix B
- AODA Contractor Compliance Forms – Appendix B
- Acknowledgement of receipt of Addenda 1 through 4
- List of Subcontractors – Appendix B
- Schedule of Items & Pricing Response Form – Appendix D

As always, we strive to provide cost-effective engineering services which exceed the high standards our clients have to come to expect. We trust that the information enclosed within this submission meets your approval. We look forward to working with you to achieve your vision.

Yours sincerely,

COLE ENGINEERING GROUP LTD.

Robert McCollum
Chief Operating Officer

Roy Johnson, P.Eng.
Project Manager

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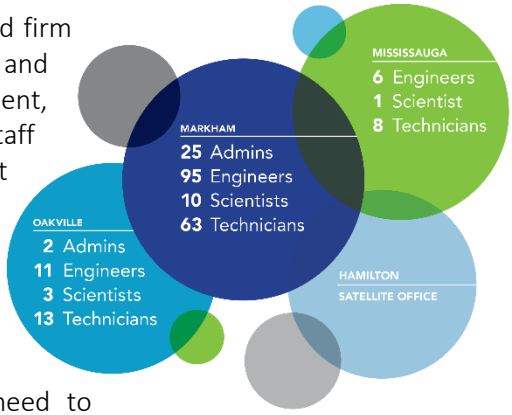
1 Company Profile

Founded in 2003, Cole Engineering Group (COLE) is an employee-owned firm that provides consulting and advisory services in planning, engineering, and public–private partnerships in the water, transportation, urban development, and environmental sectors. With offices across southern Ontario and a staff complement of more than 200, COLE is now one of the largest independent consulting engineering firms in the province.



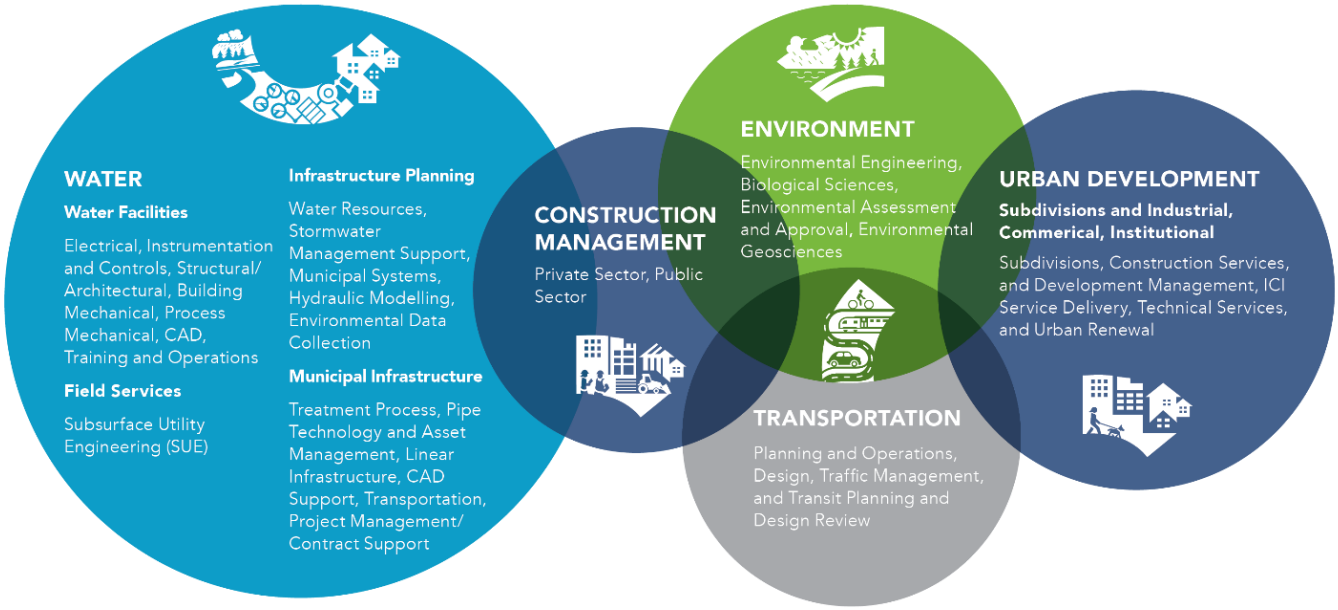
COLE has one of the largest multidisciplinary Ontario-based resource pools in the market, allowing us to provide comprehensive in-house services and expertise for our clients. We also have an end-to-end project management approach which allows us to manage our workload to better prioritize our commitments to our clients, without the need to outsource to third-party companies.

Our Corporate Brochure and copies of Insurance and WSIB certificates are included in Appendix B. Also included in Appendix B are COLE's membership in professional associations and a list of our corporate directors.

Our clients choose COLE to deliver engineering services for our integrated environment, professional approach and dedication to excellence. Our work has involves working with and for other cities and towns throughout Southern Ontario as well as Federal and Provincial Government bodies. Our major public sector clients include:

- Regions of: York, Durham, Halton, Peel, Niagara, Waterloo;
- Cities of: Hamilton, Toronto, Vaughan, Markham, Mississauga, Burlington, Brampton, Guelph, Peterborough;
- Towns of: Richmond Hill, Oakville, Newmarket, Aurora, Caledon;
- Ministries of: Transportation, Natural Resources and Forestry, Environment Conservation and Parks; and
- Authorities of: Toronto and Region Conservation, Lake Simcoe and Region Conservation, Central Lake Ontario Conservation, Credit Valley Conservation.

Our comprehensive multidisciplinary service offerings include the following:



COLE's philosophy is framed by its Mission, Vision, and Values:

COLE Mission

To take pride in providing innovative, sustainable, and value-added solutions to our clients.

COLE Vision

To be the preferred consulting firm and employer of choice.

COLE Values

To ASPIRE to offer our clients and communities the very best in who we are, and what we do, by embracing the values of Accountability, Synergy, Passion, Integrity, Respect, and Excellence.

Our Water Resources group provides a variety of services which position COLE well to undertake this assignment, including:

- Agency approval and permit expediting
- Detailed design of SWM infrastructure
- Drainage Area Studies
- Low impact development modeling and design
- Sewer capacity analysis
- Stormwater Master Planning

1.1 Subconsultants

- Myler Ecological Consulting: Mr. Barry Myler is a fisheries specialist who will be primarily responsible for reviewing existing aquatic habitat conditions across the study area and commenting on how these conditions affect stormwater management planning.
- LGL Limited: LGL will review the existing terrestrial environment and ecology. LGL's effort will be led by Allison Featherstone. This review will help to identify existing natural areas and natural features that will affect siting opportunities for stormwater facilities, and which could affect requirements for maintaining local hydrologic water budgets.

2 Project Understanding

The Community of Ayr requires completion of a Stormwater Management [SWM] Master Plan [SWMMP] following a Master Planning approach in accordance with the Environmental Assessment Act as outlined by the Municipal Engineer's Association Municipal Class Environmental Assessment (MEA), October 2000, as amended.

The Study is to focus on the Urban Area of the Community of Ayr (existing and emerging), as illustrated in the Township's Official Plan [AOP]. The Township also requires an analysis through this Study on the potential urbanization of lands framing the Northumberland Street corridor, extending from Greenfield Road to Highway No. 401. Refer to Figure 2-1.

The SWMMP will serve as a decision support tool, a methodology for the prioritization of works, a means to estimate future SWM requirements and costs and a transparent community process by which the Township can establish stormwater management guidelines and policies for the next ten to fifteen years.

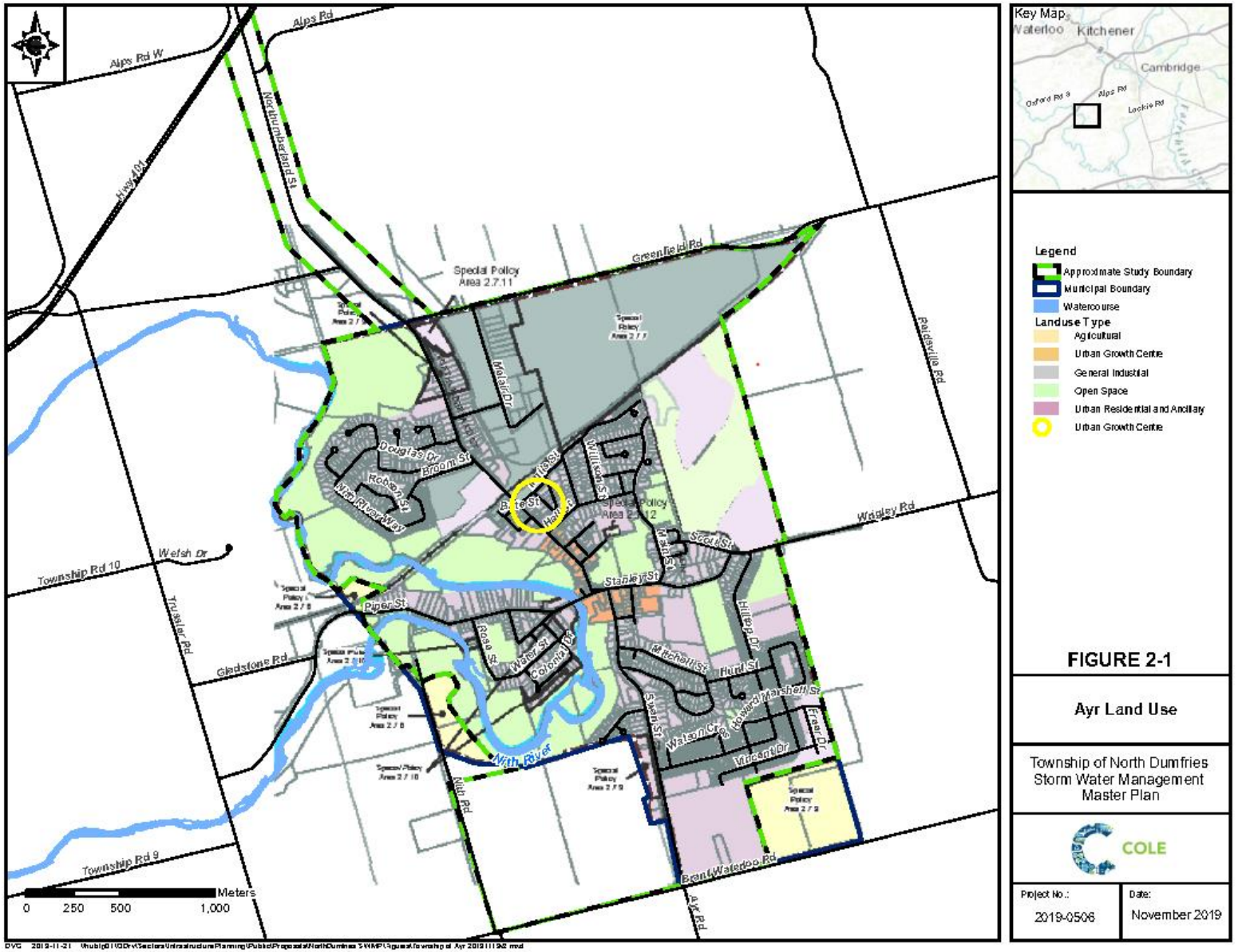


Figure 2-1 Ayr Land Use

The SWM Master Plan shall be an integrated approach that considers flood and erosion control, groundwater and surface water quality management, natural heritage environment management and infrastructure. In addition, the plan shall integrate existing policies, regulations, acts and guidelines and where appropriate develop new policies and design guidelines to aid in implementation and shall do so within a water sustainability context. In addition, the SWMMP should provide a framework for the provision of a stormwater utility tax.

COLE will work closely with the Township to ensure that the goals of the SWMMP can be accomplished in an effective and efficient manner. Based on Addendum #4, there may be challenges working within the budget set out to Council, and COLE will work with the Township to deal with these issues.

2.1 References

In preparing this proposal, we have referenced the following documents:

- *Grand River Watershed Water Management Plan*. 2014. Prepared by the Project Team, Water Management Plan. Grand River Conservation Authority [GRCA], Cambridge, ON [GRWWMP];
- *Nith River Flows*, Grand River Conservation Authority Website;
- *Preparing for Flooding, A Guide for Residents of Ayr*, prepared by GRCA [Ayr Flooding];
- *Township of North Dumfries Official Plan*, Consolidation Date: November 2018 [AOP];
- *Upper Cedar Creek Scoped Subwatershed Study*, prepared by Matrix Solutions Inc. et al, dated October 2019 [UCCSSS];
- *Waterloo Regional Official Plan*, Chapter 8 Consolidated New ROP, 2015 [WROP]; and,
- *Addenda #1-4* provided by the Township.

2.2 Background

The Community of Ayr has a population of approximately 5,000 persons and is anticipated to increase to a population of 10,000 to 11,000 persons by 2031. Increases in population require residential and employment lands, which increase the impervious cover of existing lands, and the stormwater which runs off during events requires mitigation. The SWMMP will provide specific recommendations for SWM measures to mitigate urban growth in the Study Area.

The Ayr Urban Area is designated on Maps 2 and 2.1 of the AOP. This designation is intended to serve as the primary focus for growth and development in the Township to the year 2031. Development within this designation will provide for a range of residential, commercial, employment, recreational and institutional uses. Future development within the Ayr Urban Area will be directed predominantly to the Urban Growth Centre and Designated Greenfield Area.

A goal of the AOP is to concentrate most of the growth in the Township within the Ayr Urban Area, with limited growth in designated Rural Settlement Areas and Rural Employment Area where municipal services can be provided in a cost effective and environmentally responsible manner.

The Township will encourage the provision of new dwelling units in built-up areas in the Ayr Urban Area and existing Rural Settlement Areas, through infill, conversion, intensification or redevelopment compatible with surrounding uses, except where infrastructure is inadequate or there are significant physical constraints.

The SWMMP will provide guidance for future development in these areas, including an overview of opportunities and constraints for SWM measures.

2.3 Surface Water

Ayr lies at the confluence of the Nith River and Cedar Creek, which generally flow north to south. There is a stream flow monitoring station in Ayr upstream of the confluence. Approximately 74.51ha drains to the Cedar Creek at Ayr Gauge. Regional flows at that gauge are 90.35m^3/s, per UCCSSS.

Nith River: The Nith River drains the western part of the Grand River watershed in Waterloo Region as well as Brant and Oxford counties. In the northern part of the river, water runs off the land quickly so flows can rise and fall quickly. Demand for water is high in the southern part of the river where farm irrigation is common. Typical summer flow in the Nith River at Ayr is 2.6m^3/s, with low lying areas flooded at 110m^3/s. Per Ayr Flooding, the Regional event flow is approximately 600-800m^3/s.

Cedar Creek: The UCCSSS is intended to guide and coordinate decision making by the Region, area municipalities, the GRCA and others involved in development planning, subwatershed stewardship and restoration. Cedar Creek supports a coldwater brook trout fishery and drains primarily agricultural lands, remnant natural woodlands, and low-lying wetlands south and west of the Cities of Kitchener and Cambridge, respectively. The northern part of the subwatershed is bisected by the Highway 401 corridor. The main Urban Area is the community of Ayr, in the Township of North Dumfries, located at the confluence of Cedar Creek and a meandering section of the Nith River.

2.4 Upper Cedar Creek Scoped Subwatershed Study (UCCSSS)

2.4.1 Hydrology Modeling

The study completed a continuous simulation using a calibrated GAWSER hydrologic model which applied the precipitation and temperature data from the Roseville Gauge.

The report makes various recommendations for SWM mitigation, including:

- Any potential development should be required, at a minimum, to maintain existing groundwater recharge rates.
- Potential urban developments shall only discharge stormwater offsite at an approximately similar frequency, rate, and volume as is occurring under baseline conditions. Stormwater that is not discharged offsite should be infiltrated.
- Potential urban developments shall only discharge stormwater offsite at an approximately similar frequency, rate, and volume as is occurring under baseline conditions.
- Infiltration of potentially contaminated water shall only be performed in areas where there is a lessor chance of the contaminated water reaching the municipal supply aquifer. Runoff from areas that are more likely to be contaminated (e.g., roads, sidewalks, parking spaces) should be directed toward end-of-pipe recharge facilities that are sited outside those lands that contribute recharge to AFD1. Water entering these facilities should undergo appropriate quality treatment prior to infiltration. This quality treatment may include capturing spring freshet flows to capture salt-laden water for subsequent pumping to the sanitary system or evaporate during the following summer months.

2.4.2 Existing Concerns

Per the GRWWMP and Ayr Flooding, Ayr is located within an Existing Flood Damage Centre (a community that has several structures located within the floodplain). Ayr experiences frequent nuisance flooding.

An initial review of flooding in Ayr suggests that there are few practical options to reduce flooding to the most frequently flooded properties along Tanner Street. Next steps will focus on flood preparedness,

implementing flood inundation mapping and increasing awareness of those residents located in the floodplain. Damages to property and a risk to life can occur during significant flood events. Therefore, the GRWWMP Team recommends that additional ways to reduce the flood damage potential in the community of Ayr be investigated.

2.5 Source Water Protection

Based on Map 4 Source Water Protection Areas, AOP, there are three Municipal Wellheads in Ayr. Ayr is not located in a Regional Recharge Area. The downtown core, including the Urban Growth Centre is within WPSA-4, with the remainder of the northeast portions of Ayr located in WPSA-5. Refer to Figure 2-2.

Per the WROP, those areas are defined as:

- WSPA-4: delineates medium sensitivity areas found within the two year time of travel to a municipal drinking-water supply well; and
- WSPA-5: delineates medium sensitivity areas found outside of the two year, but within the ten year time of travel to a municipal drinking-water supply well.

Development applications within all Source Water Protection Area designations will comply with the following:

(a) Employment uses that would direct infiltration of stormwater run-off without pre-treatment through the use of drywells or artificial/enhanced recharge will not be permitted; and

(b) Employment uses that would require new water taking for industrial/commercial purposes and/or for irrigation purposes, except for water taking associated with mineral aggregate operations will not be permitted.

Development applications within the WPSA 4 designation will comply with the following: underground parking garages, individual wastewater treatment systems, private wells, pipelines, sewers, stormwater management ponds (or other ponds) and plans of subdivision or vacant land condominiums may be permitted subject to further study in accordance with Policy 8.A.4.

Development applications within the WPSA 5 designation will comply with the following: Category 'D' uses and plans of subdivision or vacant land condominiums may be permitted subject to further study in accordance with Policy 8.A.4.

Based on the foregoing, stormwater infiltration may not be allowed in some areas. SWM most comply with Policy 8.A.4. The studies requested will vary based on the location of the development application relative to the sensitivity of the Source Water Protection Area and its proximity to a municipal drinking-water supply well or surface water intake. Studies submitted by the owner/applicant will demonstrate that the proposed use will not negatively impact the quantity and/or quality of drinking-water resources in Source Water Protection Areas for the development application to receive approval.

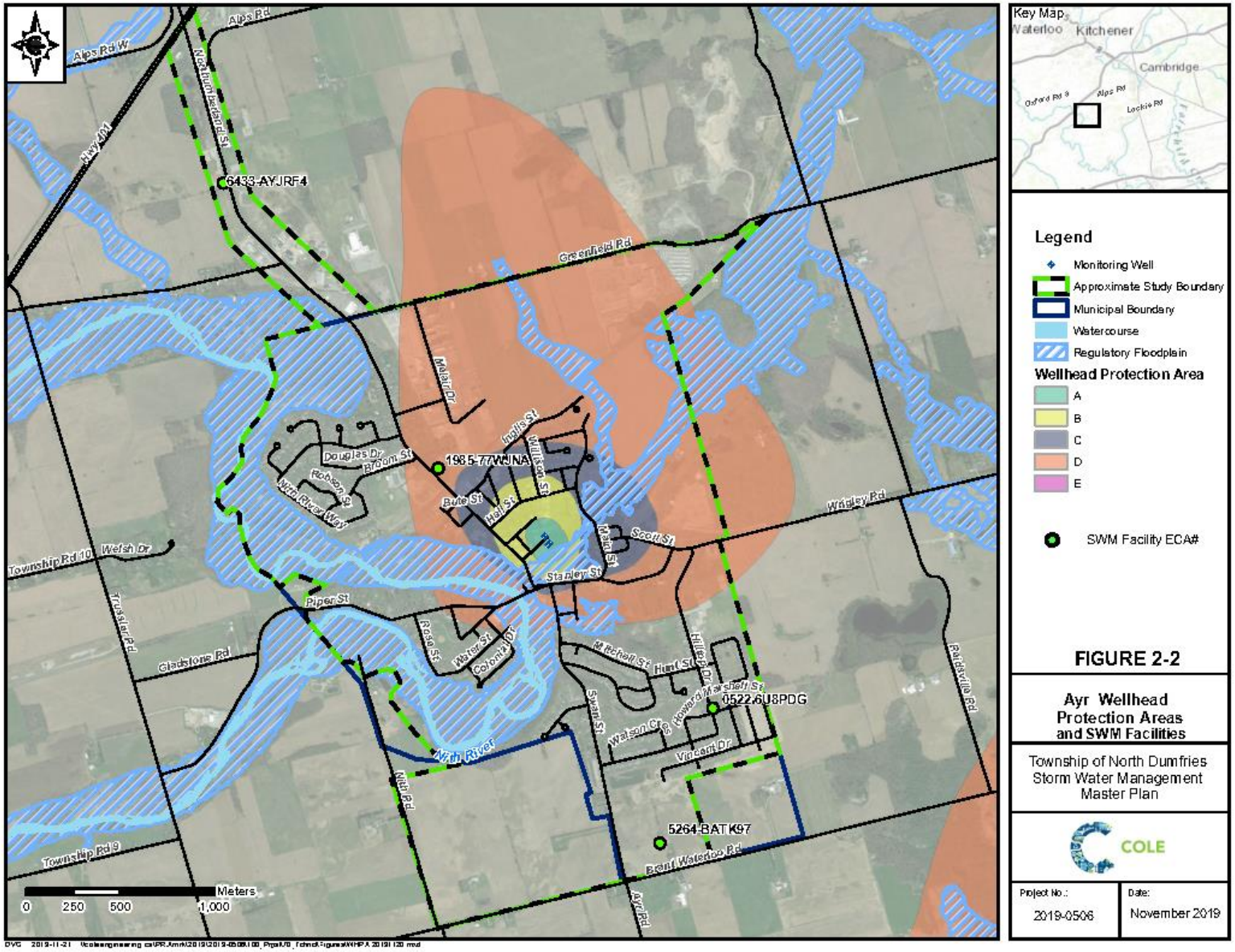


Figure 2-2 Ayr Wellhead Protection Areas and SWM Facilities

3 Approach / Methodology

COLE, after review of the RFP, has developed a detailed methodology to complete the proposed assignment. Our proposed time task matrix, indicating the time that each proposed team member will spend on the project, is located in Appendix E. The following section discusses the approach proposed by the Project Team. In order to keep our submission brief, we have focused on the key aspects of the project and we confirm that we will comply with all requirements as outlined in the RFP document.

In all respects, COLE's skills and experience will meet the needs of this project. Our team's general approach to managing this project will be based upon the following cornerstones:

- Proactive Communication between the Township and Cole Engineering Project Manager: Given the demanding timelines and the complexity of the work, timely and effective communication between the COLE Project Manager and the Township's Project Manager is mandatory. Our approach to managing this challenge is to schedule in advance regular (bi-monthly (once every two months)) progress meetings with the Project Manager. These meetings will provide a status report on the work, deliverables, and potential issues and how they are being managed. These are recommended to be conference calls.
- Ongoing Internal Co-ordination: The Project Manager and senior Cole Engineering staff will oversee the timely delivery of all aspects of the project.
- Pre-Set Milestone Delivery Dates: Co-ordination of client meetings, presentations and agency meetings often become the critical path for delivery of engineering design and environmental study products. A cornerstone of our schedule management will be to lock in dates for these meetings at the project outset. Combined consultant/client commitment to these dates will focus energies on delivering high quality design/environmental products to meet the pre-determined deadlines.
- Proactive Issue Identification and Management: We will anticipate, seek out, listen and manage client, agency and stakeholder's concerns as an integral part of our work. The depth and breadth of skill and experience of the senior members of our team, will allow us to effectively work together in this way.
- Effective Use of Senior Consultant Resources and Use of a Project Advisor: In order to ensure that the project will remain on track and will be completed efficiently, members of the Project Team will have clearly defined roles and will delegate with accountability of responsibilities. There will be a high level of back-up bench strength to protect the project interests in the event of unforeseen availability of a key team member or an unanticipated issue requiring urgent attention.

The Project Advisor, Harold Chard, M.Sc., P.Eng., will act in support of the Project Manager, Roy Johnson. Should the Project Manager be unavailable for any critical events, Harold can act as a substitute on a temporary basis.

QA/ QC Project Specific Plan

COLE will develop and implement a project specific QA/QC Plan to address all aspects of the project. All engineering deliverables will be sealed by a Professional Engineer. The QA/QC plan will address the following points:

- Control of non-conforming work
- Control of technical work
- Corrective actions
- Document control
- Document quality system
- Management responsibility and commitment
- Quality audits
- Quality milestone reviews
- Quality records
- Quality technical reviews

Will Heywood, P.Eng., will be responsible for enforcement of the QA/QC plan. At a minimum, he will review all major deliverables, and submit a signed checklist to the Township advising of the results of his review.

Schedule Control

Our proposed Project Schedule is enclosed in Appendix C. COLE's Project Manager, Roy Johnson, with the support of the Project Team, will enforce internal deadlines and notify the Township of any delays in obtaining requested information. Delays caused by the Township and/or other outside parties will be immediately brought to the attention of the Township and reflected on the project schedule. In consultation with the Township's Project Manager, contingency plans will be developed and, where possible, additional qualified staff will be utilized to overcome any delays. Other options to address delays will also be considered including recognizing the problem at an early stage and undertaking some components of the project simultaneously.

Meeting Class EA Requirements

COLE's approach to completing a Class EA, is one of open involvement of all affected stakeholders early in the process. It is therefore proposed to inform the public through multiple points of contact, exceeding the requirements under the Class EA process.

Stakeholder List

A first step in the project will be to prepare a comprehensive list of stakeholders to consult to fulfill the Class EA Master Plan process. This list will be based on parties identified by the Township as being interested in this or similar projects, as well as approval agencies and First Nations. During the full course of the project, the project stakeholder list will be maintained, and interested parties will be added for future mailings. We have assumed that the cost of publishing all notices in local newspapers and the cost of facilities for public meetings will be paid directly by the Township.

Notice of Commencement

A Notice of Commencement to be published on the Township's website and in local newspapers. The notice will also be directly mailed to the stakeholders list. A draft notice will be developed immediately after contract award and will be provided to the Township for review at the project kick-off meeting. The notice will contain the problem/opportunity statement for the project and invite the public to comment and/or join the project mailing list.

Notices of Public Information Centres

The RFP requires that three Public Information Centres (PICs) be held through the course of this project. Notices of PICs will be published approximately four (4) weeks in advance of the PIC. The notice will also be directly mailed to individuals and organizations on the stakeholder list. COLE will prepare draft notices for review by Township staff.

Public Information Centre

Given the scope of the work (equivalent to a Schedule B Class EA) and the scheduling noted in Addendum #3, COLE recommends that only two PICs be held to provide the public with an opportunity to review the problem/opportunity statement, potential alternative solutions, our proposed evaluation criteria and, finally, our recommended preferred solution. It is anticipated that each of the PICs will be an "open house" come-and-go format, with a presentation at a scheduled time.

Opinions and information gathered from this PIC will serve to guide the Master Planning process into the final stages of alternative consolidation and prioritization.

Notice of Completion

A Notice of Completion will be developed to provide the public with a final opportunity to comment on the project. The Notice will indicate the conclusions of the Master Planning/EA process, and will indicate where copies of the Master Plan can be reviewed. The Master Plan must be completed to document the Class EA process and must be filed for a 30-calendar day public review.

3.1 Task 1: Study Area Characterization

The project initiation will include a start-up meeting with the Township's staff. At this meeting the proposed work plan and project schedule will be confirmed.

3.1.1 Information Gathering and Review

Prior to the meeting, a list of information and existing data required by the Project Team will be developed and provided to the Township so that the required exchange can occur at the start-up meeting.

It is assumed that the Township will provide, according to the RFP documents:

- GIS Mapping layers, including watercourses, property boundaries, existing and/or future Official Plan land use; natural features mapping; natural hazard areas or zones including regulatory floodplain zones; and any other relevant GIS layers that the Township can supply.;
- LIDAR and/or existing digital elevation models for the Study Area;
- Stormwater Management Reports for any developed areas with the Study Areas;
- List of stakeholders
- Available record drawings, base plans, reports, digital ortho photography, and other relevant existing information.
- Existing SWM pond assessments with their respective design reports, as available.

We will review the information supplied by the Township and identify any significant gaps in the available information that could affect this project. We will then discuss with Township staff the most practical way to address these gaps. Examples of potential data gaps are:

- Existing storm sewer information;
- Drainage area information outside of settlement areas;
- Drainage areas to oil grit separators;
- Drainage areas to uncontrolled outlets; and,
- Existing SWM Pond IDs and reports.

As noted in Addendum #3, the Township does not have GIS information on existing storm sewers. As a result, no analysis of the system can be completed without a survey or other information on how the existing system was designed or built. This is critical to meeting the timelines outlined herein.

In preparing this proposal, the Ministry of the Environment, Conservation and Parks [MECP] Access Environment website was used to search for Environmental Compliance Approval (ECAs) in the Study Area. We located two Oil-Grit Separator (OGS) ECAs, and three SWM Facility ECAs. The MECP should also be consulted for possible additional ECAs. We understand from Addendum #3 that there are four SWMFs. Refer to Figure 2-1.

The SWMMP shall include an evaluation of the cumulative environmental impact of stormwater from existing and planned development. Existing and proposed land use within the Township can be classified

into several categories, including: parks, open space, recreational mixed areas, residential, institutional, commercial, and employment. Those areas will be assessed via hydrologic modeling for changes in runoff quantity and quality for existing and proposed conditions. We will review that available land-use mapping to determine whether it is adequate to support the required hydrologic analyses. If necessary, the mapping of existing land use will be refined based on review of available aerial photography.

The most significant water quality issue in the Grand River Watershed is the eutrophication of the river from both anthropogenic and natural sources. Eutrophication results from excessive loadings of nutrients, specifically nitrogen, phosphorus and/or carbon to freshwaters, resulting in increased growth of aquatic plants and algae. It is our understanding that in the case of the Grand River, the nutrient of most concern in phosphorus.

We will review the available information and develop estimates of existing phosphorus loadings to the Nith River attributable to existing stormwater discharges, and the potential change in loadings that might result from the foreseeable land development. This will help put future development in context and help to define what mitigation measures may be required as part of the overall SWM strategy.

3.1.2 Natural Environment

Desktop assessments of the natural environment will be completed by terrestrial and aquatic biologists. COLE's team includes the following sub-consultants who will be responsible for these reviews:

- Myler Ecological Consulting: Mr. Barry Myler is a fisheries specialist who will be primarily responsible for reviewing existing aquatic habitat conditions across the study area and commenting on how these conditions affect stormwater management planning.
- LGL Limited: LGL will review the existing terrestrial environment and ecology. LGL's effort will be led by Allison Featherstone. This review will help to identify existing natural areas and natural features that will affect siting opportunities for stormwater facilities and which could affect requirements for maintaining local hydrologic water budgets.

The main natural heritage features in the study area are the Nith River, Cedar Creek and several wetlands such as the Turnbull Lake Charlie Creek Wetland Complex, the Roseville Swamp and Cedar Creek Wetland Complex, and the Greenfield Swamp, all of which are provincially significant. Little Turnbull Lake Wetland is provincially significant and is also an Area of Natural and Scientific Interest (ANSI). In addition to designated features, several Species at Risk (SAR) in the study area. These include, but are not limited to:

- Blanding's Turtle;
- Bobolink;
- Eastern Meadowlark; and
- Eastern Ribbonsnake.

Through the Master Planning process the potential for impacts to terrestrial natural heritage components within the project area will be identified as part of the evaluation of the existing conditions as well as the evaluation of alternative solutions for the management of stormwater. The focus will be on screening to document site conditions and recommending any mitigation measures that may be required for the preferred SWM strategies. We will also identify any other studies that may be required at future phases of the Master Plan.

Our approach to the evaluation of natural heritage features will be to review, from a desktop basis, all natural heritage features that can be taken into consideration in early planning stages. The desktop review will focus on collection of available information from Grand River Conservation Authority (GRCA), Department of Fisheries and Oceans (DFO), and Ministry of Natural Resources and Forestry (MNRF) through

access to online resources and formal GIS data requests to agencies. Background data collection will include a review of available data such as designated natural features, vegetation communities, vascular plant lists, records for rare plants, atlases etc. A high level Ecological Land Classification (ELC) of vegetation communities will be completed using ortho-imagery. The ELC will then be used as part of the wildlife habitat characterization. Available background information will be used to characterize the wildlife habitat and communities in the project area and compile a summary species list for the study area.

In order to address the most current species at risk (SAR) requirements, LGL proposes to complete a SAR Screening, whereby consultation with the MECP will be undertaken to confirm a current SAR list for the project area and identify any known concerns regarding SAR. Species identified as endangered or threatened under the Species at Risk in Ontario (SARO) list are afforded protection under the Endangered Species Act, 2007 (ESA). The purpose of efforts with regard to SAR during the Master Plan preparation will be to first identify potential concerns early in the process to avoid impacts to these species through site selection and/or mitigation to the extent possible. Where SAR and their habitat cannot be avoided, LGL will identify potential impacts associated with the proposed strategies to ensure consideration for mitigation and recommendations for permits/approvals (if necessary) specific to SAR are carried through to future phases of the project.

Field investigations to confirm the limits and extents of natural heritage features documented through the background review, are not proposed for this project. It is assumed that a desktop screening is sufficient.

3.2 Task 2: Analysis and Assessment of SWM System

The information gathering and review completed under Task 1 will feed directly into Task 2. The RFP has set out clear requirements for Task 2, and the following describes COLE's approach.

3.2.1 Storm Sewer

To assess the existing capacity of the municipal storm drainage system, COLE will develop a hydrologic model using PCSWMM or Rational Method, as determined through consultation with the Township. That is, it will include the municipal storm sewer pipe network and its inlet, and will also include the overland flow pathways as conduits within the model.

- The storm pipe network and inlet types and locations will be based on available geodatabase information supplied by the Township, supplemented by some review of available record drawings to fill in missing pipe information as needed to complete a working model.
- Overland flow pathways and conduits will be developed based on review and processing of the available LiDAR dataset to be supplied by the Township.
- Inlet capture capacities will be based on available information sources such as MTO's Drainage Manual; supplemented by field reconnaissance by COLE staff to confirm the catchbasin grate types currently in place.
- Surface runoff catchment areas draining onto roadways or into specific inlets will be delineated within the available mapping and Li9DAR information, with catchment imperviousness based on available land-use mapping supplemented by sampling of selected representative areas using the available aerial photography.

Once the model has been built, it will be tested to ensure that internal connectivities are appropriate, and that the model is providing what can be considered reasonable results when rain events such as the 2-year, 5-year, 25-year and 100-year events are applied to the model.

3.2.2 Climate Change

Climate change refers to the long-term trend in the change of the world's weather patterns, including changes in average temperature and rainfall distribution. Stormwater runoff is intrinsically a function of rainfall, therefore change in the intensity, duration, and frequency of rainfall events has an impact on runoff, and the response of stormwater systems. Aquatic habitat health is also linked to temperature. The impacts of unmitigated climate change on storm infrastructure will be assessed.

For this Study, we could investigate using Station G6140954 (in the Grand River Region) as a basis for comparison, then modifying the existing Township IDF curves by applying the percent change in rainfall intensities used in Sta G6140954. We could then develop updated IDF curves for the 5-year and 100-year return periods for future conditions. Then, the effects of climate change on conveyance systems could be assessed by comparing future rainfall intensities to existing, specifically, comparing the 5-year intensities with an inlet time of 10 minutes, as these are representative of minor system conveyance structure requirements.

The potential effects of climate change on rainfall intensity-duration-frequency (IDF) statistics across southern Ontario have been explored by various researchers. The MECP has created the Ontario Climate Change Data Portal (http://ontarioccdp.ca/) that provides project changes in air temperature statistics and rainfall IDF curves for a set of 25km x 25km map grid squares that cover the Province. This provides a valuable resource of information that can be used to assess the potential impacts of increased frequency or intensity of heavy rainfall within and around Ayr. COLE's proposed approach will be to extract future IDF curves from the OCCDP and apply them within the PCSWMM model. A particular issue is what change might be expected in the magnitude of the 100-year rain event, and resulting impact on local flooding issues and stormwater system capacity.

3.2.3 Erosion Assessment

The RFP set out clear requirements about identifying existing erosion sites (by creek reach). This will feed into evaluating level of risk to public health and safety and environment, and alternatives for restoration.

COLE staff will complete a site walk of the relevant Reaches within the Study Area to identify potential areas of erosion concern and prepare a photo log to illustrate and describe any erosion sites. COLE will identify erosion sites based on the site visit and summarize them in a table.

Any sites that may affect public safety will be identified, and the Township so advised; and in such cases we would recommend further evaluations be undertaken for the Township by geotechnical specialists to better define the level of risk and advise the Township accordingly.

Priority areas of concern will be identified, including debris jams within the channel that could cause channel flows to back up into nearby residential/commercial properties, causing flooding concerns; perched culverts that have the have potential to cause problems with structural integrity of the road material, etc. Given the size of the Nith River and Cedar Creek, outfall erosion may be of greater concern than the watercourses themselves, given the large upstream areas contributing flow.

Recommendations will be developed for future development purposes to ensure that the erosion control component of ponds will be sufficient. These may include completing a detailed fluvial assessment in problem reaches, including cross-sectional surveys, establishment of erosion thresholds, and identification of critical reaches/flows; developing an erosion model to determine if retrofits to existing facilities would be effective at mitigating existing erosion issues; using the erosion model developed above to evaluate impacts of development and whether extended detention levels provided by the ponds would be enough to mitigate the erosive effect, or if additional LIDs would be required.

3.2.4 Stormwater Management Facility Assessment

A main component of the Project includes an assessment of the Township's current stormwater infrastructure. This assessment will require a visual inspection of stormwater ponds, including all 4 SWM ponds. The objective of this stage is to produce all necessary field data to be used in subsequent stages of the project.

Using data gathered from the background review and field investigations, the needs of each stormwater management facility will be assessed. Obvious maintenance requirements such as deteriorated structures, eroded slopes or outlets and adverse sediment accumulation will be determined and reported in this step.

Rain Gauge Network

A rain gauge monitoring plan will be developed to provide the Township with a well distributed, and easily maintainable gauge network. Appropriate locations for monitoring will be identified allowing for sufficient data coverage and will be selected based on the suitability of potential sites for monitoring equipment installation and maintenance. Careful location planning and equipment selection will allow for an efficient, cost-effective maintenance plan and will maximize the likelihood of successful data collection.

COLE has extensive experience in this field having developed, installed, and maintained many permanent and temporary rain gauge networks ranging from 1 to 20 telemetered and logged gauge locations within an individual municipality. Gauge locations have been planned and operated throughout Toronto, Mississauga, Brampton, Hamilton, Guelph, Peterborough, Barrie, Wellington North, Cannington, Sunderland, and more.

Field Assessments

All field work will be completed by Cole Engineering staff. We own all necessary equipment and have fully trained staff that will complete all field work. Our field staff has inspected over 200 facilities in the past few years and are very familiar with data collection and facility component assessment.

Two people will visit each of the ponds to perform a visual inspection of the general condition of the pond, access roads, vegetation, overland flow routes, inlet/outlet headwalls. Access requirements (keys, arranging field meetings with Township staff, etc.) will be discussed with Township staff at the onset of the study.

The facilities condition will be documented using the field forms as well as dated digital photographs. Digital geo-referenced photos will also be taken of the periphery land use and general facility layout for inclusion into the SWM facility database. The initial condition assessment will include condition rating of all assets as documented during the field inspection and confirmed by our Project Engineer and Project Manager.

The field data will be collected by qualified one or two-person team equipped with either a GPS or total station, inspection forms, digital camera, and other necessary field, as required.

Aquatic Habitat

Aquatic habitat within the Ayr SWMMP study area includes a reach of the Nith River and the lowermost portion of Cedar Creek above its confluence with the Nith River, including the online Jedburgh and Watson ponds. The Nith River supports a diverse warmwater fish community. Cedar Creek's fish community includes the native coldwater Brook Trout. In addition to review of existing watershed/subwatershed studies that have been prepared for the Nith River and Cedar Creek, GRCA will be contacted for fisheries and aquatic habitat information, issues, opportunities and constraints specific to the study area. For instance, the extent of Cedar Creek coldwater habitat into the study area will be confirmed with GRCA.

Aquatic Species at Risk mapping identifies two provincially and federally designated Threatened fish species (Black Redhorse and Silver Shiner) and one provincially and federally designated Special Concern mussel species (Rainbow) within the study area. Mapping does not indicate designated Critical Habitat of these at-risk species, but it is understood that the Ontario Ministry of Natural Resources and Forestry had designated portions of the Nith River as "sensitive environment" in relation to Black Redhorse, the potential occurrence and extent of which will be determined for the study area.

Policy and regulations relevant to fisheries and aquatic habitat include the federal Fisheries Act and Species at Risk Act, and the provincial Endangered Species Act, provisions of which will be identified and incorporated into the SWM Master Plan.

3.3 Task 3: Evaluation of Alternatives

Several alternative solutions for SWM measures for the existing and future land uses within the Township that consist mainly of urban areas shall be developed. The approach for developing and evaluating alternatives shall be consistent with the requirements of the planning and design process for Master Planning projects described in the Municipal Class EA (Municipal Engineers Association, June, 2000; amended 2007, 2011). It involves reviewing Phase 1 work (i.e. Identification of the Problem) and undertaking Phase 2 (i.e. Establishing Existing Conditions, Identification of Long List of Alternatives, Development and Assessment of Alternative Management Strategies and Selection of a Preferred Strategy). In addition, consultation with stakeholders is a necessary step in this process.

The MECP divides SWM measures into three broad categories:

1. Source/lot level controls;
2. Conveyance controls; and
3. End of pipe controls.

The preferred SWM strategy is to provide an integrated treatment train approach to water management based on providing control at the lot level and in conveyance (to the extent feasible) followed by end-of-pipe controls. This combination of controls is typically the only means of meeting the multiple criteria for water balance, water quality, erosion control, and water quantity.

The reasoning behind that approach is to maximize the benefits from the combination of those elements, including:

- More effective SWM;
- Reduction in land area required to implement end-of-pipe solutions;
- Enhanced opportunities to integrate SWMPs effectively as amenities;
- Decreased total cost when land value is factored in; and,
- Increased level of public awareness and involvement in the implementation and management of SWM initiatives.

A preferred SWM Strategy will then be developed by the synthesis of the inter-disciplinary inputs to the project, including computer modeling, terrestrial and aquatic habitat assessments, water balance and hydrogeology, social, cultural, and economic considerations. The approach in developing and evaluating the alternative shall be generally consistent with the Class EA planning/design process for Master Planning project.

Using the initial set of developed evaluation criteria, and incorporating public comments as appropriate, the Project Team will apply a net effects analysis to the preliminary list of alternative solutions which will involve the following steps:

- Identification of potential effects;
- Develop and apply mitigation/compensation/enhancement measures; and,
- Determine net effects after mitigation measures have been applied.

The Township would like to explore the opportunities for innovative approaches such as Low Impact Development (LID) and green infrastructure for lot level controls, conveyance controls and end of pipe facilities. To assess the most applicable alternatives, COLE will review available information regarding Site setting that could influence the infiltration capacity of each area. This will include a review of the surficial geology, topography, depth to groundwater, depth to overburden, soil cover etc. In addition, available Source Water Protection ("SWP") mapping and SWP plans will be reviewed to understand if there are any constraints regarding LIDs within Wellhead Protection Areas (WHPAs) or other SWP vulnerable areas.

In addition, a water balance will be completed using the Thornthwaite and Mather methodology to compare pre-development and post-development hydrologic recharge of groundwater. This information will aid in assessing the list of alternatives and assess the suitability of various LID measures that could be completed.

The comparative evaluation of the alternative solutions will be carried out using a systematic approach that fulfills the intent of the Class EA process. The evaluation process will be presented in the form of an evaluation matrix in which alternative is scored or ranked against the other alternatives, with respect to a number of criteria that fall into the following categories:

- Environmental criteria: These include potential impacts on natural terrestrial features and aquatic habitat, and will include consideration of net change on hydrologic water balance and pollutant loadings to natural watercourses;
- Financial criteria: Includes initial capital cost including consideration of any need for property acquisition; expected life-cycle costs; and implications for future financing of centralized stormwater facilities that may serve more than one development property;
- Public safety and public acceptability: This category will address potential concerns regarding public safety and health; and how ell proposed facilities may fit into existing or future built-up areas;
- Implementation: Includes consideration of how easily implementation can occur as new land development occurs; and how well the SWM plan integrates with current land-use planning and the development approval process.

Evaluation of the alternatives will be undertaken in consultation with the Project Team and the Township's Project Manager. Our Project Ecologist will also contribute to the evaluation of alternatives, particularly about potential impacts to the environment both during and after construction.

3.4 Task 4: Preferred SWM Strategy

The preferred SWM strategy will be comprised of several elements. These may include replacement of existing storm pipes and culverts; erosion abatement projects; construction of new storm pond/wetland facilities or other types of centralized stormwater management such as infiltration facilities; and recommendations regarding stormwater design practices within new developments to minimize stormwater volume at the source and achieve objectives for preserving existing local hydrology.

We will clearly define each separate component of the preferred strategy and identify what the implementation sequence needs to be. We will identify all projects that are to be the responsibility of the Township, and identify what future Class EA requirements may apply, and what the regulatory approval

requirements are, for each component project. As noted in the RFP, for those projects identified as Class EA "Schedule B" projects, the Master Plan document will demonstrate that the Schedule B requirements have been fulfilled, as we will have followed Approach 2 in completing the Master Plan.

The preferred strategy will include recommendations regarding existing municipal drainage infrastructure assets, to provide the Township with a prioritized list of needs.

Existing data incorporated into the database and each component will be categorized into one of the following groups:

- Excellent: Component is in a "new" condition without any visible deficiencies;
- Satisfactory: Component is functioning within normal parameters but visible signs of wear are present;
- Attention Required: Component is no longer working as designed and requires maintenance, however, maintenance actions are minor (e.g. cleaning or debris removal);
- Non-Functional: Component is not functioning and requires more immediate maintenance (e.g. pond is full of sediment, inlet is blocked, spillway is eroded, etc.); and,
- Safety Hazard: Component presents a safety hazard to the public and should be repaired immediately (e.g. grate on large inlet pipe is open or missing allowing ingress, manhole cover missing, etc.).

Once each component has been entered into the system, any components with a rating of three (3) or higher will be given maintenance tasks as well as tasks added for inspection, as deemed appropriate. This will form the basis for the maintenance and budget needs for each facility, helping to evaluate and prioritize implementation requirements.

3.5 Task 5: Implementation Plan

3.5.1 Asset Monitoring, Management and Maintenance Program

COLE will establish a City-wide stormwater asset database and to identify any components that require maintenance.

Upon analysis of the stormwater management facility assessment results, Cole Engineering will prepare a long-term stormwater asset maintenance program, which will help to guide Public Works staff in the overall operation of the stormwater infrastructure. The maintenance program will be incorporated into the Master Plan and will include cost estimates as well as relevant regulations and processes for operations and maintenance activities.

The deliverable for this stage of the project will include a complete database, along with an operation and maintenance standard operating procedure manual, which the Township may use to guide its Public Works staff.

3.5.2 Operation and Maintenance Procedures

COLE will be able to identify the operation and maintenance requirements of each SWM facility and its assets which will allow for forecasting future requirements in terms of capital costs, operation and maintenance costs, and resources required by the Township to maintain its SWM facilities. The life cycle costs of each SWM facility will be calculated based on the forecasted operations and maintenance requirements. This information will be incorporated into the database, allowing Township staff to easily identify and plan yearly costs and resources required for each SWM facility and the overall program.

After completing an inventory of the SWM facilities and their assets within the Township, we will be able to develop an inspection and maintenance approach. The approach will be documented with an operation and maintenance standard operating procedure manual that will outline how to monitor, inspect, and maintain the SWM facilities and their assets. The manual will specify in detail the procedures Township staff will need to undertake when monitoring and inspecting the SWM facility and will include the following:

- Timelines for monitoring, inspections, and maintenance activities;
- Monitoring and inspection checklist based on the timelines;
- Guidance to interpret the monitoring data;
- Recommendations for the various maintenance activities that may be undertaken for each SWM facility based on the monitoring data;
- A standardized rating system to assess the priority of the maintenance needs for the various SWM facilities;
- Procedures for sediment sampling, removal, and disposal; and,
- Procedures for obtaining required approvals for removal and disposal of sediments.

The above will help the Township ensure that it remains in compliance with the ECAs for its municipal stormwater facilities.

In prioritizing the proposed solutions, considerations will be made for future implementation of the solutions, which is outside of the scope of this project. This may include the consideration of staging plans, property acquisition, easements, utility relocation, or any other timing or physical constraints the City may encounter. The Project Team will strive to present solutions capable of achieving the highest water quality results, while simultaneously thinking of the practical aspects the City will face beyond the life of Phases I and II of this Class EA project

3.5.3 Stormwater Quality Management Strategy

The Master Plan will include a stormwater quality management strategy.

The focus will be on promoting measures that reduce stormwater pollution at source. Measures that may be included are as follows:

- Encouragement of lot level improvements on public and private property, such as:
  - Soakaway pits;
  - Roof leader splashpads;
  - Oil / grit separators;
  - Pervious pavement; and,
  - Green roof technology.
- Implementation of conveyance enhancements on municipal rights-of-way, such as:
  - Pervious piping;
  - Bioswales; and,
  - Dryswales.

3.5.4 Policy Recommendations

In addition to providing physical solutions in the stormwater quality management strategy, the Project Team will also recommend policies based on review of other local municipal, provincial, or other agency documents. The recommendations for incorporation to Township policies will be detailed in the Master Plan document. Policy recommendations will include, but not be limited to:

- Municipal standards, operations, maintenance and design practices;
- Infill development SWM practices; and,
- Disposal of material removed from municipal stormwater treatment facilities.

Municipal Standards, Operations, Maintenance and Design Practices

Comparable municipal guidelines, such as the City of Barrie's *Storm Drainage and Stormwater Management Policies and Guidelines*, 2009, or the City of Toronto's *Wet Weather Flow Management Guidelines*, 2007, will be reviewed to ensure the Township maintains current standards in stormwater maintenance and design. Review of various municipal perspectives will allow for optimization of the Township own practices.

Infill Development SWM Practices

Comparable infill development guidelines, such as the City of Ottawa's Urban Design Guidelines for Low-Medium Density Infill Housing Update, 2009, will be reviewed to ensure the Township maintains current standards in infill stormwater management maintenance and design. Review of various municipal and provincial perspectives will allow for optimization of the Township's own practices.

Disposal of Materials Removed from Municipal Stormwater Facilities

COLE will provide the Township with advice on to how to deal with material that is occasionally removed from stormwater facilities such as storm ponds. Clean-out of accumulated sediments from storm ponds is needed from time to time, to maintain ECA compliance. Disposal of that material is an important cost consideration for pond clean-outs. We will review and summarize current regulatory requirements in this regard, and provide the Township with a step-by-step procedure for designing a pond clean-out.

3.6 Task 6: Master Plan Document

The Master Plan document will be the key deliverable for the project for the implementation of future works. The document will provide the planning rationale and EA documentation required to proceed with detailed design of the recommended works. The Master Plan is expected to contain, at a minimum:

- Problem/Opportunity statement;
- Documentation of all public, agency, and First Nations comments and responses;
- Review of best practices and minimum design guidelines;
- Rationale for evaluation criteria;
- Summary evaluation of alternatives;
- Summary of preferred solution prioritization;
- Implementation, feasibility and staging recommendations;
- Supporting technical memoranda (in appendices), including:
    - Results of field data investigation of stormwater management infrastructure;
    - Maintenance program for individual stormwater assets;
    - Recommendations for stormwater management policies to be developed by others;
- Cost estimates;
- SWM Pond Long-Term Maintenance Program;
- Recommendations for Township Design Guidelines;
- Mitigation measures and commitments;
- Sufficient information to formulate a framework for stormwater utility tax;
- Operations and maintenance costs;
- Prioritization of works;

- Provide a basis for future investigations for the specific Schedule C projects identified within it, i.e. identify everything the Township needs for the first five years after study completion and complete all the site specific work required, including public consultation to meet Municipal Class EA requirements for Schedule A and B projects;
- SWM Policy for integration into Development Manual and,
- Water Resources Monitoring Program.

It is expected that the draft Master Plan document will be submitted in black and white with the exception of relevant figures. The draft Master Plan will be presented to the Township's staff for review and comment. After receipt of the Township's comments on the Master Plan, the draft will be finalized and delivered to the Township. The Master Plan will be made available for public review at selected Township facilities.

The Master Plan document will include an Executive Summary that provides a clear picture of the recommendations, and a description of how those recommendations were arrived at.

As needed, the final document will be formatted to meet the Township's AODA requirements or policies.

4 Schedule

Appendix C presents our overall detailed resource loaded, critical path project schedule. Based on Addendum #3, the Township would like a preliminary overview / assessment by March 30th, 2020 with a completed Study by June 15th, 2020. Given the scope and identified data gaps, a more reasonable time for a completed Study is early October. If the assignment is awarded and starts by February 3rd, 2020, COLE is able to provide our preliminary findings (Tasks 1 and 2) by end of March 2020.

We understand that project schedule is critical and that timelines must be met. To that end, our approach to schedule management will be as follows:

→ Immediately upon notification of award, we will prepare a baseline schedule to align the project start date and completion dates. The baseline schedule will be broken down to define timelines for sub-activities and will highlight the critical path. The baseline schedule will be included in our Project Management Plan.

→ Complete a monthly Project Progress Report, which will include an updated project schedule. We will track all dates against the baseline schedule to ensure that we are continuing to meet timelines. We will pay attention to our critical path and dedicate the resources necessary to meet these timelines.

→ Should we find that our work on a task extends beyond the completion date, we will consider options to accelerate specific activities to return to our schedule. If these tasks are on the critical path, we will consider assigning additional resources to meet timelines. Our Project Manager has the authority to assign additional staff from COLE. Where this is necessary, we will inform the Township. Where these activities are not on the critical path, we will assess the impact of schedule delays on the overall schedule and develop an approach to return to the baseline schedule.

The following Table 4.1 outlines critical areas of our schedule review:

Table 4.1 Project Schedule Summary

Task	Activity	Completion Date
-	Closing Date	January 15, 2020
-	Estimated Project Award	January 29, 2020
-	Estimated Start Date	January 30, 2020
1	Task 1 Project Start-up Meeting	February 3, 2020
2	Project Management Plan/Gantt Chart of key milestones	February 5, 2020
3	Summarize Data Gaps to Project Team	February 14, 2020
4	Public Consultation Plan	February 14, 2020
5	Task 2 Meeting	March 10, 2020
6	Task 2 PIC Meeting 1	April 22, 2020
7	Task 2 Draft SWMMP (30%)	May 6, 2020
8	Task 3 Meeting	June 1, 2020
9	Task 3 PIC Meeting 2	June 24, 2020
10	Task 3 Draft SWMMP (60%)	July 31, 2020
11	Task 4 Meeting	August 7, 2020
12	Task 4 Asset Management Planning Meeting	August 24, 2020
13	Task 5 Draft SWMMP (90%) – agency review	August 31, 2020
14	Task 5 EA Report Meeting – Project Team	September 14, 2020
15	Task 5 EA Report Meeting – Township Council	September 30, 2020
16	Final SWWMP (100%)	October 7, 2020

Note: All Report Submission dates subject to confirmation with Township Project Team and can be moved as required.
Review time assumed 2 weeks per submission, time noted under "Agency Review" in "SUBCONSULTANTS" column of TTM

5 Experience and References

COLE brings forward a project team with extensive master planning team experience. Staff proposed on our team have a long working relationship on similar assignments including: the Uxbridge Comprehensive Stormwater Management Master Plan, the Town of Newmarket Water and Wastewater Master Plan, Toronto Waterfront Sanitary Master Plan EA, the Town of Markham Water and Wastewater Master Plan, and York Region's Water and Wastewater Master Plan.

The following project descriptions and references demonstrate relevant experience of COLE to undertake this assignment. Each of the projects presented have involved project team members named in this proposal.

Table 5.1 lists 3 corporate projects demonstrates recent relevant projects (last 5 years) in which COLE successfully delivers (or is currently delivering) similar investigative services. Additional details of these and other similar projects are included in Appendix B. The Township of North Dumfries' Schedule "C" – Reference Form is included in Appendix A.

Table 5.1 Project References

#1 CITY OF TORONTO BASEMENT FLOODING REMEDIATION & WATER QUALITY IMPROVEMENTS MASTER PLAN CLASS EA, AREA 36 (AREAS 30, 7-12, 1-2, 4-6, 36)	
COMPANY NAME:	City of Toronto
ADDRESS:	100 Queen St. W.
CITY/PROV/POSTAL CODE:	Toronto, ON M5H 2N2
CONTACT PERSON/TITLE/PHONE NUMBER AND E-MAIL ADDRESS:	Kirill Cheiko, P.Eng./Capital Works Delivery, Toronto Water T: 416-338-5556 | E: kcheiko@toronto.ca
Scope: The COLE team has completed 14 basement flooding studies and is currently near completion of a 14th area and is starting on another three areas coving downtown Toronto. Each of the studies have flowed a similar work scope. The Master Plan Class EA studies are part of the City of Toronto's extensive basement flooding protection program, and are completed to provide the City with comprehensive basement flooding solutions. The projects aim to determine the primary cause and mechanisms which cause basement flooding in the study areas, and develop cost effective flood and water quality remedial measures that meet the level of service criteria and other goals of the City. COLE's involvement in the Toronto Basement Flooding Program is as a trusted consultant to the City. The projects involve many of the key work items identified in this Roster Category including all aspects of infrastructure planning including background review, field investigations, hydraulic model development and application, wastewater flow monitoring data analysis, alternatives development, constructability, developing SQL tools, developing webapps including ArcCollector and ArcSurvey, groundwater data analysis, and the EA process (public and stakeholder consultation). **Project Value and Schedule:** $ 1.0M; Completed 2019	

#2 CITY OF OTTAWA – HALIFAX AND VALLEY DRIVE DUAL DRAINAGE STUDY	
COMPANY NAME:	City of Ottawa
ADDRESS:	100 Constellation Crescent, 6th Floor East
CITY/PROV/POSTAL CODE:	Ottawa, ON K2G 6J8
CONTACT PERSON/TITLE/PHONE NUMBER AND E-MAIL ADDRESS:	Hiran Sandanayake, P.Eng./Senior Engineer, Water Resources T: 613-580-2424 X13848 | E: hiran.sandanayake@ottawa.ca
Scope: The Halifax and Valley Drive area of Ottawa is primarily residential with commercial development on the main roadways. The area is approximately 860ha. The storm system in the area was not designed using modern dual drainage principles and is known to surcharge in the 2-year design storm as well as result in overland flooding that has led to basement flooding. In 2015, the City developed a dual drainage model. A key component of this assignment was to expand the existing model to include additional area and to include more detail delineation of drainage features and systems. The existing PCSWMM model was expanded to include additional areas and in doing so the original model was also validated. Flow monitoring data and field investigations were undertaken to confirm data and connection anomalies. With the completion of the model, the storm system assessment looked at a range of design and historical events, including the City's climate change events. An objective of the study is to develop a conceptual Inlet Control Device (ICD) plan to improve overland and sewer performance (optimize major and minor systems) as an early action imitative followed by identifying opportunities for short- and long-term infrastructure replacement and rehabilitation. **Project Schedule:** Completed 2019	

Table 5.1 Project References

OAKVILLE PART III MIDTOWN EA – STORMWATER MANAGEMENT (SWM)	
COMPANY NAME:	Town of Oakville
ADDRESS:	1225 Trafalgar Road
CITY/PROV/POSTAL CODE:	Oakville, ON L6H 0H3
CONTACT PERSON/TITLE/PHONE NUMBER AND E-MAIL ADDRESS:	Kristina Parker, Water Resources Engineer; T: (905) 845-6601, x3889| E: Kristina.parker@oakville.ca
Scope: Schedule 'C' Municipal Class EA and preliminary design for road, transit, and stormwater infrastructure for Midtown Oakville, a designated urban growth centre adjacent to 400 series highway and GO Rail corridor. COLE completed the SWM Report as part of a Municipal Class EA of proposed transportation improvements within Midtown Oakville. The stormwater component of this EA study included hydrologic analysis, hydraulic analysis and development of future SWM criteria in support of the proposed major transportation improvements. Project complications included unsteady modelling of the Morrison-Wedgewood Diversion Channel, assessment of flooding potential at 12 culvert crossings and within several residential areas previously identified as being flood prone. **Project Value and Schedule:** $380,000; 2012 - May 2015.	

5.1 Additional Relevant Project Experience

To demonstrate the depth of our experience in all areas of this assignment, we have included additional relevant projects in each topic area. Each of the projects presented below have involved project team members named in this proposal.

MARKHAM VILLAGE AND UNIONVILLE FLOODING STUDY | CITY OF MARKHAM. The COLE project team is tasked with completing a full assessment of all storm drainage systems in two areas of the City of Markham: Markham Village and Unionville. Markham Village is comprised of 21 neighbourhoods, while the Unionville area is one storm system that can be affected by the local receiving stream (Fonthill Creek) and is a Special Policy Area (SPA). The outcome of this project will be a comprehensive Flood Remediation Plan for both areas to address the primary cause of and reduce the risk of flooding. (Ongoing)

CITY OF VAUGHAN STORMWATER MANAGEMENT (SWM) MASTER PLAN. Development of a Storm Drainage / Storm Water Management Master Plan. The project was city-wide with a specific focus on new growth and secondary plan areas in addition to areas of intensification. The project followed the Master Planning process established by the Municipal Class Environmental Assessment Phases 1 and 2 and included public consultation through two Public Information Centres, coordination with the public, and a technical advisory committee developed in partnership with the relevant review agencies. (2014)

CITY OF PETERBOROUGH STORMWATER QUALITY MASTER PLAN. Master Plan for the management of stormwater quality. The study was carried out as a Master Plan in accordance with Ontario's Municipal Class Environmental Assessment process. The study provided the City with a long-term strategy for reducing the amount of pollution reaching local waterways. (2014)

CITY OF GUELPH DOWNTOWN SERIVICING STUDY. In preparing the Downtown Servicing Study, COLE looked at the alternative water, wastewater and stormwater servicing strategies to make efficient use of existing municipal water, wastewater and stormwater services to support growth, while considering other factors that affect municipal servicing and the community such as climate change, adaptability, infrastructure security, low impact development, and conservation. (2017-Ongoing)

6 Team Structure / Staff Qualifications

6.1 Structured for Program Delivery

To structure the COLE team to ensure successful delivery, on-time of the project, we selected experienced Program Manager (PM) Roy Johnson supported by a strong Technical Team. Together they will focus on the critical factors of leadership, resources, and quality. The qualifications and dedication of the team members, as shown in the organization chart in Figure 6-1 is critical to this assignment. CVs are provided in Appendix D.

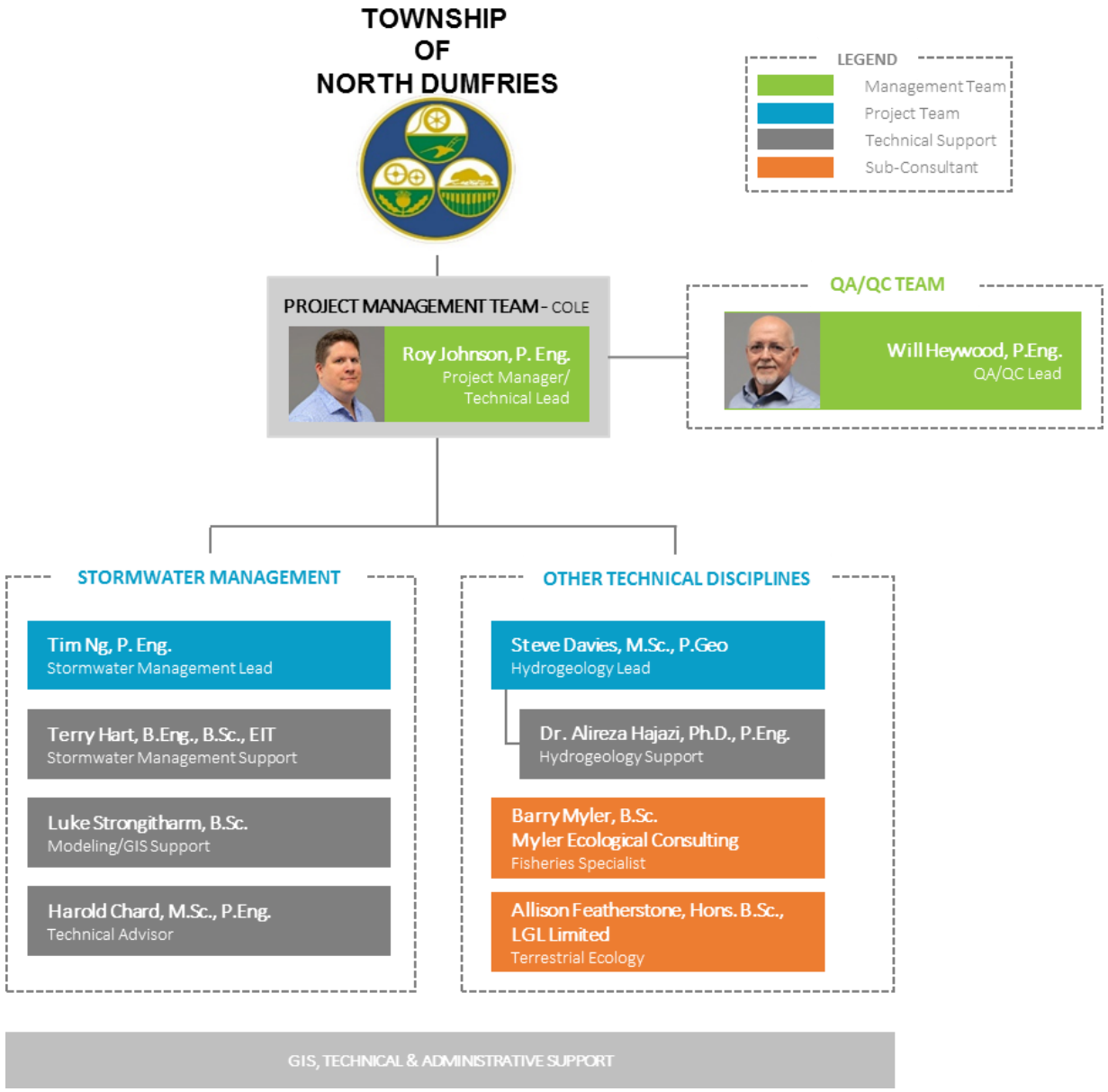


Figure 6-1 Organization Chart

The COLE team is structured to respond to the Township's vision for the program and includes Management and Technical teams. The Management Team leads the project, serving as a point of contact for the Township and the Township's Senior PM. They provide consistency through the project and are dedicated for its duration to manage contract strategies, develop cost estimates and schedules, facilitate meetings, initiate technical input, drive the permit process, and assure conformance with the Township's objectives and standards. This team monitors progress to proactively address schedule concerns and serve as the Township's liaison or communications officer with stakeholders. COLE recognizes that priorities change. The COLE team is structured to work with the Township to develop a work plan to drive schedule that will accomplish the Township of North Dumfries's objectives within a flexible framework that allows for modifications as appropriate to account for changing priorities.

The Technical Team gathers and reviews the data collection, conducts field verifications, ensures all necessary approvals. COLE has the bench strength to provide the Township confidence that our team has adequate resources and will deliver consistent quality throughout the length of the Program.

6.2 Stormwater Management Planning and Design, Including Preparation of Master Drainage Plans

Our team has extensive experience in the preparation of master drainage plans. For each project, we take into consideration the future needs of the study area and closely document the existing stormwater management facilities, flood risk zones, and sewer conditions. Our staff is also specialized in conducting micro-drainage studies by analyzing dual drainage systems using advanced hydrologic modelling techniques.

6.3 Expertise in Hydrologic and Hydraulic Modelling and Design

Each of the staff members of the Water Resources team are involved in hydrologic and/or hydraulic modeling using a broad range of software. Our combined staff are well-versed in Visual OTTHYMO and HEC-RAS, but is also experienced in modeling and analysis with MIKE URBAN, InfoWorks, PCSWMM, QUALHYMO, DDSWMM, XPSWMM, Flow 2D, WABAS, AutoCAD Civil 3D and other software.

In-house tools have been developed specifically for stormwater applications in AutoCAD Civil 3D to simplify hydrologic and hydraulic processes, such as the digital mapping of floodlines. Many of our projects have been completed by first establishing the baseline existing conditions in order to assess the impacts of difference design alternatives. All of our hydrologic and Hydraulic models can be prepared using the "what if" scenarios. Our staff has completed a number of pipe capacity studies, where existing sanitary and stormwater infrastructure is assessed to determine their capacity under different development scenarios.

6.4 Experience and Knowledge of the Municipal Class Environmental Assessment process and other Regulatory Requirements for Stormwater Management Projects

The COLE team has undertaken the Class Environmental Assessment process many times and is confident in leading every phase of a Class EA project. Our staff is familiar with both the Municipal Class EA process as well as the Conservation Ontario Class EA process to complete stormwater management projects. From junior staff to project managers, our team is technically skilled to provide feasible design alternatives while still being able to communicate various facets of the designs effectively through reports and presentations at Public Information Centres for all stakeholders. Experience in Processing Permit Applications and Complying with Acts and Regulations

The proposed team is highly experienced in identifying and acquiring all permits and approvals required to complete water resources and stormwater management projects. Immediately after project commencement, our project teams will begin the consultation process with approval agencies and identify required permits and approvals. This approach has been highly effective at mitigating the risk to the project from unexpected approval issues. We are highly experienced with the approval process of the Ministry of Natural Resources and Forestry, Ministry of Environment Conservation and Parks, Department of Fisheries and Ocean and the local conservation authorities, and has the contacts with agency staff to assist in expediting approvals when required.

6.5 Experience in Using Technical & Stormwater Management Modelling Tools

We confirm that our staff have extensive experience in using technical and stormwater management software and models as part of the design process: including but not limited to: MIKE URBAN, InfoWorks ICM, Visual OTTHYMO, PCSWMM, CulvertMaster / HY8, FlowMaster, HEC-RAS, GeoHEC-RAS and other associated software.

6.6 Project Management

ROY JOHNSON, P.ENG. — PROJECT MANAGER / TECHNICAL LEAD

Roy Johnson is a Senior Project Manager in COLE's Infrastructure Planning Group with over 17 years of experience in the planning, analysis, and design of stormwater management systems. He is an experienced Project Manager and has successfully completed various master plan Class EAs.

As a Water Resources Project Manager, Roy has overseen and developed hydrologic and hydraulic computer models for use in flood plain studies and stormwater management planning; led multidisciplinary teams to prepare comprehensive Master Environmental Servicing Plans, Functional Servicing Plans, Stormwater Management Plans, and other technical and environmental initiatives; and has also interpreted various municipal, provincial, and federal regulations to ensure design compliance and oversee permit application processes. Roy has been effective in ensuring all multi-discipline objectives are met to deliver a quality project. He establishes meaningful communication structures with our clients, safeguards staff engagement, and ensures that all budget and schedule control targets are met.

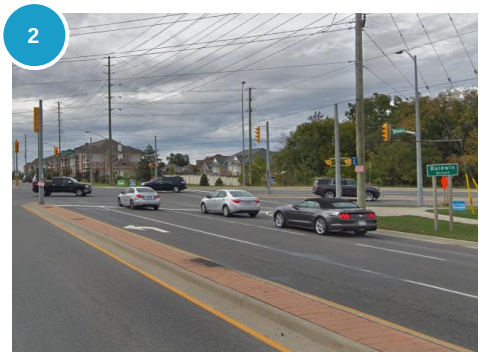
Roy has additional recent experience acting as Project Manager and Technical Lead at Stantec for the following projects:

1

Uxbridge Comprehensive Stormwater Management Master Plan, Township of Uxbridge, ON

Senior Water Resources Engineer/Project Manager responsible for the preparation

2



Winchester Road Reconstruction and Widening, Town of Whitby. Brooklyn, ON.

Stormwater Management Reviewer. Detailed design for the proposed reconstruction and widening of

3

Rodick Road/Miller Avenue Stormwater Management Options Assessment, City of Markham, ON.

Stormwater Management Engineer. As part of the development of the Miller

of a Comprehensive Stormwater Management (SWM) Master Plan for the Uxbridge Urban Area and Hamlet of Coppin's Corner in in accordance with the Comprehensive SWM Master Plan Guidelines, prepared by the LSRCA and the Municipal Class EA process. Through the Class EA Master Plan process, planning and technical review, several 'preferred alternatives' were established with respect to the existing natural environment; provided the design criteria for future new development, redevelopment, and/or the upgrading or replacement of existing infrastructure. SWM design criteria as it relates to water quality, water quantity, water balance, and erosion controls were established for both Uxbridge and Coppin's Corners. The Master Plan also provided recommendations for SWM implementation approaches and ongoing inspection/ maintenance considerations. Completion Date: 2015.	Winchester Road (Regional Road 3) through the Community of Brooklin including reconstruction and widening of Thickson Road (Regional Road 26) in the vicinity of Winchester Road. The approximate project limits for this assignment extend on Winchester Road from Baldwin Street to 200m east of Garrard Road and on Thickson Road from 400m south of Winchester Road to 350m north of Winchester Road in the Town of Whitby. The drainage work consists of the preparation a Drainage and Stormwater Management Report, building on the report prepared during the EA, describing existing and proposed conditions for roadway drainage, transverse drainage crossings and stormwater management. Completion Date: 2018	lands near Rodick Road, a stormwater management pond was proposed to be located on City lands, currently used as their snow dumping Site. The project included the evaluation of various options to eliminate the pond, including on-site detention, oil-grit separators, etc. One option was using StormTrap products in place of the pond. The project also included the coordination with the manufacturer to develop a conceptual design of the StormTrap system, including costs of materials, construction, and maintenance. Also provided the City with a matrix of solutions, including costs, likelihood of approval, degree to which criteria are met, and a preferred solution. Completion Date: 2015

Roy will be our Project Manager as well as the Technical Lead. He was Project Manager for the Township of Uxbridge's Comprehensive Stormwater Master Plan.

WILLIAM HEYWOOD, P.ENG. — QA/QC REVIEWER

Quality Management promotes consistency and delivery of the highest quality products. William, with **over 30 years** of infrastructure master planning and EA experience will lead the QA/QC review process. He will undertake QA/QC review of key project deliverables and assign an experienced discipline-specific professional to review technical deliverables. Will is very familiar with the quality expectations of our clients and will be able to guide the QA/QC team in their activities. Will is familiar with similar projects through his work on the following project:

- Project Manager for Storm Runoff Water Quality and Investigation of Basement Flooding Areas 41, 40 and 34, City of Toronto
- Project Manager and Technical Lead for Black Creek Sanitary Drainage Area Servicing Improvements Class EA Study, City of Toronto
- Project Manager and Technical Lead for Emery Creek Quality Control Plans Design, City of Toronto
- Project Manager and Technical Lead for Churchill Park Redevelopment Phase 1 where rain gardens were incorporated into stormwater management system using a treatment train approach, City of Hamilton.
- Project Manager and Technical Lead for Glynwood Tributary Area Sewer Surcharge and Flood Remediation Class EA, City of Markham.

William will provide senior technical review of all deliverables to the Township.

6.7 Project Team

The team members listed below have critical roles in the development and completion of this project and were chosen for their area of expertise. All our team members will be available for the duration of the project and/or the phase of work to which they are assigned.

6.7.1 Stormwater Management Team Members

TIMOTHY NG, P.ENG. — **STORMWATER MANAGEMENT LEAD**

Timothy is a Water Resources Engineer at COLE and has over 6 years of experience in hydraulic and hydrologic analyses, water permitting, stormwater management systems, pond design, water quality analysis and erosion and sediment control. Tim has prepared and provided technical input on various Stormwater Management (SWM) Reports, Functional Servicing Reports (FSR), Master Environmental Servicing Plans (MESP), and Stormwater Master Drainage Plans for several commercial, industrial and residential development designs within Ontario. Tim has also prepared several stormwater related peer reviews for several municipalities.

Some of Tim's recent relevant experience includes:

- Water Resources Designer for the Uxbridge Comprehensive Stormwater Management Plan, Township of Uxbridge
- Water Resources Designer for the South Sharon (Green Lane MESP and FSR) Modelling and Pond Design, Baif Developments, East Gwillimbury, ON.

Tim will provide technical guidance to junior staff.

TERENCE HART, B.ENG., B.SC., EIT — **STORMWATER MANAGEMENT SUPPORT**

Terence has over 1 year of experience in Water Resources Engineering and has been involved in a variety of projects focusing on stormwater management, highway drainage, floodplain impact analysis, tree protection and erosion and sediment controls. He has made site inspections and assisted with topographic and tree surveys. Terence has applied AutoCad Civil 3D, Visual HYMO Suite, GeoHEC-RAS, Bentley FlowMaster and CulvertMaster software to support his work in analysis, detailed design, report writing and tender preparation. Some of Terence's recent relevant experience includes:

- Drinkwater Pond Outfall Rehabilitation and Retrofit, City of Brampton – Water Resources Designer
- Environmental and Climate Change, North Harbour Sediment Management Options, Thunder Bay – Water Resources Designer
- West Whitby Holdings, West Whitby Holdings Inc. Whitby – Water Resources Designer
- Detail Design at Various Sewage Pumping Stations, Regional Municipality of Peel – Water Resources Designer

Terrence will provide technical analysis and report writing.

LUKE STRONGITHARM, B.SC., — **MODELLING/GIS SUPPORT**

Luke Strongitharm is a Geographical Information Systems Specialist and Hydraulic Model Developer with over 18 years of experience in spatial analysis, data implementation and visualization. He has led several large engineering projects coordinating data collection, organization and analysis. Luke has significant technical knowledge of ArcGIS, InfoNet, InfoWorks, databases and many other software projects. Luke has done similar work for the Township of Markham to reconcile various data sources to develop population and flow projections/demands for the Township of Markham water and wastewater servicing study, as well as for the Township of Toronto, York Region, and Peel Region. Other project roles are to manage all data

from the Township, undertake a critical review of GIS data, support project team modelling needs, and prepare study graphics for reports and meetings. His relevant project experience includes:

- Technical Lead for GIS and Data Analysis for the Basement Flooding Remediation and Water Quality Improvements Master Plan Class EA for Areas 1, 2, 4, 5, 6, 7, 8, 9, 11, 12, 30, 36, 45, and now 42, 44 and 62 City of Toronto
- GIS Analysis for West Thornhill Flood Control Implementation Refinement, City of Markham.
- Technical Lead for Update and Calibration of Peel Region's Wastewater Hydraulic Model, Region of Peel
- GIS Specialist for Stormwater Quality Management Master Plan Class EA, City of Peterborough

Luke will lead and direct all GIS analyses completed as part of this project.

HAROLD CHARD, M.Sc., P.Eng. — TECHNICAL ADVISOR

Harold Chard has over 30 years of experience in planning and design of municipal stormwater management facilities, combined sewer overflow control facilities, and storm and sanitary sewer systems. He has extensive experience in hydrologic and hydraulic modelling of pipe systems and watercourses as needed for infrastructure planning, watershed studies, and pollution control studies. Harold has broad experience in preparation of Provincial and Federal environmental assessment (EA) documents, public presentations, and technical reports for support of urban planning initiates. His projects include:

- Stormwater Quality Management Master Plan, City of Peterborough – Project Manager
- Water Resource Protection Funding Feasibility Study, City of Peterborough – Project Manager
- Basement Flood Remediation Areas #42, #44 and #62, City of Toronto – Technical Advisor
- Pollution Control Plan Update, City of Cornwall – Project Manager

Harold will act as technical advisor to the Project Manager, Roy Johnson, and input on operation and maintenance costs.

6.7.2 Hydrogeological Team Members

STEVE DAVIES, M.Sc., P.Geo. — HYDROGEOLOGY LEAD

Steve is a Senior Hydrogeologist and Team Leader at COLE with over 25 years of diverse experience in the private and public sectors leading multi-disciplinary teams of geoscientists, ecologists and engineers. Extensive experience with source water protection studies, groundwater supply investigations, municipal infrastructure studies, land development studies, Environmental Impact Studies (EISs), mining studies, Environmental Site Assessments (ESAs), and remediation projects. He works closely with various stakeholders to resolve permitting requirements, estimate construction dewatering requirements, assess potential impacts to the natural environment and other users of water, and to develop effective environmental monitoring and management plans. He acts as a third party reviewer for various municipalities for various development applications and ESAs. Steve has also appeared before the Ontario Municipal Board (OMB) as an expert witness in hydrogeology. His relevant experience includes:

- Sustainable Halton Water and Wastewater Master Plan, Regional Municipality of Halton. Halton Hills – Hydrogeology Lead
- Clair-Maltby Master Environmental Servicing Plan, City of Guelph – Hydrogeological Lead
- Southwest Georgetown Secondary Plan Subwatershed Management Strategy, Town of Halton Hills – Hydrogeological Lead

For this project, Steve will senior input and review of hydrogeology tasks

ALIREZA HEJAZI, PH.D., P.ENG. — HYDROGEOLOGY SUPPORT

Dr. Hejazi is an Environmental Engineer and Hydrogeologist with over **10 years** of experience in groundwater hydrology, physical hydrogeology, groundwater flow and contaminant transport modeling. His areas of expertise include conducting and organizing groundwater engineering projects, managing and analyzing soil and groundwater data, and developing and implementing comprehensive groundwater and surface water monitoring program. Dr. Hejazi has expertise in conducting and analyzing infiltration testing, water balance assessments, LID assessments and Source Water Protection studies. Similar relevant project experience includes:

Dr. Hejazi's will provide technical analysis of water balance and other hydrogeology input to the report.

6.7.3 Subconsultants

MYLER ECOLOGICAL CONSULTING – FISHERIES

Barry Myler, B.Sc., is a consulting Fisheries Biologist with over **26 years** of experience. He has addressed Federal Fisheries Act compliance and both Federal Species at Risk Act and Provincial Endangered Species Act compliance for aquatic Species at Risk for a wide variety of public and private sector clients and project types. Barry will conduct a desktop analysis and prepare an existing conditions summary of fisheries and aquatic Species at Risk constraints and opportunities within the Nith River and Cedar Creek reaches in the Ayr SWMMP study area, including reference to pertinent policy and regulatory requirements. He will contribute to the evaluation of identified erosion sites, development of assessment criteria for SWM alternatives and preparation of summary subwatershed factsheets.

LGL LIMITED - NATURAL HERITAGE AND PROTECTION MEASURES

LGL Limited is an environmental research and consulting firm specializing in environmental assessment and planning, and terrestrial, aquatic, wetland and marine ecology. LGL was founded in 1971, and is Canadian-owned and operated by its employees. A copy of their corporation information can be found in Appendix B.

Allison Featherstone, Hons.B.Sc. Vice-President, Senior Planning Ecologist
Project Role: Project Manager, Ecologist, SAR Specialist

Allison Featherstone is a Senior Manager and Ecologist at LGL Limited environmental research associates, where she leads a team of ecologists, biologists and planners. Since joining LGL in June 2003, Allison has been involved with over 150 natural heritage investigations in support of infrastructure, Renewable and Clean Energy Projects, Comprehensive Broad Scale Environmental Studies and Environmental Assessments/Environmental Impact Statements. She regularly represents LGL at project team meetings, agency meetings, technical and stakeholder advisory committee, public and stakeholder consultation, and consultation with First Nations and Métis. Allison's community involvement includes participation as a member (2007-2018) and Chair (2014-2018) of the Region of Waterloo's Ecological and Environmental Advisory Committee, where she also served as a member on the Region of Waterloo Technical Advisory Committee for Wastewater Master Plan, the Region of Waterloo Transportation Master Plan Stakeholder Advisory Committee, and the Climate Change Adaptation Committee.

Allison has considerable experience navigating the Endangered Species Act, 2007 and has direct experience with the species identified in the Ayr study area. Allison participated in several peer reviews of studies in the Ayr study area as part of her role on EEAC, in addition to direct project experience with LGL in Ayr for Northumberland Road, Stanley Street and Swan Street EA, and has participated in all aspects of the Surface Water Quality Monitoring Program.

Allison will provide support to the project team by providing expertise in natural heritage issues and protection measures that arise during this project.

7 Project Cost

Our copy of the Schedule of Items & Pricing Response Form (Appendix D of the RFP) is included in Appendix A. Our detailed Time-Task Matrix and Cost Breakdown for the proposed Stormwater Management Master Plan is included in Appendix E.

8 Closing

We look forward to working with the Township on this project that will provide long term stormwater planning solutions for the community. COLE is willing to discuss budget and scope of work with the Township to ensure your needs are met.

Yours sincerely,

COLE ENGINEERING GROUP LTD.

Roy Johnson, P.Eng.
Project Manager

APPENDIX N

Agency Comments

Administration Centre: 400 Clyde Road, P.O. Box 729 Cambridge, ON N1R 5W6

Phone: 519-621-2761 Toll free: 1-866-900-4722 Fax: 519-621-4844 www.grandriver.ca

June 24, 2022

Via Email

GRCA File: Ayr SWM Master Plan

Roy Johnson, B.Eng., P.Eng., MA.Sc
Team Lead, Water Resources Engineering
IBI Group
8133 Warden Avenue, Unit 300
Markham, ON L6G 1B3

Dear Roy Johnson,

Re: **Ayr Stormwater Management Master Plan**
Township of North Dumfries

Further to our comments of April 8, 2020, the Grand River Conservation Authority (GRCA) has now had an opportunity to review the following document:

- Draft Report, Ayr Stormwater Management Master Plan, Community of Ayr, Township of North Dumfries (prepared by IBI Group and dated January 2022).

Background and Comments

It is our understanding that this study focused on the Ayr urban area (existing and emerging). The Township of North Dumfries also required an analysis of the potential urbanization of lands along the Northumberland Street corridor from Greenfield Road to Highway No. 401. Further, this Stomwater Management Master Plan (SWMMP) will serve as a decision support tool, a methodology for the prioritization of works, a means to estimate future SWM requirements and costs and a transparent community process by which the Township can establish stormwater management (SWM) guidelines and policies for the next ten to fifteen years.

Overall, the GRCA did not have any significant concerns with the SWMMP. However, the GRCA offers the following advisory comments and points of clarification on items within the SWMMP:

1. Section 1.3.4 – Reference to Township of North Dumfries Official Plan (OP) policy 2.7.3 (a), we note that this policy states that the Township would embark on process on the potential for implementation of a two-zone flood plain policy framework. If the Township wishes to proceed with the development of a two-zone policy area, the GRCA would recommend that the Township have early discussions with GRCA staff to establish a Terms of Reference prior to undertaking the study. Additionally, the GRCA's Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation (Ontario Regulation 150/06) sets out the parameters for establishing a two-zone policy area under policies 8.1.29. Specific two-

zone floodplain policies would need to be developed and incorporated into the Township's OP.

2. Section 2.2.2.2 Special Policy Areas – this section discusses Special Policy Areas (SPA) floodplain policy areas and refers to GRCA policies 8.1.33 to 8.1.36. Figure 2-1 (Ayr Township Land Use) under this section suggests that Areas A, B, C and E are located within the SPA. However, there are no formal SPAs approved in Ayr. It appears these areas are future development areas identified in the OP but they are not SPA floodplain policy areas. All the floodplains within the study area are designated one-zone policy areas. This section will need to be clarified.

3. Section 8 Preferred SWM Strategy – This section identifies specific SWM strategies for Areas A, B, C, D, E, F and the Northumberland Street corridor.

   We note that Areas A and B are currently being developed with a multi-unit townhouse development (approved site plan application SP-1/18) and 15 single-detached dwelling lot subdivision (approved draft plan 30T-17301). Additional details on the SWM strategy used for these new developments should also be reviewed.

   Area C is an agricultural field, but also contains an area of floodplain. We note that there is reference to space for a SWM pond on these lands. As noted earlier, the GRCA has specific policies dealing with SWM ponds in the floodplain. There is further reference to conveying stormwater to the Jedburgh Pond. As noted previously, the GRCA owns several properties within the study area. Jedburgh and Watson Ponds are part of the GRCA's Upper Mill Pond Property. For further clarity and reference, a map of the Upper Mill Pond property is enclosed. Any future infrastructure projects, such as SWM outlets on GRCA-owned property would require the review and approval GRCA property staff, in addition to any approvals from the GRCA under Ontario Regulation 150/06.

   Area D is identified as a former aggregate pit, but is currently the subject of a proposed residential plan of subdivision (30T-20301). Additional details on the SWM strategy being pursued for this development should also be reviewed.

   Area E will be developed as draft plan approved residential subdivision (30T-18301). A SWM pond is proposed along the southern portion of the site and will outlet to the south towards Charlie Creek and a wetland area. Additional details on the SWM strategy being pursued for this development should also be reviewed.

   There are no current development plans for Area F that the GRCA is aware of, but the north end of this area contains wetland areas along the Nith River, floodplain and steep valley/erosion hazard slopes. In addition to the challenges of avoiding any SWM outlets through the wetland area, the slopes will also present a significant challenge. Additional slope stability and environmental impact studies (EIS) may be required to support development in this area and be subject to approval from the GRCA under Ontario Regulation 150/06.

   Along the west side of Northumberland Street at Greenfield Road, there are steep valley/erosion hazards slopes, areas of wetland, floodplain and tributary of the Nith River. In addition, the GRCA owns the Reinhart Property in this area. Any new SWM infrastructure in this area may require the review and approval GRCA property staff, in addition to any approvals from the GRCA under Ontario Regulation 150/06. At the

northern end of Northumberland Street on the west side near Alps Road, the GRCA has also identified two smaller wetland pockets. In general, the GRCA would not support development within the wetlands but may support development adjacent to these wetland areas with the support of an EIS, as part of a permit under Ontario Regulation 150/06.

We again appreciate the opportunity to provide input into this study and trust that the above comments are of assistance on this matter. If you have any further questions or require clarification on these comments, please do not hesitate to contact the undersigned at 519-621-2763 ext. 2233 or jbrum@grandriver.ca.

Yours truly,

John Brum
Resource Planner
Grand River Conservation Authority

Enclosed: GRCA Map

Copy: Lee Robinson, Township of North Dumfries (via email)
Rob Anderson, GRCA (via email)

IBI GROUP
300 – 8133 Warden Avenue
Markham ON L6G 1B3 Canada
tel 905 763 2322
ibigroup.com

September 12, 2022

IBI Group Project No.: 131788 | 2019-0506
GRCA File No: Ayr SWM Master Plan

VIA EMAIL ONLY TO: jbrum@grandriver.ca

John Brum, Resource Planner
Grand River Conservation Authority
400 Clyde Road, PO Box 729
Cambridge, ON N1R 5W6

Dear Mr. Brum:

AYR STORMWATER MANAGEMENT GUIDING PRINCIPLES (FORMERLY MASTER PLAN)
IBI GROUP RESPONSE TO GRCA COMMENTS – DRAFT REPORT, AYR STORMWATER MANAGEMENT MASTER PLAN
TOWNSHIP OF NORTH DUMFRIES

This letter is in response to the Grand River Conservation Authority's comments dated June 22, 2022 provided on the *Draft Report, Ayr Stormwater Management Master Plan provided for the Master Plan and Environmental Assessment (EA)* Project File for the above noted Class EA project.

Please refer to the comment response matrix below which illustrates how the GRCA's comments have been incorporated into the SWMGP.

AYR STORMWATER MANAGEMENT GUIDING PRINCIPLES GRCA COMMENTS – IBI GROUP RESPONSE		
	COMMENT	**RESPONSE**
GENERAL		
1.	Section 1.3.4 – Reference to Township of North Dumfries Official Plan (OP) policy 2.7.3 (a), we note that this policy states that the Township would embark on process on the potential for implementation of a two-zone flood plain policy framework. If the Township wishes to proceed with the development of a two-zone policy area, the GRCA would recommend that the Township have early discussions with GRCA staff to establish a Terms of Reference prior to undertaking the study. Additionally, the GRCA's Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation (Ontario Regulation	Added the following to Section 1.3.4 "Specific two-zone floodplain policies would need to be developed and incorporated into the Township's OP."

AYR STORMWATER MANAGEMENT GUIDING PRINCIPLES GRCA COMMENTS – IBI GROUP RESPONSE		
	COMMENT	**RESPONSE**
	150/06) sets out the parameters for establishing a two-zone policy area under policies 8.1.29. Specific two-zone floodplain policies would need to be developed and incorporated into the Township's OP.	
2.	Section 2.2.2.2 Special Policy Areas – this section discusses Special Policy Areas (SPA) floodplain policy areas and refers to GRCA policies 8.1.33 to 8.1.36. Figure 2-1 (Ayr Township Land Use) under this section suggests that Areas A, B, C and E are located within the SPA. However, there are no formal SPAs approved in Ayr. It appears these areas are future development areas identified in the OP but they are not SPA floodplain policy areas. All the floodplains within the study area are designated one-zone policy areas. This section will need to be clarified.	Clarification has been added to Section 2.2.2.2 that "Various future development areas are in or partially in Township defined Special Policy Areas (SPAs) under OP Section 2.6.13. As noted by GRCA, these SPAs are not SPA floodplain policy areas. All the floodplains within the study area are designated one-zone policy areas."
3.	Section 8 Preferred SWM Strategy – This section identifies specific SWM strategies for Areas A, B, C, D, E, F and the Northumberland Street corridor.	Section 8 has been updated to clarify that any development will be dealt with through existing policies, the Site Plan or Draft Plan process, and that GRCA requirements are to be met.

The Township has determined that Master Plan does not require the completion of any specific projects subject to approval through the EA process. As such, the Township has elected to complete the document outside of the formal EA process as a Guiding Principles document, although, the document will generally conform to the process required of a Master Plan (equivalent to a Schedule B). Should any projects require a formal EA in the future, they will undertake a formal EA at the time. The Township intends to have Council adopt the document as a Guiding Principles document.

Regards,

Roy Johnson B.ENG., P.ENG., MA.SC.
Team Lead, Water Resources Engineering
T: +1 416 346-3875
E: roy.johnson@ibigroup.com

cc:

Lee Robinson – Township of North Dumfries – lrobinson@northdumfries.ca

Ontario

Ministry of the Environment, Conservation and Parks

Environmental Assessment Branch

1st Floor
135 St. Clair Avenue W
Toronto ON M4V 1P5
Tel.: 416 314-8001
Fax.: 416 314-8452

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction des évaluations environnementales

Rez-de-chaussée
135, avenue St. Clair Ouest
Toronto ON M4V 1P5
Tél. : 416 314-8001
Téléc. : 416 314-8452

Via E-mail Only

May 2, 2022

Lee Robinson
Director of Public Works
Township of North Dumfries
lrobinson@northdumfries.ca

Roy Johnson
Team Lead, Water Resources Engineering
IBI Group
roy.johnson@ibigroup.com

Re: DRAFT- Ayr Stormwater Management Master Plan
Town of North Dumfries
Municipal Class Environmental Assessment – Master Plan
Project Review Unit Comments – Final Project File

Dear Lee Robinson and Roy Johnson,

This letter is in response to the Draft Ayr Stormwater Management Master Plan provided for the Master Plan and Environmental Assessment (EA) Project File for the above noted Class EA project. Our understanding is that in order to maintain, expand and improve the existing storm drainage system of the Community of Ayr, the Town of North Dumfries (the proponent) has determined that the preferred alternative is to undertake various improvements including replacement of existing storm pipes and culverts; erosion abatement projects, construction of new storm pond/wetland facilities or other types of centralized stormwater management such as infiltration

facilities. The Ministry of the Environment, Conservation and Parks (ministry) provides the following comments for your consideration.

General

1) The Ministry recommends that the Stakeholder Contact List included in Table 9.1 be updated.
    - Amy Shaw is not longer working at MECP
    - As the Regional Environmental Planner for this project, I am responsible for circulating project notices and information to MECP reviewers and coordinating the MECP response during the Class EA process. Please include my contact information.
    - For Future, please provide copies of all notices by email (pdf) to the regional Email address at eanotification.wcregion@ontario.ca.

Class EA Process & Master Plan Approach

2) Appendix 4 of the Municipal Class EA document outlines various approaches to conducting master plans (available online at https://municipalclassea.ca/manual/page79.html). All master plans, at a minimum, must address at least the first two phases of the Class EA process (identifying a problem or opportunity and identifying alternative solutions to address the problem or opportunity).

    The master planning process under Approach #1 as described in Appendix 4 is completed at a broad level of assessment, requiring more detailed investigations at the project-specific level in order to fulfill Class EA requirements. The master plan in Approach #1 becomes the basis for specific Schedule B and C projects that are required to undergo a Class EA in future.

    Like Approach #1, Approach #2 must also satisfy Phases 1 and 2 of the Class EA. However, this approach involves a level of investigation, consultation, and documentation sufficient to fulfill the requirements for Schedule B projects. A Notice of Completion for this approach should identify/list specific Schedule B projects.

    The Report should clearly identify the Master Plan Approach adopted during this study and should include a list of schedule B, C projects for which Class EA requirements have been fulfilled in the Master plan. The list should also be included in the Notice of Completion.

Public Consultation

3) All the Notices should be included in the Class EA documentation. Please ensure that the final Notice of Completion reflects the changes made to the *Environmental Assessment Act* in July 2020, which scoped the grounds on which a Section 16 order request (formerly referred to as a Part II order request) can be made to the Minister of the Environment, Conservation and Parks to the grounds that the order may prevent, mitigate, or remedy adverse impacts on existing Aboriginal and treaty rights of the Aboriginal peoples of Canada as recognized and affirmed in section 35 of the Constitution Act, 1982.

4) Section 9 of the Report discusses consultation that was undertaken for the Master Plan. If any comments or concerns were raised during public consultation, the ministry recommends that the proponent include at a minimum a brief summary of how these public concerns have been addressed through the planning process. If no comments or concerns were raised

during public consultation, the ministry recommends that a statement indicating this be included in the Report.

Indigenous Consultation

5) Section 9.3 *First Nations Consultation* refers to Appendix J and it should refer to Appendix K.

6) The Ministry notes that Haudenosaunee Confederacy Chiefs Council had not been included in the environmental assessment consultation process, as required. The Haudenosaunee Confederacy Chiefs Council is one of two councils that assert that they represent the community of Six Nations of the Grand River. In order to correct this deficiency and meet the consultation requirements, the Ministry would ask that the Town of North Dumfries (the proponent) contact the Haudenosaunee Confederacy Chiefs Council to share all of the information about the project that has been shared with the Six Nations of the Grand River elected council and other communities and provide the Haudenosaunee Confederacy Chiefs Council with an opportunity to ask questions and raise concerns. The Ministry would remind the Proponent that appropriate timelines should be provided taking into account the current status of the pandemic and the needs of the community at this time. If any concerns are raised by the Haudenosaunee Confederacy Chiefs Council during the consultation process, we would ask that The Proponent advise the ministry immediately of the concerns raised so that the ministry can consider and address, as appropriate, the concerns. All the consultation records with Haudenosaunee Confederacy Chiefs Council should be included in the final Report.

7) It appears that the Town of North Dumfries (proponent) provided notices to Six Nations of the Grand River - Elected Council and Mississaugas of the Credit First Nation. However, no additional information is provided regarding engagement efforts with these community. The report should document the notifications that were distributed and whether there was any follow-up correspondence. The report should also identify whether any comments were received and, if so, how they were addressed. Without this information, the ministry cannot determine whether adequate consultation with these two communities have been undertaken.

8) Indigenous communities frequently receive a high volume of project notices and require time to review project proposals. For this reason, it is important that a proponent utilize different methods of reaching out to communities and reach out to the communities at different points in the process. Documentation of these efforts should be contained in the consultation record, including courier receipts, read receipts for emails and telephone logs recording calls and messages. Any efforts to follow-up by the proponent should be documented in the record of consultation that accompanies the Class EA documentations.

Evaluation of Alternatives

9) The Report does not explicitly identify any recommended upgrades as being Schedule B or C Class EA projects. If this Master Plan will be used in support of future investigations for

specific Schedule B or C projects, these projects should be identified in the Report. The Report should also present an evaluation of how each alternative was considered for each proposed Schedule project.

10) Table 7.2 *Criteria for evaluating Alternatives* includes cultural Environment (Impacts to build and cultural heritage Landscaped, Impacts to archeological resources). However, the Report does not provide any information regarding Cultural Environment. It is recommended that the Report be revised to include a section on Cultural Environment and the Proponent to consult with The Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) regarding the extent to which any assessments are required.

Noise and Vibration

11) Construction mitigation plans should incorporate appropriate noise control measures to mitigate adverse noise impacts to nearby residential land uses within the study areas during construction activities.

Species at Risk

12) Further to the discussion of Species at Risk included in Section 3.4 of Appendix B Environment Reports. Please be advised that it is the responsibility of the proponent to ensure that Species at Risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. If the proposed activities cannot avoid impacting protected species and their habitats, then the proponent will need to apply for an authorization under the ESA. If the proponent believes that their proposed activities are going to have an impact or are uncertain about the impacts, they should contact SAROntario@ontario.ca to undergo a formal review under the ESA.

Thank you for circulating this draft EA Project File for the ministry's consideration. Please document the receipt of this Project Review Unit Comments letter in the final report. We look forward to receiving a written response from the Town of North Dumfries to address our comments above. Should you or any members of your project team have any questions regarding the material above, please contact me at joan.delvillarcuicas@ontario.ca.

Sincerely,

Joan Del Villar C
Regional Environmental Planner – West Central Region

cc Katy Potter, Supervisor, Project Review Unit Environmental Assessment Branch

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September 12, 2022

Joan Del Villar Cuicas
Regional Environmental Planner
Ministry of Environment, Conservation, and Parks
West Central Region
VIA EMAIL ONLY

Dear Ms Cuicas:

AYR STORMWATER MANAGEMENT GUIDING PRINCIPLES (FORMERLY MASTER PLAN)

TOWNSHIP OF NORTH DUMFRIES

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT – MASTER PLAN

This letter is in response to the MECP comments dated May 2, 2022 provided on the *Draft Ayr Stormwater Management Master Plan provided for the Master Plan and Environmental Assessment (EA)* Project File for the above noted Class EA project.

This letter is to inform the Ministry that through this process, the Township has determined that the SWM Master Plan does not require the completion of any specific projects subject to approval through the EA process. As such, the Township has elected to complete the document outside of the formal EA process as a Guiding Principles document, although, the document will generally conform to the process required of a Master Plan (equivalent to a Schedule B).

We therefore request the Ministry close the file on this project.

Regards;

Roy Johnson B.ENG., P.ENG., MA.SC.

Team Lead, Water Resources Engineering

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cc:

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