Preliminary Design
Stormwater Management Report

Calder Industrial Subdivision
Township of North Dumfries

July 2019

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MERITECH

July 10, 2019

Angbar Construction & Development Ltd
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Attention: Brian Calder
Owner

Dear Mr. Calder,

Re: Preliminary Stormwater Management Report
Calder Industrial Subdivision
Township of North Dumfries

Please find our report for the above-noted project, in support of Official Plan Application and to guide future work.

Our report summarizes the known stormwater management requirements and presents a conceptual design configuration. The stormwater management plan satisfies the criteria set forth by the Township of North Dumfries, Ministry of the Environment, Conservation and Parks (MECP), the Grand River Conservation Authority (GRCA), and the Region of Waterloo.

The proposed stormwater management plan consists of lot level infiltration for all design storms. The public right-of-way will convey runoff from with in the right-of-way to roadside ditches where it will be captured in catchbasins, routed through an oil-grit separator, and then infiltrated by a gallery underneath a section of the road. Together these components satisfy the design objectives for water quality and quantity control.

WWW.MERITECH.CA

Yours very truly,

MERITECH ENGINEERING

Rubar C. Uras
CAD Designer

Chris H. Togeretz, P.Eng.
Manager, Design Services

RCU/sb
Enclosures (1)

cc

Executive Summary

The proposed industrial subdivision is located at the northwest corner of Cedar Creek Road and Dumfries Road, in the Township of North Dumfries. The property is bounded by agricultural lands to the east, a railway to the north and west, an industrial lot to the north, a gravel pit to the south, and an existing wetland along the northwest to south portion of the site. As the site is currently an inactive gravel pit, and due to large earthen berms around the site, stormwater runoff drains internally and infiltrates within the site. The proposed development consists of industrial lots fronting on a new internal municipal road.

The overall stormwater strategy focuses on infiltration-based practices due to the conducive properties of the soils, as well as the identification of the site as a recharge point for the Cedar Creek Subwatershed. As the site is adjacent environmentally-protected lands, agency concerns regarding erosion and environmental impacts have guided allowable stormwater management approaches for the site.

A combination of roadside ditches and a storm sewer system in the road's right-of-way can store and convey flows to an infiltration gallery for runoff from storms up to the 100-year event. Flows will enter an oil-grit separator before being infiltrated to ensure an enhanced level of quality. Lots will be sold following the development of the internal road. Detailed instructions for the development of the lots will be created as part of the detailed design phase, to assist future land purchasers in developing their lots. The guidance will consist of strategies that will guide the development of the industrial lots, which will be processed through the Site Plan Approval process.

Approval agencies shall review and approve this document as a suitable approach to a stormwater management plan in support of Official Plan Approval and zone change. Following these planning approvals, a Preliminary Stormwater Management Report will build on this Conceptual Design report for Draft Plan Approval.

Use and Reproduction of This Document

For Further Information

For further information regarding this stormwater management plan please contact the author at the following address:

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Introduction

The objective of this report is to gain agency support of the stormwater management criteria and a conceptual design approach in order to obtain Official Plan Approval for the proposed industrial subdivision in the Township of North Dumfries. The future Draft Plan approval will be for the development of an internal road to permit the creation of industrial lots.

Figure 1 shows the location of the site at the intersection of Dumfries Road and Cedar Creek Road. The site is located towards the east of Cedar Creek and is surrounded by agricultural lands to the east, a railway to the north and west, an industrial lot to the north, a gravel pit to the south, and an existing wetland along the northwest to south portion of the lot.

The vacant property is a vegetated inactive gravel pit with high slopes along the east to the southeast property line and low areas within the development. The site currently contains two existing ponds, a gravel driveway, and abandoned structures and vehicles. A church site exists at the corner of Dumfries Road and Cedar Creek Road. An existing noise buffer (earthen berm) exists between the church site and the proposed development.

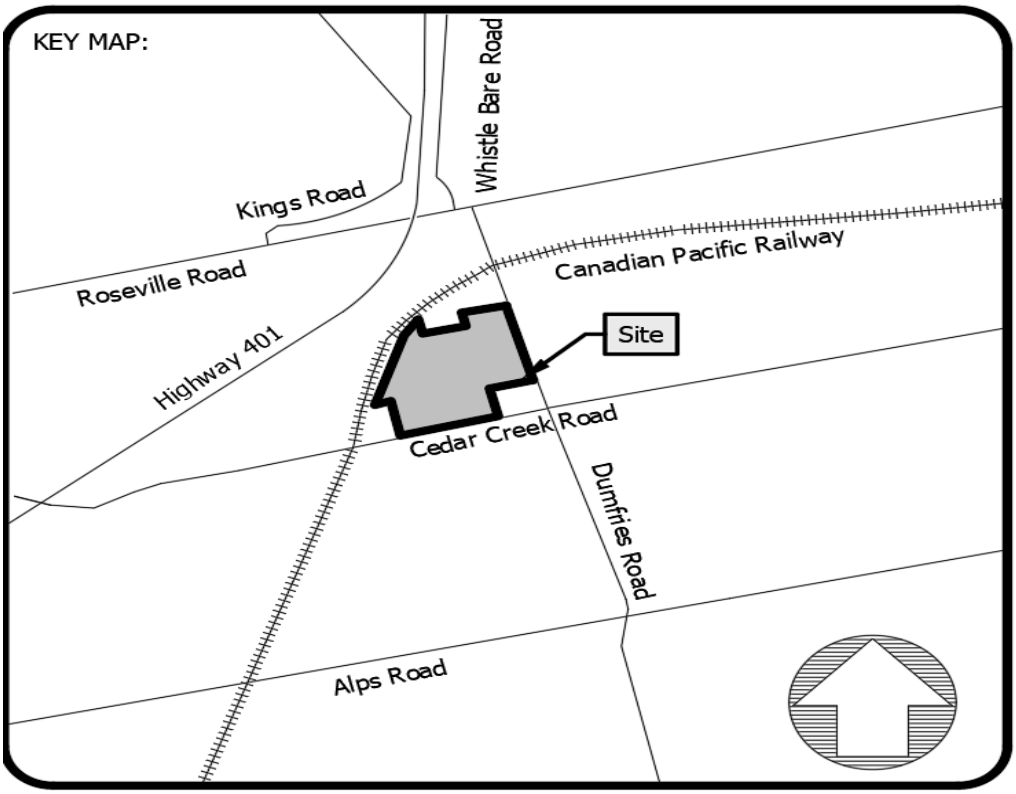

Figure 1: Site Location

Approach

This report provides a description of the stormwater management required for the development of the land for industrial purposes. It will provide guidance for future preliminary and detailed designs for the subject lands. The design criteria stage consists of a pre-submission consultation meeting with approval agencies and reviewing the reports and graphics currently available from the ongoing Cedar Creek Subwatershed Study.
The following flowchart explains the typical submission and approval process. The section highlighted in grey indicates that status of this circulation.

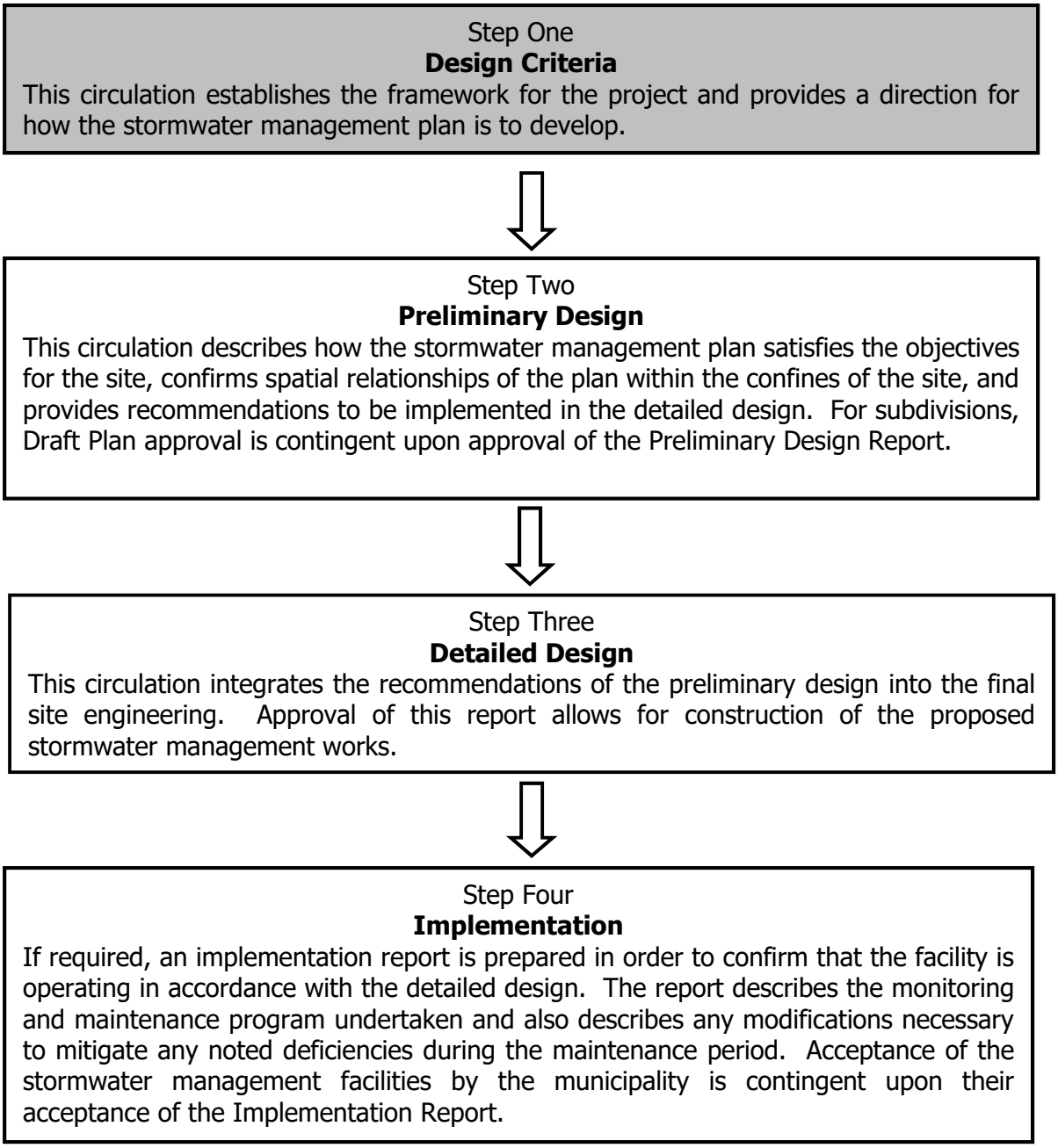

Figure 2: Approach Flowchart

Policy Framework

This chapter outlines the framework upon which the stormwater management plan, which is described in more detail in subsequent chapters, is built upon. Previous studies, municipal and provincial standards, as well as any field work undertaken to support the project, are examples of information described in this chapter. This background information is then used to build an appropriate plan for the site. The next chapter, "Objectives and Targets", describes the site-specific requirements noted from the following sources:

Stormwater Management Studies

Cedar Creek Scoped Subwatershed Study Public Consultation No.1, April 2018
The information provided by the study prior to the first open house included presentation boards with the objectives of the Subwatershed study. Study areas were set up to monitor surface and ground water conditions, and modelling was completed to evaluate the recharge rate of contributing lands to the subwatershed. The water table was found in the Cedar Creek head waters, ±30m below the Cedar Creek. Most of the stream flow within Cedar Creek comes from ground water discharge, which is largely supported by locally generated groundwater recharge. Surface water supports the area's natural features and resources such as wetlands, wet forests, watercourses, and fish. The study includes many significant wetlands, woodlands, wildfire habitat, and species at risk. Maintaining recharge rates, providing temperature control in runoff, and providing buffers from natural features are main points within the study.

Cedar Creek Scoped Subwatershed Study Public Consultation No.2, March 2019
The information provided by the study included the relative characteristics of surface water and groundwater conditions. The study also confirmed the results from the April 2018 presentation using additional modelling and additional obtained information. The key item that was verbally discussed at the meeting by the project team was the importance of pre-treating runoff with more ways then one before entering the storm sewer system. Pre-treatment included vegetated overland routes, catchbasins with sumps, and Goss traps/catchbasin guards. The information provided by the study included the relative characteristics of surface water and groundwater conditions. The study also confirmed the results from the April 2018 presentation using additional modelling and additional obtained information.

MOE (MECP) Guidelines

Stormwater Management Planning and Design Manual, 2003
This manual provides guidelines on the planning and design of stormwater management facilities in Ontario.

LID Stormwater Management Guidance Manual- DRAFT, 2017
This manual was released as a draft to solicit comments on proposed Low Impact Development (LID) design guidance. It is meant to be used together with the 2003 guidelines so that LID techniques can better be integrated into stormwater management designs.

Municipal Guidelines

Township of North Dumfries, Design Standards and Engineering Submission Requirements, *2002*
This manual was reviewed for typical design criteria; the Township is updating this manual.

City of Cambridge, Engineering Standards and Development Manual, 2013
This manual includes a list of coefficients to be used in modelling of synthetic design storms.

Conservation Authority Guidelines

Greater Golden Horseshoe Area Conservation Authority Erosion & Siltation Control Guideline for Urban Construction, December 2006
This document describes the methodology for determining the erosion potential of a site and the measures that should be undertaken to mitigate construction disturbance.

Environmental and Tree Management Studies

Environmental Impact Study and Tree Inventory & Preservation Plans will provide details on the protection and preservation of existing onsite features to prevent damage with the development. Setbacks and recommendations will help keep the impacts to the environmental core adjacent the site to a minimum. The study is currently being completed by Aboud & Associates and will be provided with a later submission.

Geotechnical Studies

No geotechnical study is available at this time and will be provided at a later time. Borehole logs from the MOE and the Cedar Creek Subwatershed Study have been used to determine soils and groundwater conditions. Borehole logs helped determine that the soils are consistent with a mix of gravel, sand, and clay. Water levels in the logs were recorded as being 15-17 meters below the surface. The study is currently being completed by Chung & Vander Doelen Engineering Ltd. and will be provided with a later submission.

Hydrogeological Studies

A hydrogeological report is currently being completed by Chung and Vander Doelen. The study will help better describe the properties of soils, set infiltration parameters for the proposed infiltration gallery, the relationship between groundwater and surface water, confirm groundwater depth, and determine the pre-development and post-development water balance conditions and objectives.

Pre-Consultation/Design Criteria

A pre-submission consultation meeting was held with the Region of Waterloo on October 4, 2013. Formal comments were issued by the Region following the meeting. Specific pre-submission consultation comments from the Region of Waterloo related to stormwater management include:

- To include a Stormwater Management Strategy which identifies how stormwater management will be approached over the entire property to ensure that there are no impacts to the Cedar Creek
- Impacts to be addressed through the approach will need to include, but may not be limited to, water cooling and deposition of sediment
- A detailed servicing strategy will be required to demonstrate how the proposed lots are to be serviced and to verify capacities to do so through private services

A pre-submission consultation meeting was held recently with the MECP Mike Spencer from the CA on November 9, 2018 and the project team at the MECP Guelph District Office. Notes from the meeting include the need to provide a separate Environmental Compliance Approval (ECA) and spill containment plan for each individual lot. In addition, an ECA for the works within the right of way will need to be provided. Land uses will need to be controlled through zoning; as the site is nearby to an Environmental core it is important to refrain from building high impact industrial buildings such as chemical plants or businesses that deal with the production of chemicals.

Reconnaissance

Meritech staff have visited the site on multiple occasions to become familiar with the site topography, drainage patterns, and existing low points along property lines, and to gather additional information as time has progressed. The majority of the site is internally draining as it used to be an active gravel pit. The site is surrounded by hills and the less sloped internal portion of the site drains from east to west as shown in the existing condition photographs in Figure 3.

(Southwest corner of Cedar Creek Road before the existing Church)

(Existing gravel entrance at the northeast corner of Dumfries Road)

(Forested area along the west from within the site)

Figure 3: Existing Conditions Photographs

Objectives and Targets

This chapter describes typical stormwater management concerns associated with development. In each section, a brief commentary on the application of these requirements to this project is provided, along with their associated objectives and targets. In the next chapter, Proposed Stormwater Management Plan, a more complete description is provided for how the proposed plan addresses these objectives.

Environmental

The primary environmental objectives are to protect the existing Cedar Creek and maintain recharge rates across the proposed development.

Quantity

Development of land from rural to urban causes an increase in runoff due to the increase in impervious cover. Additionally, the increased runoff flows faster to receiving watercourses, which combined with other developed sites, may cause downstream flooding. It is, therefore, usual to provide either on-site or regional "holding" areas that act to contain the increased runoff and discharge it over a longer period of time while not exceeding the targeted peak flow.

As the proposed development is surrounded by earthen burms along the east to the south east and the native characteristics of the soil the objective of post-development quantity control is to infiltrate all runoff from the development.

Quality

Water quality control is provided for several reasons, including sediment and contaminant (chemical) removal. It is now standard practise to incorporate water quality treatment into the design of any stormwater management facility. This often includes:

- Pre-treatment (for example, grassed swales)
- Treatment (for example, sediment forebay/permanent pool), and
- Enhancement (for example, extended detention)

As the industrial subdivision is adjacent to the Cedar Creek spillway, an enhanced level of quality control is proposed to be provided based on the information acquired from the Subwatershed study.

Water Balance, Infiltration and Groundwater Conditions

Another example of the impact of development on the natural water cycle is groundwater recharge. The increase in impervious cover prevents water from soaking into the ground. Cumulatively, these minor losses can cause significant loss to the groundwater regime. Analysis of these impacts, in the form a water budget, is sometimes undertaken with the intent of designing appropriate mechanisms for recharge.

From the Cedar Creek study, we have learned that the site is apart of a portion of land that contributes to the creek through groundwater recharge. Thus, the site must be able to maintain infiltration rates within the site with development. As development will result in increased imperviousness, infiltration measures will need to be employed to maintain the average annual pre-development infiltration volume. The geotechnical report indicates that the groundwater table is deep and that native soils are conductive to infiltration. Infiltration will be an integral part of the proposed stormwater management strategy.

Baseflow and Channel Erosion

Changes to land use can cause impacts on receiving watercourses, including erosion or a change to the baseflow. While erosion is a natural and important phenomenon, analysis of the potential erosion of the receiving watercourse is sometimes necessary. Approved methods of performing an erosion analysis are described in the Ministry of Environment Planning and Design Manual.

As the proposed development is part of the catchment contributing to the existing Cedar Creek, our design will need to infiltrate all runoff to maintain recharge rates. The design will have no negative impacts to the creek as infiltration is the lead in stormwater management. Runoff will have pre-treatment before being infiltrated, once runoff has passed through the galleries the native soils of the site will provide temperature control by cooling runoff naturally before hitting the clay layer and ultimately entering the Creek. As we know from the MOE borehole logs the soils consist of a clay layer at the bottom of the gravel layer and top soil surface which conveys flows to the Cedar Creek Spillway.

The west portion of the site along the wetland limit will be raised to provide flat lots, the 3:1 slope will be filled with material cut from the east portion of the site. The slopes will need to be vegetated and maintained in order to provide treatment and match pre-development conditions. By infiltrating and the use of native materials erosion is not a constraint in post-development.

Site Erosion and Sedimentation Control

Without proper controls, construction activities can cause erosion of disturbed land by either water (alluvial) or wind (aeolian) action. Eroded soil can then be transported off the construction site to environmentally sensitive areas. However, with proper planning of construction activities, along with a concerted effort to install and maintain siltation/erosion control measures, the potential for damage is minimized.

As the site contains a wetland towards the west, an existing pond within the wetland, and overland sheet flow from a portion of the site is currently directed towards Cedar Creek, erosion and sediment control will need to be maintained through the duration of construction.

Concept Generation and Evaluation

As with all subdivisions there are many potential stormwater management designs that would meet most or all of the objectives and targets such as but not limited to end-of-pipe or lot level controls. The target of the Concept is to maintain pre-development infiltration rates in post-development while providing an enhanced level of quality control.

In order to provide a solution, the requirements set out by the Cedar Creek Subwatershed study, as well as comments from corresponding agencies were looked at to get a better understanding of the expectations for post-development. In looking through the background information, stormwater management approaches which include end-of-pipe, lot-level control, and right-of-way controls were considered to fulfill all the requirements set out by the client, Conservation Authority and MECP. Additional consideration such as costs to the developer as well as costs to the Township will be a key factor in choosing the final design.
The end-of-pipe approach includes the conveyance of runoff through pipes and overland to a stormwater management pond. The pond will include a forebay in which flows will be attenuated to provide quantity and quality control. For the proposed development the use of a pond can be achieved within the development limits. Flows will be carried using overland and a storm sewer system to a pipe and then ultimately the pond. An infiltrating pond will help ensure that pre-development infiltration rates are maintained.

The second approach which is lot level control can also be achieved. The internal road will infiltrate within the right of way as the lots are controlled within their own limits. Lot level infiltration will provide quantity and quality control using pipes and overland. An oil grit separator will provide the enhanced level of quality control. From the Background of the site we know that the current conditions include internal drainage as the native soils have a high conductivity rate. Therefore, infiltration whether end of pipe or Lot level is the key aspect that needs to be met regarding stormwater management. The Ministry of Environment and Climate Change LID manual does not view the end of pipe approach as a means of infiltrating runoff.

The manual more sees the use of a pond to provide quality and quantity control then ultimately discharging to a water course. For lot level controls oil grit separators and infiltration galleries are used to maintain a water balance. From the background we have been provided by the Subwatershed Study we know that ground water within the catchment is a major contributor to the Cedar Creek and existing environment such as wetlands and wet forested areas.

Whether end-of-pipe or lot level the solutions meet the set background parameters by the Subwatershed study and corresponding agencies. With the end-of-pipe system a large portion of developable land will be required to build the infiltrating pond as the undevelopable portion of land is thick forested area a pond cannot be placed within. The end-of-pipe system will include the installation of pipes and structures to convey flows to the proposed pond. The lot-level solution also requires pipes and structures to convey flows from the ROW to infiltration but avoids a large extended system to capture runoff from all the lots as well as a final discharge pipe that leads to the pond.

It has been identified that infiltrating the right-of-way will benefit the client as well as the township. With the lot level approach, the roadside ditch will need to be maintained to ensure waste is not backing up the system, as well as obstructions to the structures will need to be cleared. A pond will require more maintenance measures such as, ensuring growth of the planted structures, occurrence of erosion, ensuring animals are not destroying the pond, and destruction of security measures such as fences.

For the development of the site the better SWM approach will be lot level control and infiltration of the right-of-way. The benefits include maximizing the developable land area, reducing maintenance costs for the township and the client, and meeting the infiltration and quality requirements.

Lot Level Control

Level control will be the key approach for stormwater management. As a pond will require a large portion of developable land, will need to be maintained at a large scale, and may not provide the quality control of overland before infiltrating into the ground, it is not considered as a beneficial option for this development. Lot level will provide a more controlled approach as it is per lot, undeveloped lots will not have an excess amount of untreated overland passing through, and a large area of developable land will not be needed to capture runoff. Another key piece of information is during the Cedar Creek Subwatershed Public Information Centre it was discussed that the more attenuation and pre-treatment to flows the better, with lot level controls being at a smaller more controlled scale it will be easier to meet pre-treatment requirements by the use of onsite vegetated swales to convey flows to catchbasins, having sumps in the structures, OGS units and Goss traps/catchbasin guards to provide a better pre-treatment approach.

Proposed Stormwater Management Plan

From the background information and criteria presented in previous chapters, an appropriate stormwater management plan was developed. This chapter describes the project-specific stormwater plan in detail.

The overall stormwater management plan consists of infiltration features on lots and in the right of way designed to capture and infiltrate all runoff in storm events up to the 100-year storm event. The west portion of the site that contains the existing wetland is proposed to be raised with native material from the wetland limit up in order to maintain infiltration rates. This area can be attenuated if needed through the use of a French drain along the raised slope near the bottom lower portion.

The following table presents typical stormwater management solutions. Each one is ranked high, medium, or low (H, M or L) as to the level of performance for Water Quality, Erosion, Water Quantity and Infiltration. The last two columns present whether or not the control is proposed in the stormwater management solution, along with a commentary of its suitability to this project.

Lot Level & Conveyance Controls	Water Quality	Erosion	Water Quantity	Infiltration	Incl. In Plan?	Comments
Flat Lot Grading	M	M	L	H	Y	Recommended for SPA
Control of Roof Leaders	M	M	L	H	Y	Recommended for SPA
Control of Foundation Drains	M	M	L	H	N	
Grassed Swales	M	M	M	H	Y	
Filter Strips	M	M	L	H	N	
Infiltration Trench	H	M	L	H	Y	Soils Conducive
Pervious pipes, catchbasins	H	M	L	H	Y	Soils Conducive
Oil / Grit Separator	M	L	L	L	Y	Provide enhanced quality
Rooftop Storage	L	M	H	L	Y	Recommended for SPA
Parking Lot Storage	L	M	H	L	Y	Recommended for SPA
Underground Storage	L	M	H	L	Y	Gallery underneath road to capture 100-year flows
End of Pipe Controls						
Sediment Forebay	H	M	L	L	N	A SWM pond is not proposed for this development; refer to Concept Generation and Evaluation for reasoning.
Wet Pond	H	H	H	L	N	
Constructed Wetland	H	H	H	L	N	
Dry Pond	M	H	H	L	N	
Infiltration Pond	H	M	L	H	N	

Table 1: Selection of Stormwater Management Practises
(Compiled From 2003 MOE Manual)

Operation of Stormwater Management Facility

Minor/Major System Routing

The proposed right-of-way section will be 24m wide (refer to Appendix A for Sections through right-of-way) and will provide a route for runoff to be captured within the ditch.

In all storm events up to the 100-year event runoff from the right-of-way will be captured and infiltrated within the right-of way. The conveyance system which consists of road side ditches which will capture and hold a portion of runoff from the right-of-way, a storm sewer system within the ditch to convey flows through an oil-grit-separator and finally an infiltration gallery underneath the right-of-way to infiltrate up to the 100-year storm event. The gallery will be sized to hold the remaining amount of runoff the ditches can not hold.

The major storm system, which conveys storm larger than the 100-year storm event will be tipped towards the road for lots 1-3 and 10-14 and fill up the ditches. Once the ditches overflow the runoff will tip into the emergency swale as indicated on the conceptual plan (see Appendix A) and flow towards the existing wetland at the end of the swale as this is the lowest portion of the site. With the low portion being raised to 307.00± to achieve flat lots the remaining lots will be graded higher to ensure that flows are directed to the overland channel in a greater than 100-year storm event.

Winter Conditions

In the event of the storm sewer system freezing the road side ditches will fill up to maximum capacity and tip into an emergency overland grassed swale that will convey flows towards the wetland. Rock check dams and quality enhancing features will be within the swale to ensure runoff will not cause erosive impacts to the wetland. The catchbasin leads and gallery will all be below minimum cover to ensure that freezing will not occur within the system.

Quantity

As the site drains internally through infiltration from native soils, post-development will require infiltrating all runoff from the development. Runoff volumes up to the 100-year design storm event will need to be infiltrated through lot level control and within the right-of-way. MIDUSS was not used for pre-development due to the site draining internally.

Catchment Numbering Convention

The following catchment number convention was used to identify the characteristics of each catchment:

Description:			Catchment #
Existing	Internal	Uncontrolled	100
Existing	External	Uncontrolled	200
Existing	Internal	Controlled	300
Existing	External	Controlled	400
Proposed	Internal	Uncontrolled	500
Proposed	External	Uncontrolled	600
Proposed	Internal	Controlled	700
Proposed	External	Controlled	800

Table 2: Catchment Naming Convention

Pre-Development

Although surface grades on site drain towards the south, most runoff is infiltrated. Additionally, the site is surrounded by earthen berms that contain any runoff that occurs within the site. The site was originally an active gravel pit, the main point of drainage is through infiltration due to the native soil's conductivity. Modelling was not used as the SWM approach is infiltrate all the runoff generated in post-development.

Post-Development

Post-development catchments incorporate the routing of the minor and major storm systems to infiltration for both the lots and right of way. As the site is a recharge point for the existing Cedar Creek, and the pre-development conditions don't produce runoff that discharges outside of the site. Lots will be infiltrated to hold all flows, along with the right of way being captured and infiltrated up to the 100-year storm event. Refer to Appendix B for Post-Development Catchment Plan.

Catchment 501 is a mix of the existing wetland along with a slope up from the limit to provide the development with a flat site. Native materials will be used for the construction of the slopes to maintain the flow rate within the catchment and prevent the wetland from taking any additional flows.

Catchment 701 & 703 is the area along the internal road consisting of proposed lots, these two catchments will incorporate the use of parking lot storage, roof top storage (minimum 20mm) and infiltration to hold up to the 100-year design storm event.

Catchment 702 the right of way running through the site will be comprised of road side vegetated ditches with catchbasins and pipes leading to an infiltration gallery. The gallery will be sized to hold the amount of runoff less the road side ditches storage capacity. In the detailed design phase MIDUSS will be used to calculate runoff volumes of the internal road in order to size the ditches and gallery accordingly.

Quality

Treatment Train Approach

The proposed development will be optimized to provide a treatment-train approach to water quality enhancement. Flows from the right-of-way will be conveyed to the roadside ditches and travel through vegetated buffers before being caught within catchbasins. Catchbasins will include sumps and Goss traps/catchbasin guards to provide pre-treatment before entering the storm sewers. Flows will then be conveyed to an OGS unit to provide the enhanced level of quality. Ultimately flows will be infiltrated therefore, a pre-treatment must be applied to ensure an enhanced level of quality.

For lot level the criteria will follow the same treatment train approach to provide pre-treatment before entering the OGS and then infiltration. Vegetated swales and catchbasins with sumps and Goss traps/catchbasin guards will be required to provide pre-treatment, in addition clean roof runoff should be piped to the infiltration gallery which will allow developers to have more options regarding placement of the gallery's as well as the OGS does not need to be sized for clean roof runoff allowing for smaller OGS units.

Baseflow and Channel Erosion

As the proposed development is part of the catchment contributing to the existing Cedar Creek, our design will need to maintain recharge rates. The design will have no negative impacts to the creek as infiltration is the lead in stormwater management. Runoff will have pre-treatment before being infiltrated, once runoff has passed through the galleries the native soils of the site will provide temperature control by cooling runoff naturally before hitting the clay layer and ultimately entering the Creek. As we know from the MOE borehole logs the soils consist of a clay layer at the bottom of the gravel and top soil which conveys flows to the Cedar Creek Spillway.

The west portion of the site along the wetland limit will be raised to provide flat lots, the 3:1 slope will be filled with material cut from the east portion of the site. The slopes will need to be vegetated and maintained in order to provide treatment and match pre-development conditions.

Construction Staging

The site will be built starting with the ROW and services. Lots will be pre-graded as the west portion will need to be lowered and the east portion will need to be raised. This will allow developers to grade their sites to their best interests. Once the site is complete lots will be sold and developed to individual builders as needed.

Site Erosion and Sedimentation Control

Construction activities can cause erosion of native soils, and deposition of sediment on other properties or in receiving watercourses. To avoid these problems siltation control measures, such as silt ponds, silt fencing and construction staging are utilized.
A detailed erosion and sedimentation control (ESC) plan will be developed during the detailed design phase. The following issues will be considered:

- Disturbed areas should be protected from erosion caused by rain
- Disturbed areas should be kept to a minimum and revegetated in a reasonable timeframe in order to minimize dust
- Maintenance of the installed measures
- Where the topsoil stockpile will be located, from where it will be accessed, and appropriate siltation control measures

Site Design Guidelines-Stormwater Management

As part of detailed design site design guidelines will be created in its own appendix to help guide development of the future individual lot parcels. The appendix will include criteria that will need to be met with steps on how to develop a lot to infiltrate all runoff. The criteria will include submission requirements and calculations in order to help future developers to build their lots.

Submission requirements will include:
Preparation of SWM and Servicing (on-site wells and septic) reports

- Original topo survey (Developers preference not mandatory)
- Site servicing plan
- Site grading plan
- Modelling/handcalcs
- Infiltration gallery calculations
- OGS sizing calcs
- Storm drainage area plan
- Any other required documents for SPA

Conclusions

Post-development flows will need to be infiltrated and kept within the lots and right-of-way.

The proposed stormwater management facility meets the design objectives for water quality and water quantity (flood) control. The facility includes: a system of road side ditches with catchbasins and a sewer system to convey flows into an oil grit separator and finally an infiltration gallery.

As part of detailed design criteria and instructions for the development of lots will be provided in its own appendix.

The erosion potential for the site is high and, therefore, siltation and erosion control measures will be required during construction.

Recommendations

This Design Criteria Report shall *not* be used for construction.

A detailed siltation and erosion control plan shall be developed as part of the final design and prior to any grading. Consideration should be given to the use of temporary silt ponds until such time as areas are revegetated and stabilized.

That approval agencies shall review and approve this document as a suitable approach to a conceptual design configuration in support of Official Plan and a zone change and approve OPA and zoning.

Following these planning approvals, a Preliminary Stormwater Management Report will build on this Design Criteria Report, in support of Draft Plan Approval.

References

Greater Golden Horseshoe Area Conservation Authorities, Erosion & Sediment Control Guideline for Urban Construction, December 2006

Ministry of the Environment, Stormwater Management Planning & Design Manual, Toronto ON, March 2003

Ministry of the Environment & Climate Change, LID Stormwater Management Guidance Manual-DRAFT, April 2017

Matrix Solutions Inc. Environment and Engineering , Cedar Creek Scoped Subwatershed Study Public Consultation No. 1, April 2018

Matrix Solutions Inc. Environment and Engineering, Cedar Creek Scoped Subwatershed Study Public Consultation No. 2, March 2019

The Corporation of the Township of North Dumfries, Design Standards and Engineering Submission Requirements August 2002

Appendix A: Concept Plan& Conceptual Sections

Legend

Proposed Grades	X 314.94
Existing Grades	*X 307.75*
Lot Numbers	9
Roadside Ditch	
Gravel Shoulder	
Catchbasin/Catchbasin Manhole	
Wetland Limit	
Ditch Flow Direction	
Pr. Road Grade	0.5%
Emergency overland Grassed Channel	
Ex. Wetland area	
Ex. Pond	

Length of Road=946.44m
CB=2±
CBMH=11±
OGS=1
Length of pipe required=1180m±
Culverts will be required at driveways and between ditches to ensure no overflow spills in to lots
Material cut from east side of site to be used to fill west side of site to maintain infiltration abilities

Pond to be filled in to become part of lot 5

Pr. Road side ditch to follow road grade

Buffer limit

Buffer limit

Existing Pond

Pr. Location of Gallery

Approx limit of 3:1 slopes to achieve flat lots

OGS

Ex. Berm to be graded to provide buffer for church

Pr. Gravel shoulder graded towards road side ditches

Cedar Creek Road Regional Road 97

Dunnville Road Regional Road 97

X 307.80 · X 307.90 · X 307.70 · X 307.50 · X 307.20 · X 306.90 · X 305.50 · X 305.90 · X 306.70 · X 306.30 · X 306.50 · X 307.00

X 311.20 · X 309.20 · X 313.50 · X 314.00 · X 314.50 · X 315.44 · X 317.32 · X 313.30 · X 309.18 · X 308.36 · X 308.36 · X 312.00 · X 307.40 · X 307.50 · X 310.80 · X 307.10 · X 306.40 · X 307.60 · X 306.21 · X 309.79 · X 307.80

3.0 Acres · 2.2 Acres · 2.8 Acres · 7.6 Acres · 5.9 Acres · 9.3 Acres · 6.2 Acres · 6.8 Acres · 7.4 Acres · 9.8 Acres · 6.1 Acres · 6.0 Acres · 4.7 Acres · 7.1 Acres

24.0m · 49.1m · 3.8% · 2.0% · 0.5% · 2.2%

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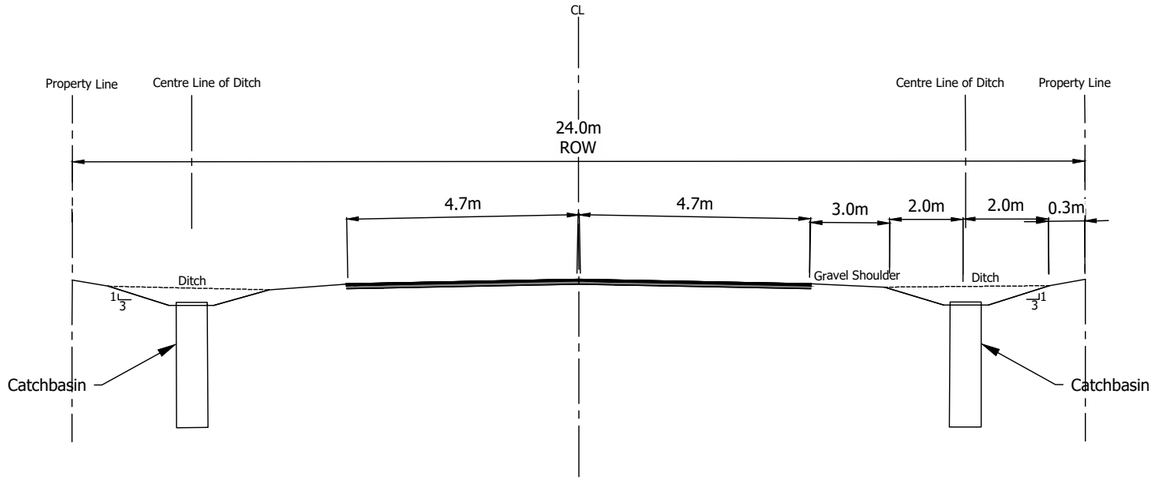
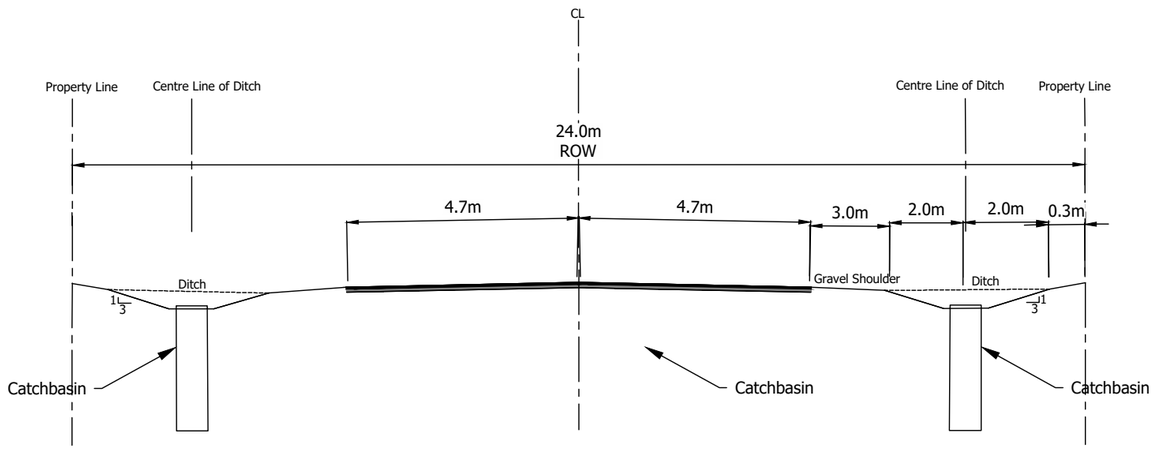
T 519.623.1140 F 519.623.7334 www.meritech.ca

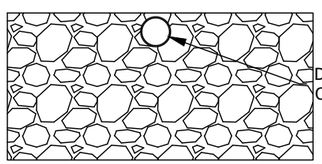
DRAWING: Grading and SWM Concept Plan
Calder Pit Industrial Subdivision

DRAWN BY:	RCU	CHECKED BY:	CHT
FILE NAME:	4371	DATE:	Mar 2019
SCALE:	1:5000		CP



Cross Section A-A
Not to Scale





Cross Section B-B
Not to Scale

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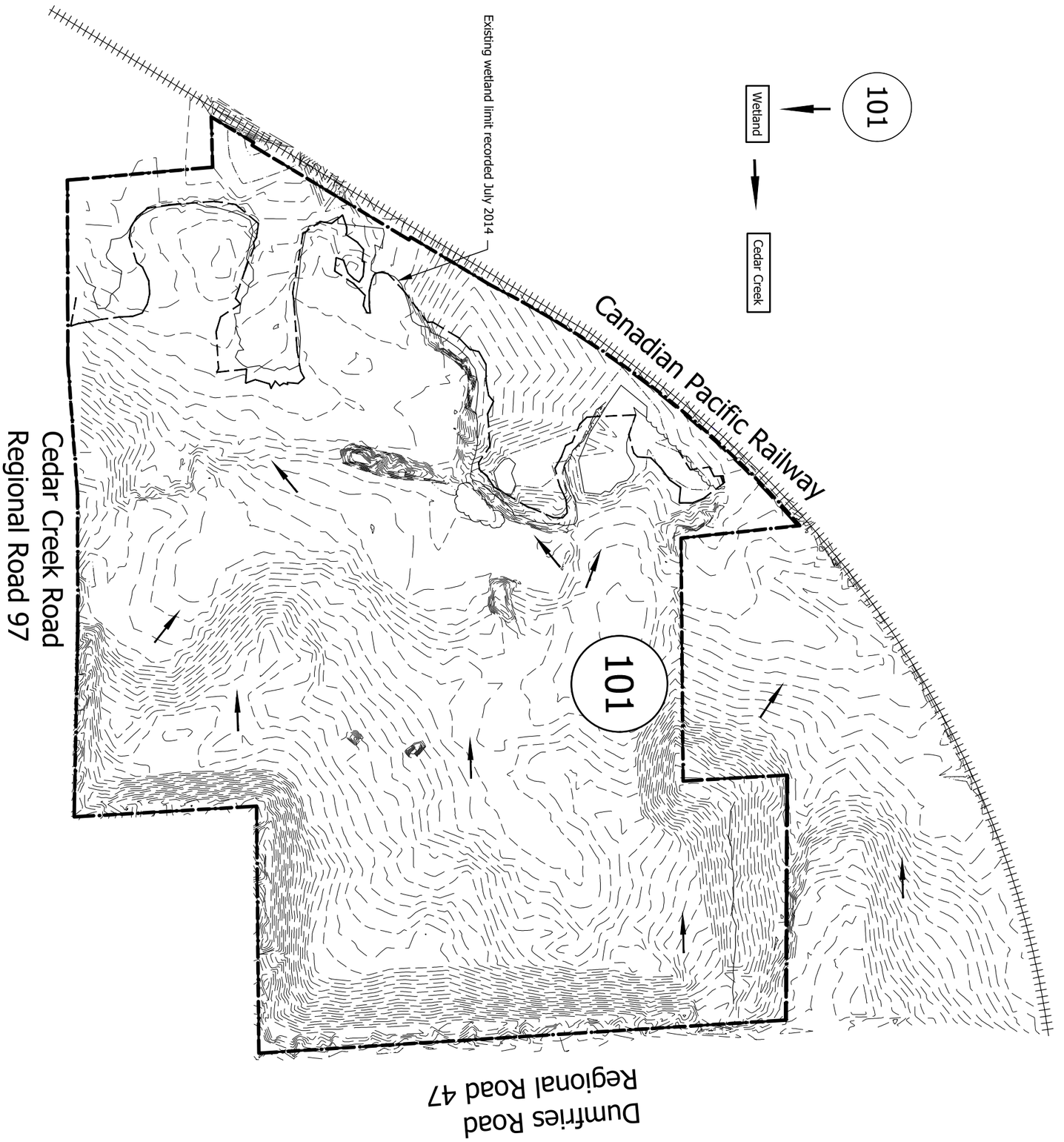
DRAWING: Cross Section A-A & B-B
Calder Pit Industrial Subdivision

DRAWN BY: RCU	CHECKED BY: CHT	SCALE: 1:100	Sect
FILE NAME: 4371-Sect	DATE: June 2019		

Appendix B: SWM Figures



DRAWING: Pre Development Catchments
Calder Pit Industrial Subdivision

DRAWN BY:	RCU	CHECKED BY:	CHT	SCALE:	1:5000
FILE NAME:	4371.Figs	DATE:	Jun 2019		Figure 4

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MERITECH engineering
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DRAWING: Post Development Catchments
Calder Pit Industrial Subdivision

DRAWN BY: RCU	CHECKED BY: CHT	SCALE: 1:5000	Figure 5
FILE NAME: 4371	DATE: XXX 2019		

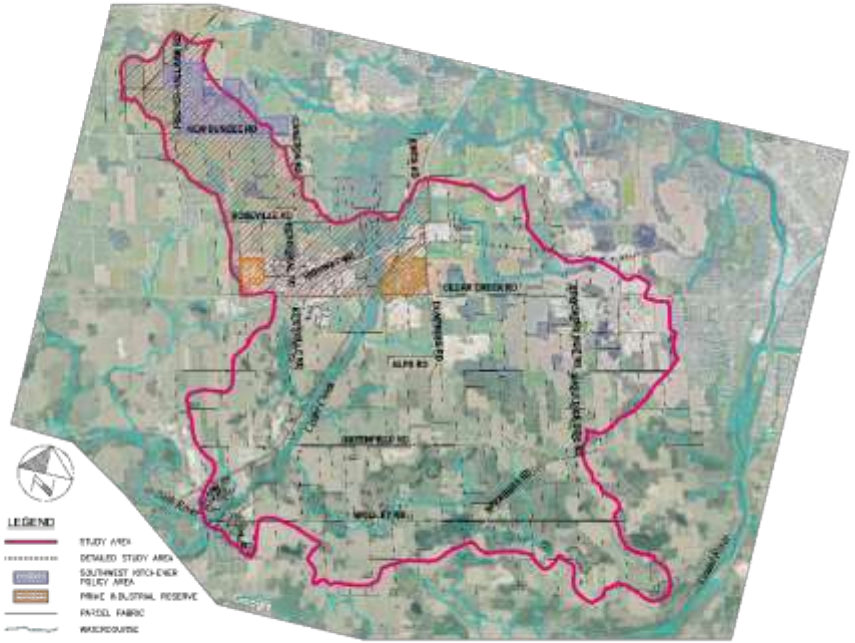
Appendix C: Cedar Creek Subwatershed Study

Cedar Creek Scoped Subwatershed Study

Study Purpose and Objectives

Study Purpose and Objectives

- To develop a watershed-based management plan to maintain, enhance or restore the health of the Cedar Creek Subwatershed focusing on lands north of Cedar Creek Road and west of Dumfries Road
- To establish management recommendations for existing and possible future land uses and to inform the next review of the Regional Official Plan



Cedar Creek Scoped Subwatershed Study

Land Use and Watershed Planning Context

Regional Official Plan (ROP):

- Requires watershed studies prior to the development of significant areas of land to protect the Greenlands Network
- Within the Southwest Kitchener Policy Area, the final extent of the Protected Countryside will be coincident with the Regional Recharge Area and will be determined through the next review of the ROP

Growth Plan for the Greater Golden Horseshoe:

- Municipalities and conservation authorities will ensure that watershed planning is undertaken to support protection of water and natural heritage systems

Provincial Policy Statement:

- Provides guidance on the scope and application of subwatershed planning

Cedar Creek Scoped Subwatershed Study

Study Process

Study involves two (2) phases:

Phase 1 Subwatershed Characterization and Integration

- Data Review
- Field Work
- Set goals, objectives and targets

Phase 2 Impact Assessment and Management Plan

- Identify and assess potential impacts of land use change in the Detailed Study Area on the subwatershed resources and functions
- Assess Strategy
- Development of a Preferred Management Plan
- Establish Monitoring and Implementation Strategies

Cedar Creek Scoped Subwatershed Study

Discipline-Specific Studies

Several Disciplines involved:

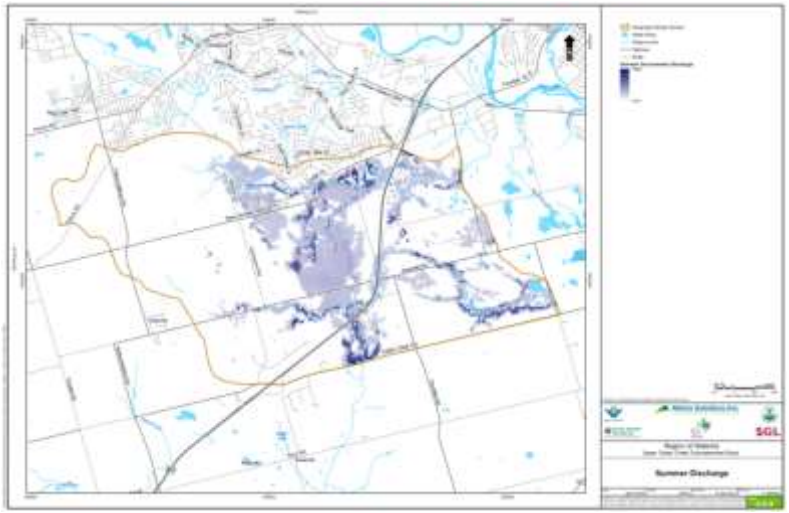
- Groundwater
  - Role of groundwater in sustaining natural features and functions
  - Influence on drinking water

- Surface Water
  - Role of surface water in sustaining natural features and functions
  - Influence on floodplains and creek stability (erosion)

Cedar Creek Scoped Subwatershed Study

Preliminary Findings

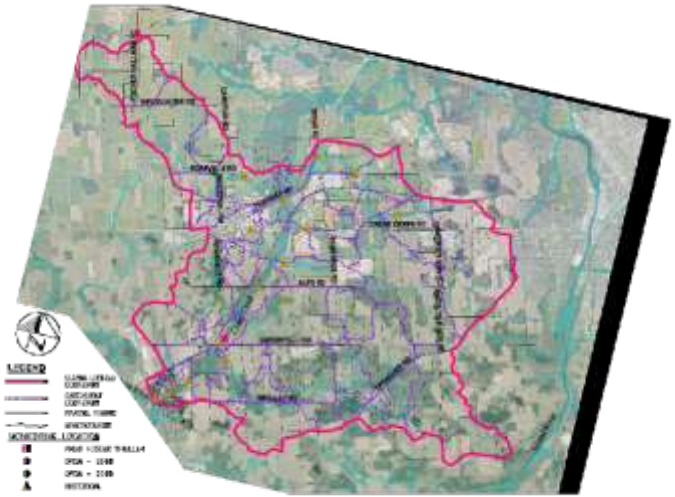
- Groundwater
  - No permanent flow upstream of Roseville Road in creeks
  - Distinct shallow (upper) and deep (lower) groundwater systems
  - Streamflow in Cedar Creek largely comes from groundwater (cold, clear water)

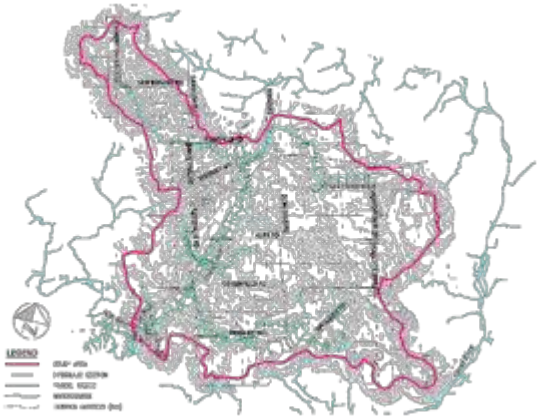


Cedar Creek Scoped Subwatershed Study

Preliminary Findings

- Surface Water
  - Draft catchment limits have been defined for runoff modelling purposes
  - Considerable natural water storage in watershed and densely vegetated riparian (near creek) zone, reduce runoff rate





Cedar Creek Scoped Subwatershed Study

Next Steps

Completion of Phase 1: Subwatershed Characterization and Integration

- Develop an integrated understanding of the role of surface water and ground water in sustaining the natural features in the Subwatershed
- Report will be made available to the Public for review in late spring / early summer

Phase 2: Impact Assessment and Management Plan

- Development of management criteria and evaluation of two (2) alternative land use scenarios
- Conduct Impact Assessment and establish preliminary preferred management strategies for the Management Plan
- Public, agency, stakeholder and land owner consultation will occur in Fall 2018 at the second Public Consultation Centre.

Cedar Creek Scoped Subwatershed Study

Study Process and Scope

Phase 1 Subwatershed Characterization and Integration

- Integrated study of form, function and linkages of environmental resources
  - Field work and analysis / assessment of:
    - Physiography
    - Groundwater
    - Stream Systems
    - Geology
    - Surface Water
    - Plants and Wildlife
- Establish baseline environmental conditions and sensitive features / processes
- Establish goals, objectives, and targets
- Establish criteria for management of environmental features and systems

Cedar Creek Scoped Subwatershed Study

Study Process and Scope

Phase 2 Impact Assessment and Management Plan

- Identify and assess potential impacts of land use change in the Detailed Study Area on subwatershed resources and functions
- Develop a Preferred Management Plan
- Establish monitoring and implementation strategies

Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Groundwater Fieldwork

Purpose:

- To increase understanding of the hydrologic and hydrogeologic function of Cedar Creek Subwatershed through the collection of key field data

Methodology / Approach:

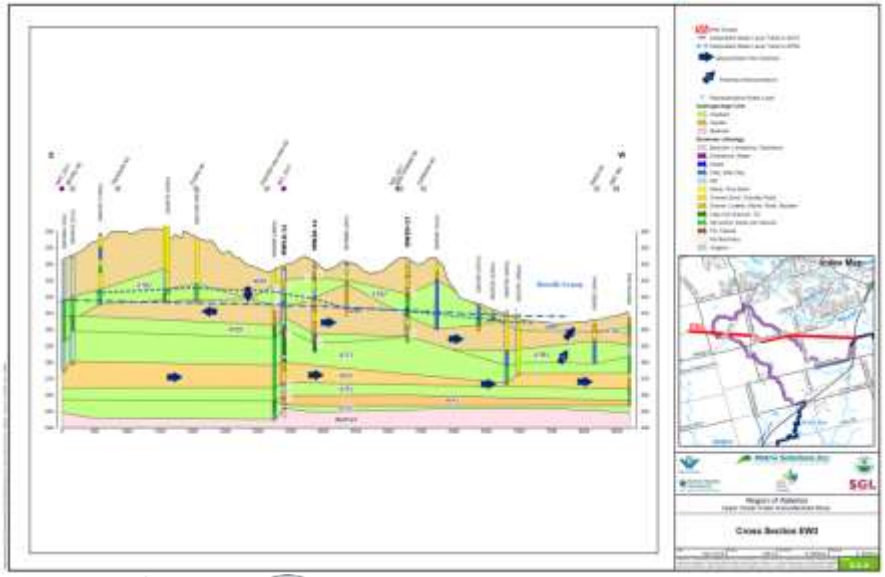
- Reviewed existing geological information and identified gaps
- Installed and monitored four exploration wells to gather groundwater information
- Installed piezometers to measure the pressure and depth of groundwater
- Measured water flow at certain locations (spot-flows)

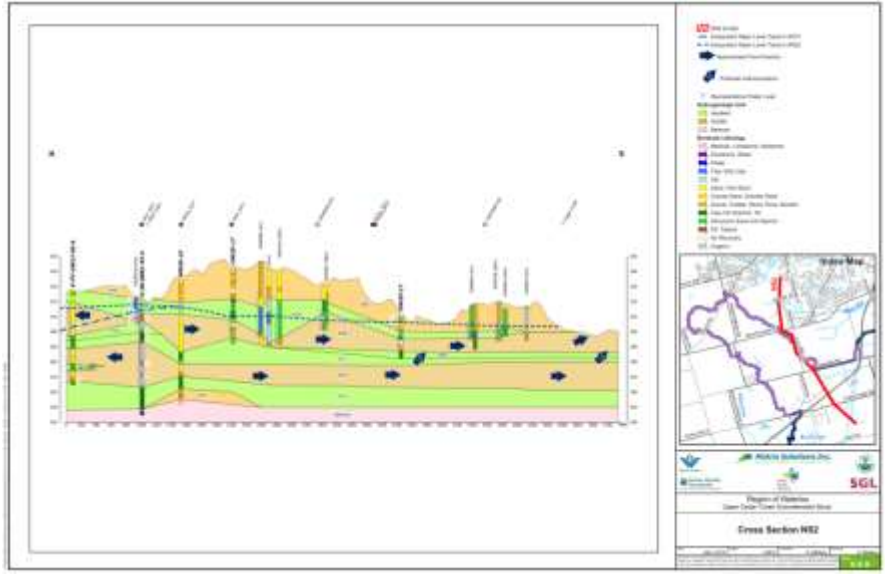
Preliminary Findings:

- Deep water table in Cedar Creek headwaters (~30 m below ground surface)
- No permanent flow upstream of Roseville Road
- Drilling and reported water levels suggest potential connections exist between shallow aquifers and the ground surface; deeper aquifers appear to be separated by silts/clays

Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Groundwater Fieldwork





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Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Groundwater Analysis

Purpose:

- Identify and explain water movement through the Upper Cedar Creek Subwatershed to understand how the groundwater system supports natural features and how the groundwater system is replenished

Methodology/Approach:

- Refine a numerical model to estimate the proportion of precipitation that supplies evaporation, vegetation transpiration, streamflow, and contributions to the groundwater system (i.e. water budget) and understand how water moves through the subwatershed

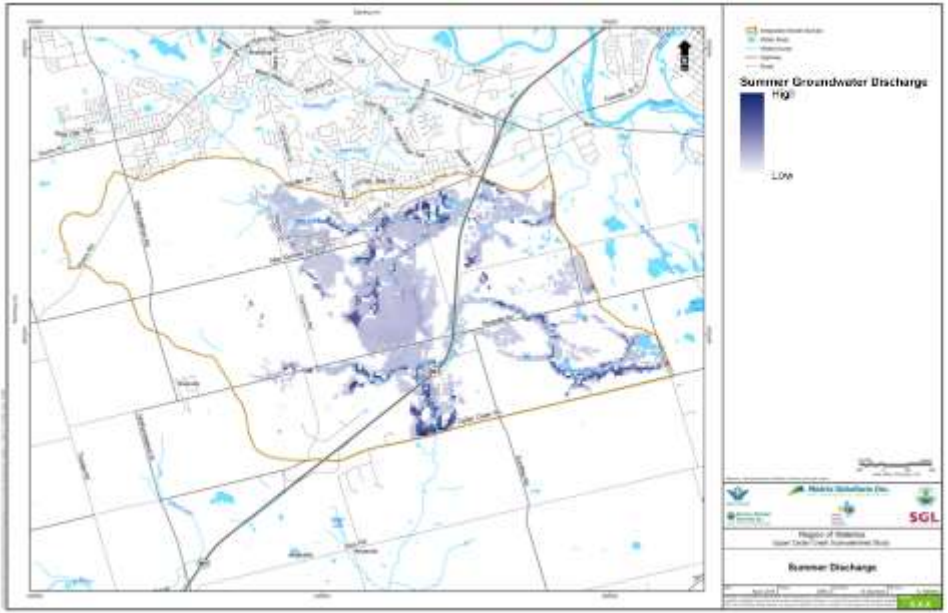
Preliminary Findings:

- A large portion of streamflow within Cedar Creek comes from groundwater discharge (e.g cold, clear water), which is largely supported by locally generated groundwater recharge
- Numerical modelling is ongoing and will be used to identify linkages between groundwater recharge and groundwater discharge areas
- Very little groundwater discharge upstream of Roseville Road

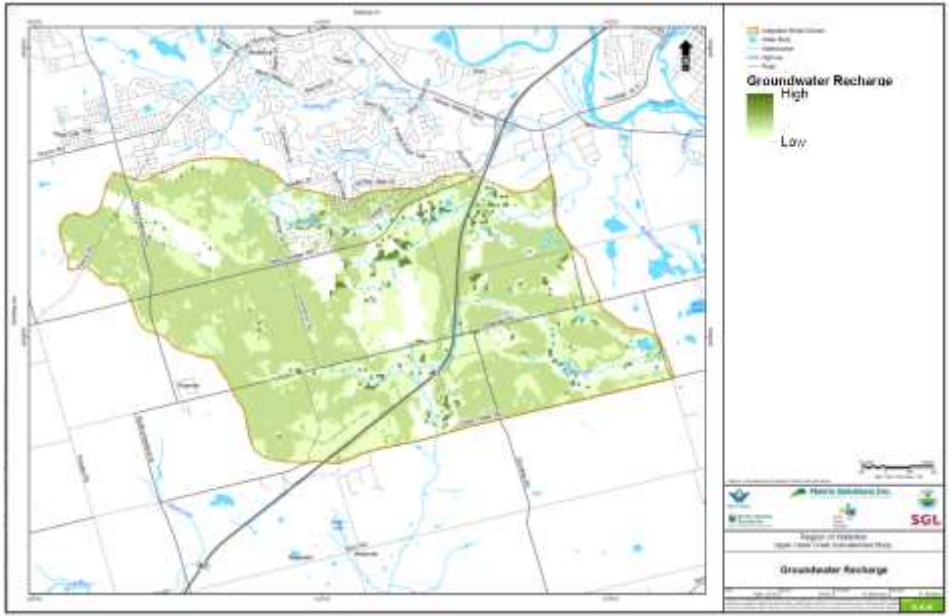
Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Preliminary Groundwater Analysis

Summer Groundwater Discharge



Groundwater Recharge



Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Surface Water Fieldwork and Analysis

Purpose:

- To increase understanding of the surface water that supports the area's natural features and resources such as wetlands, wet forests, watercourses and fish (brook trout). The rate and duration of surface water flows influence both flood risk and erosion processes

Methodology / Approach:

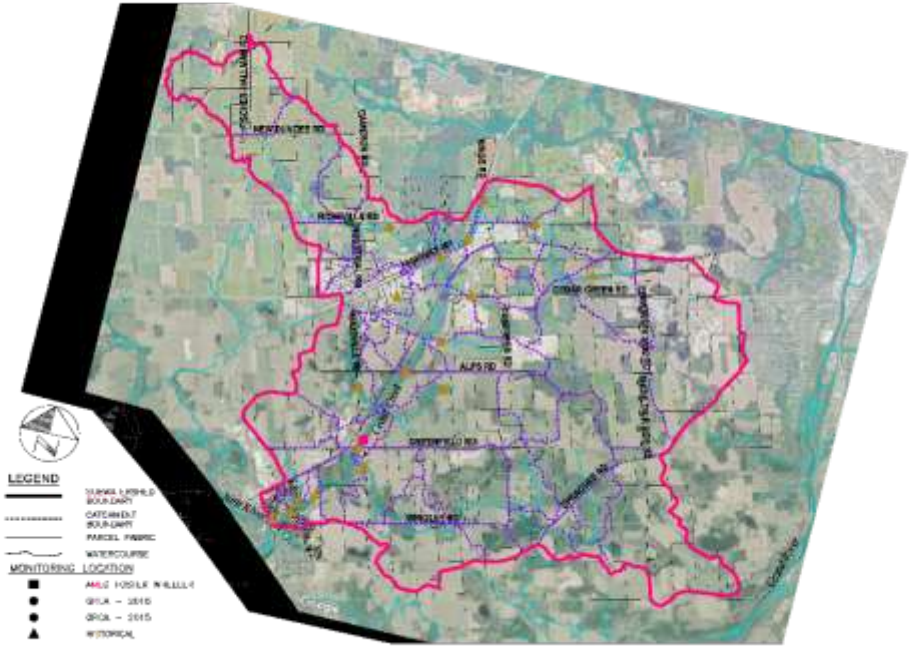
- Monitoring stations installed at key locations to collect data on water levels
- Numerical tools (models) built to predict runoff rates and floodplain limits

Preliminary Findings:

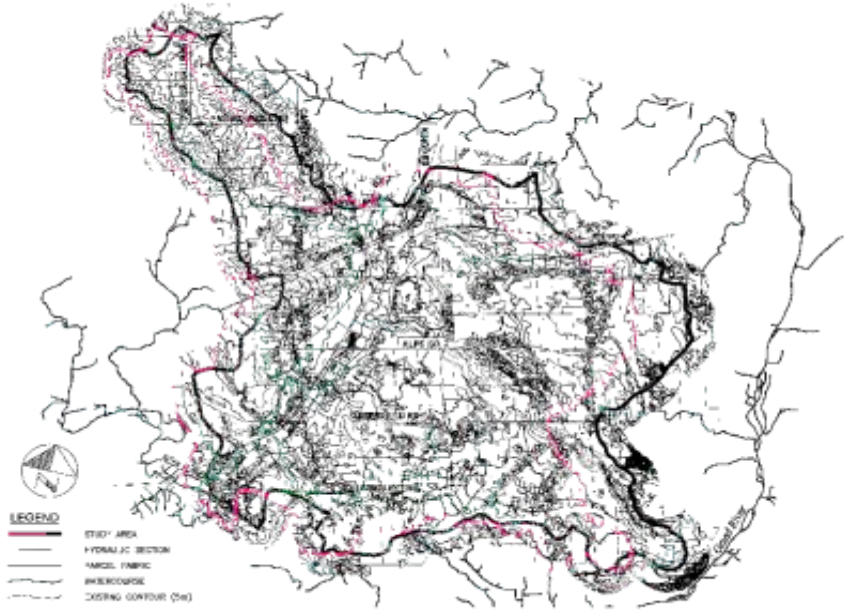
- Draft subcatchment limits for the study area have been prepared
- Cedar Creek system naturally stores large amounts of water which helps to reduce flooding

Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Surface Water Analysis



Draft Subwatershed Catchments and Monitoring Sites



Cross-Section locations for Floodplain Analysis (survey combined with mapping)

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Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Terrestrial Ecology Fieldwork

Purpose:

To describe the natural features and wildlife of the subwatershed, such as woodlands, wetlands, plants, animals and linkages

Methodology / Approach:

- Plant surveys and vegetation communities identification
- Migratory and Breeding Bird surveys
- Anuran (frog and toad) surveys and snake cover board surveys
- Wildlife surveys, winter wildlife surveys, road mortality surveys

Preliminary Findings:

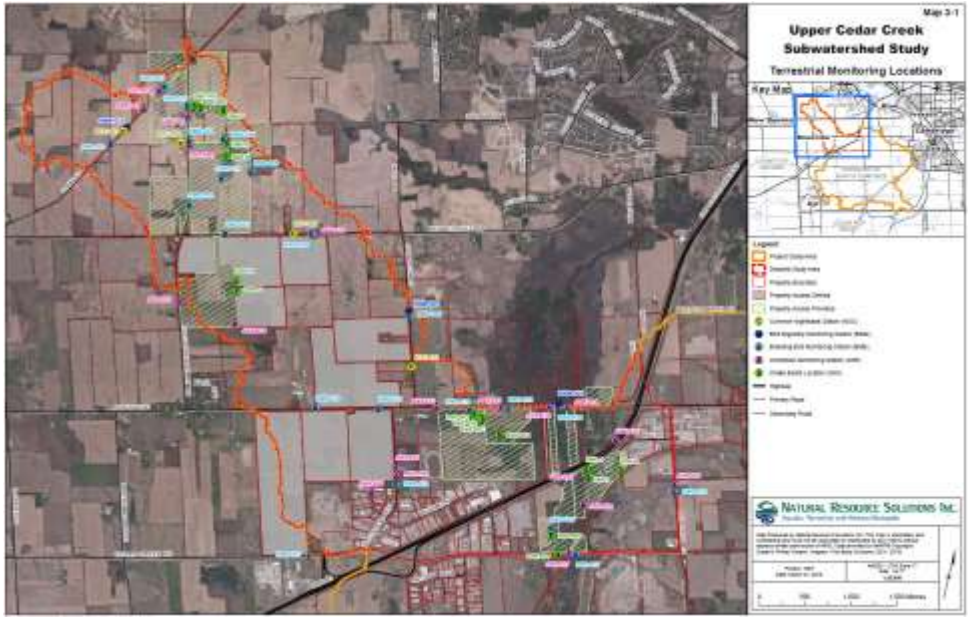
- The Subwatershed includes many significant wetlands, significant woodlands, significant wildlife habitat, and Species at Risk. These natural features will need to be considered when preparing management recommendations.

Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Monitoring Stations & Property Access

Project Study Area

Detailed Study Area

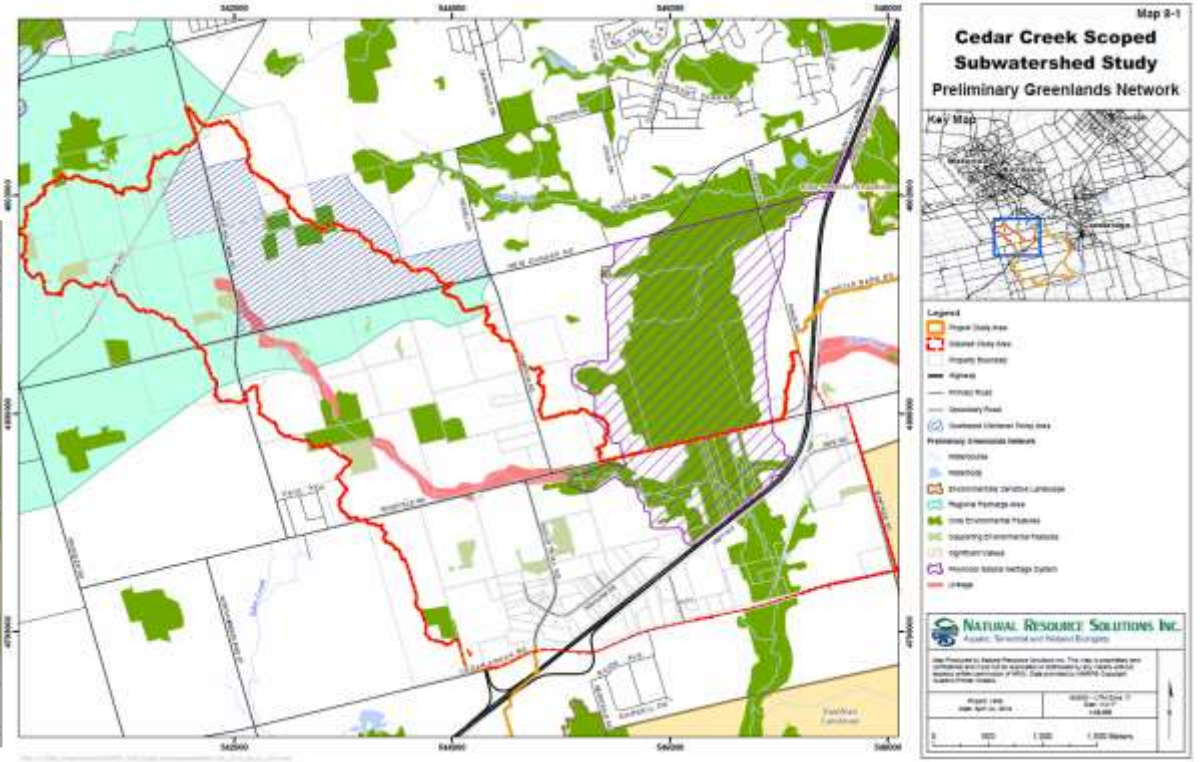


Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Preliminary Greenlands Network

Some significant species found include

Barn Swallow, Bobolink, Eastern Meadowlark, Eastern Wood-Peewee, Common Sootywing, Monarch, Eastern Milksnake, Butternut



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Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Stream Systems Fieldwork and Analysis

Purpose: To describe the form and function of Cedar Creek and the headwater drainage features in the Detailed Study Area

Methods:

- Study the channel morphology (stream shape) – creek section walks, photos and surveys
- Develop erosion threshold values to guide stormwater management planning
- Classify channel stability and sensitivity to potential future land use change

Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Stream Systems Fieldwork and Analysis

Preliminary Findings:

- No defined creek channel upstream of Roseville Road
- Majority of the watercourses are considered to be “in transition” and shows evidence of widening and aggradation (sediment deposits)
- Erosion threshold values to be developed based on sediment and channel geometry to prevent future erosion
- Headwater drainage features are mainly fields with a lack of defined bed and banks

Cedar Creek Scoped Subwatershed Study

Next Steps

Completion of Phase 1: Subwatershed Characterization and Integration

- Develop an integrated understanding of the role of surface water and ground water in sustaining the natural features in the subwatershed
- Draft report will be available for public review in late spring/early summer 2018

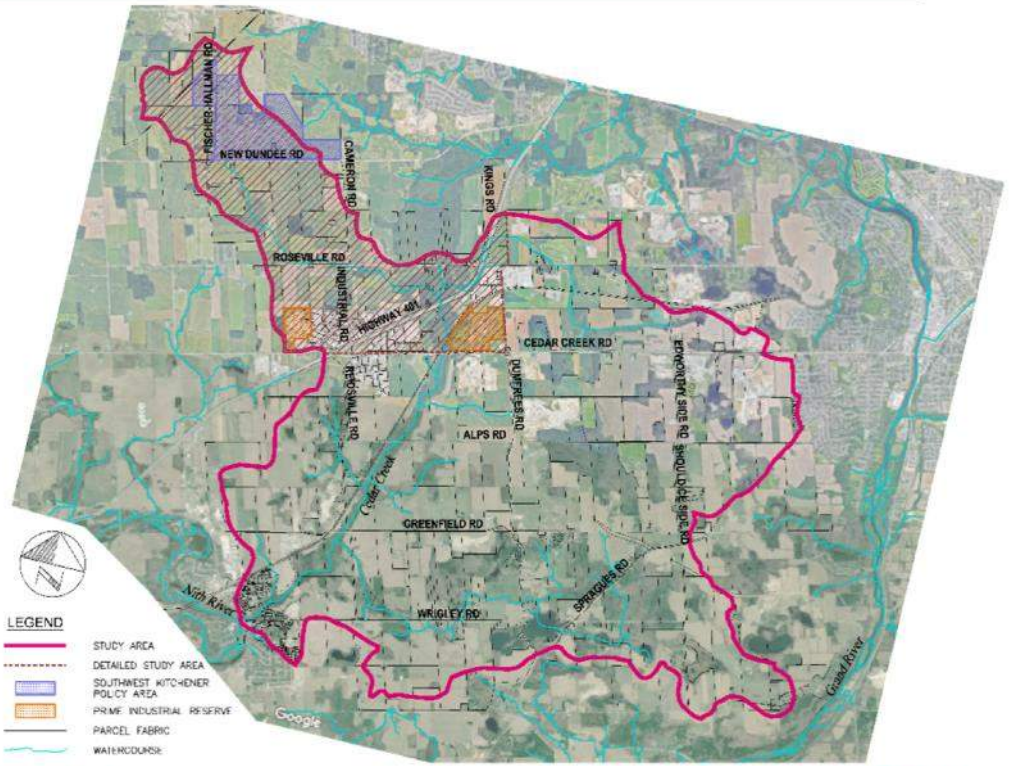
Phase 2: Impact Assessment and Management Plan

- Develop management criteria and evaluate two alternative land use scenarios
- Conduct Impact Assessment and establish preliminary preferred management strategies for the Management Plan
- Public, agency, stakeholder and land owner consultation will occur in fall 2018 at the second Public Consultation Centre

Cedar Creek Scoped Subwatershed Study

Study Area and Scale

- The Project Study Area is the Cedar Creek Subwatershed which contains lands drained by Cedar Creek into the Nith River
- The Detailed Study Area represents lands that could be affected by potential future land use change:
  - Southwest Kitchener Policy Area
  - North Dumfries Prime Industrial Strategic Reserve



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Cedar Creek Scoped Subwatershed Study

Study Overview

- Phase 1
  - Study and understand watershed function and linkages
- Phase 2
  - Assess potential impacts to watershed function and linkages
  - Develop management strategies to mitigate potential impacts
- Public Consultation
  - April 25, 2018 – Introduce study and preliminary Phase 1 characterization
  - March 20, 2019 – Present comprehensive Phase 1 findings, introduce high-level Phase 2 impacts
    - Receive feedback from stakeholders
  - Spring 2019 – Present management strategies and overall Subwatershed Plan.
    - Receive feedback from stakeholders

We are Here

Cedar Creek Scoped Subwatershed Study

Study Process and Scope

Phase 1 Subwatershed Characterization and Integration

- Integrated study of form, function and linkages of environmental resources
  - Field work and analysis / assessment of:
    - Physiography
    - Groundwater
    - Stream Systems
    - Geology
    - Surface Water
    - Plants and Wildlife
- Establish baseline environmental conditions and sensitive features / processes
- Establish goals, objectives, and targets
- Establish criteria for management of environmental features and systems

Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Groundwater Characterization & Analysis

Purpose:

- To understand how the groundwater system supports natural features and how groundwater is replenished

Methodology / Approach:

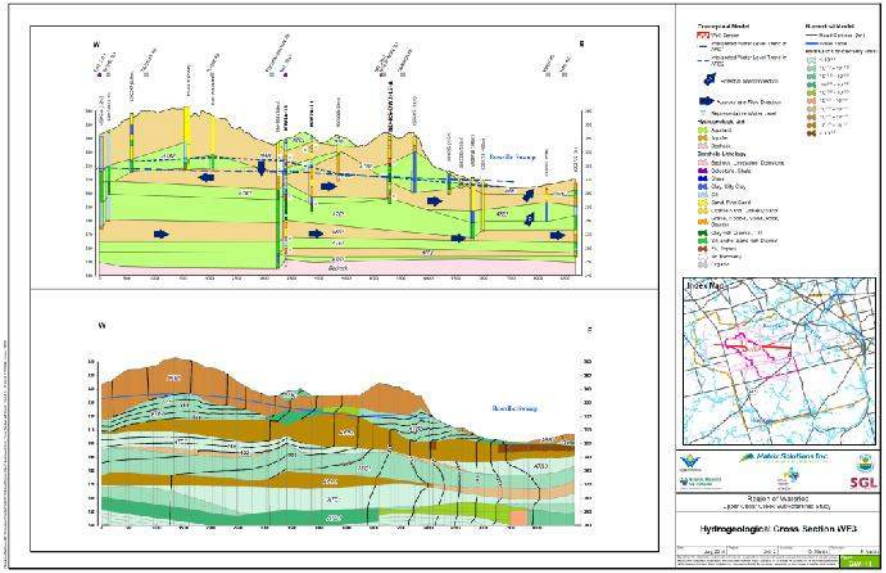
- Collect field data to update/refine geological understanding of the Subwatershed and aquifer properties
- Refine a numerical model to estimate the proportion of precipitation that supplies evaporation, streamflow, and groundwater recharge (i.e. water budget) and understand how water moves through the subwatershed

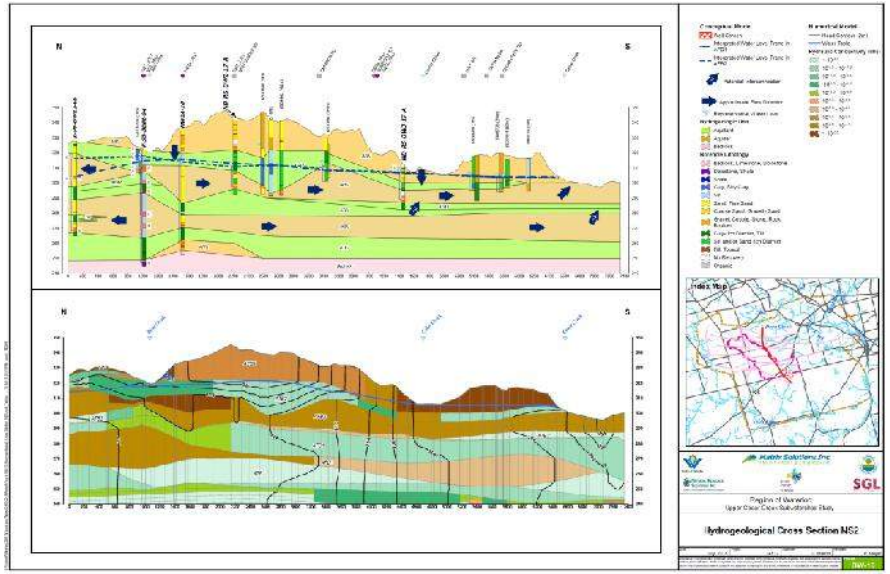
Findings:

- Thick deposits of sand in Upper Cedar Creek promote infiltration and groundwater recharge rather than runoff
- No permanent/defined creek channel upstream of Roseville Road
- Deeper aquifers are often separated from the surface by silts/clays. In some areas, the silts/clays are thin, allowing water to move between the deep and shallow aquifers
- Groundwater recharge in Upper Cedar primarily supports Cedar Creek and tributaries, as well as Roseville Swamp.
- A small portion of lands within the Detailed Study Area is predicted to provide recharge to municipal water supply wells

Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Groundwater Characterization & Analysis





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Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Groundwater Characterization & Analysis

Where does Rainfall/Snowmelt Go?

Water Budget (mm/yr)	Detailed Study Area*	DSA North of New Dundee Road*
Precipitation	914	914
Evapotranspiration	577	591
Total Streamflow	281	0
Overland Runoff	*22*	*0*
Baseflow	*259*	*0*
Groundwater Inflow	391	315
Groundwater Outflow	418	582
Change in Storage**	28	56

* units in mm/yr
** Storage is water held in groundwater system, surface ponding

Where does Groundwater Recharge Go?

Discharge Receptor	% of Recharge Volume Generated within DSA
Grand River	3%
Nith River	4%
Blair Creek (incl. Roseville Swamp)	12%
Blair Creek (wout Roseville Swamp)	*<1%*
Roseville Swamp	*11%*
Cedar Creek Eastern Tributary	4%
Cedar Creek Western Tributary	25%
Cedar Creek u/s of Alps Road	45%
Cedar Creek d/s of Alps Road	1%
Strasburg Wellfield	1%
Ayr Wellfield	3%
Roseville Wellfield	2%

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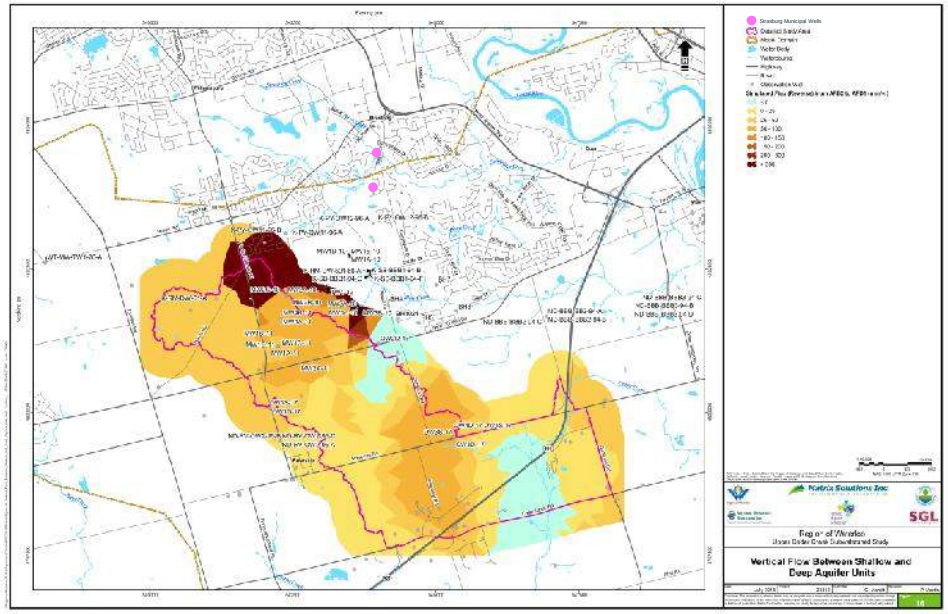
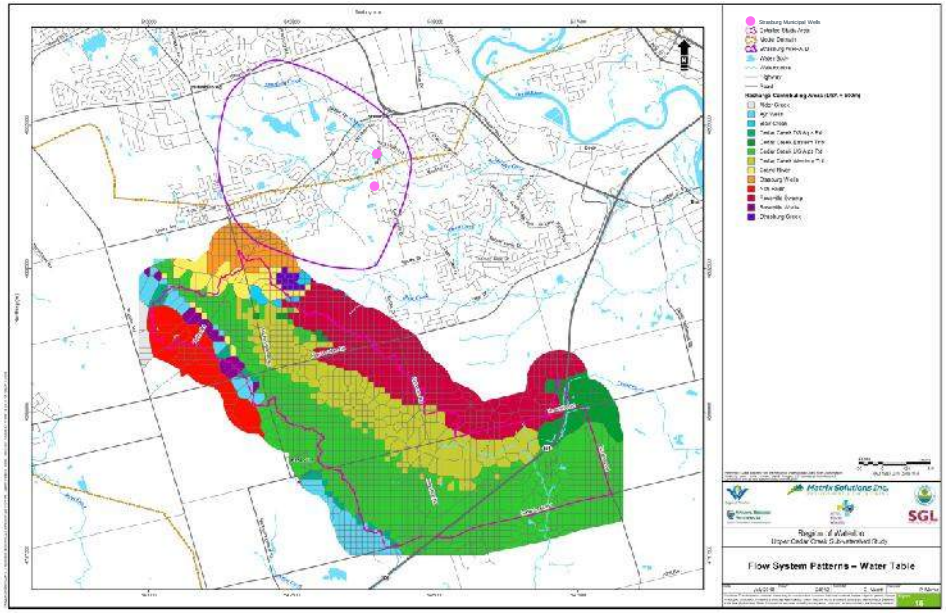
Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Groundwater Characterization & Analysis

Interaction between Shallow and Deep Aquifers



Groundwater Recharge/Discharge Linkages



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Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Surface Water Fieldwork and Analysis

Purpose:

- To increase understanding of the surface water that supports the area's natural features and resources such as wetlands, wet forests, watercourses and fish (brook trout). The rate and duration of surface water flows influence both flood risk and erosion processes

Methodology / Approach:

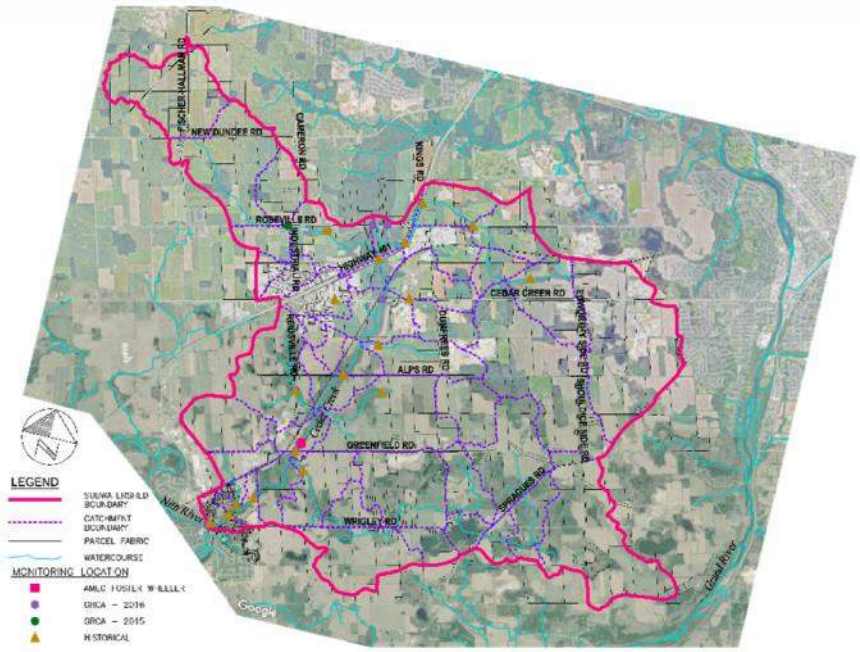
- Monitoring stations installed at key locations to collect data on water levels
- Field survey of bridges, culverts and creek / floodplain
- Numerical tools (models) built to predict runoff rates and floodplain limits

Findings:

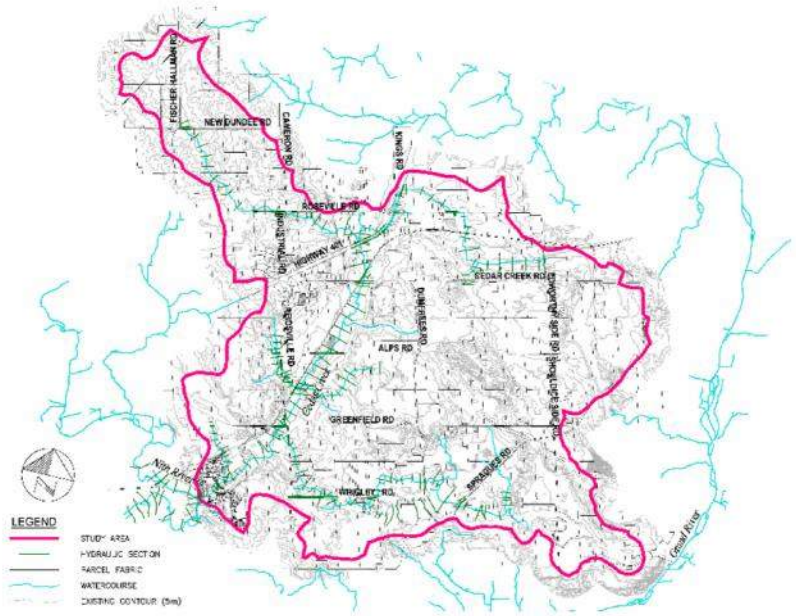
- Cedar Creek system naturally stores large amounts of water which helps to reduce flooding potential
- Dense floodplain vegetation reduces water velocities during flood conditions

Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Surface Water Analysis



Subwatershed Catchments and Monitoring Sites



Cross-Section locations for Floodplain Analysis (field survey combined with mapping)

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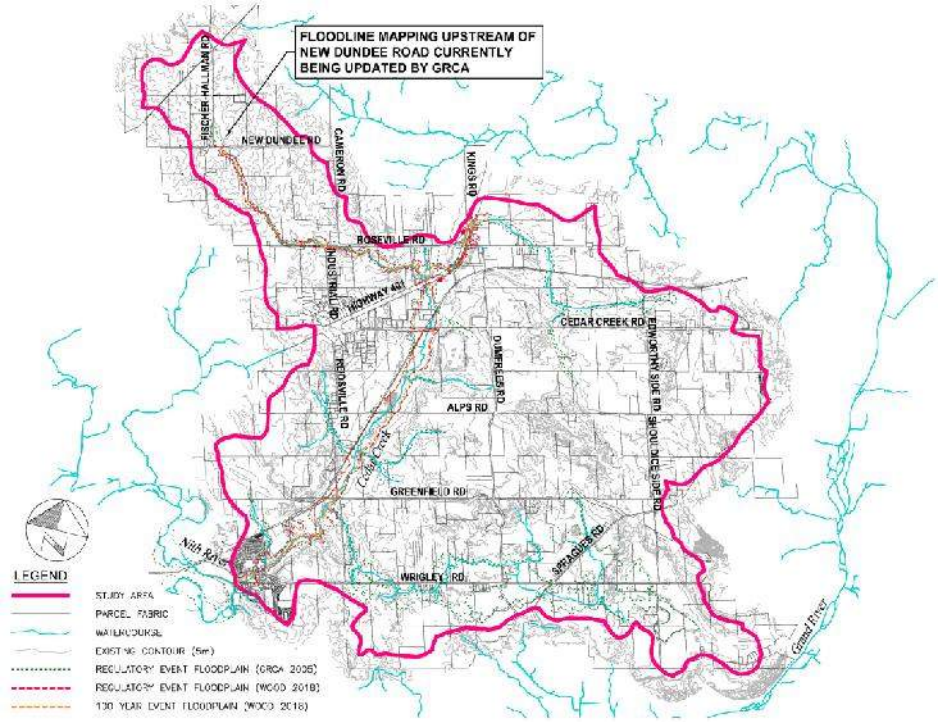
Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Surface Water Analysis



- Updated floodline mapping shows limits of floodplain are generally comparable with the Cedar Creek Floodline Mapping Study (2005)
- Most of the road crossings exhibit adequate capacity based upon road classification and current standards
- Localized backwater zones occur at some bridges and culverts where culvert capacity is less than that of upstream watercourse

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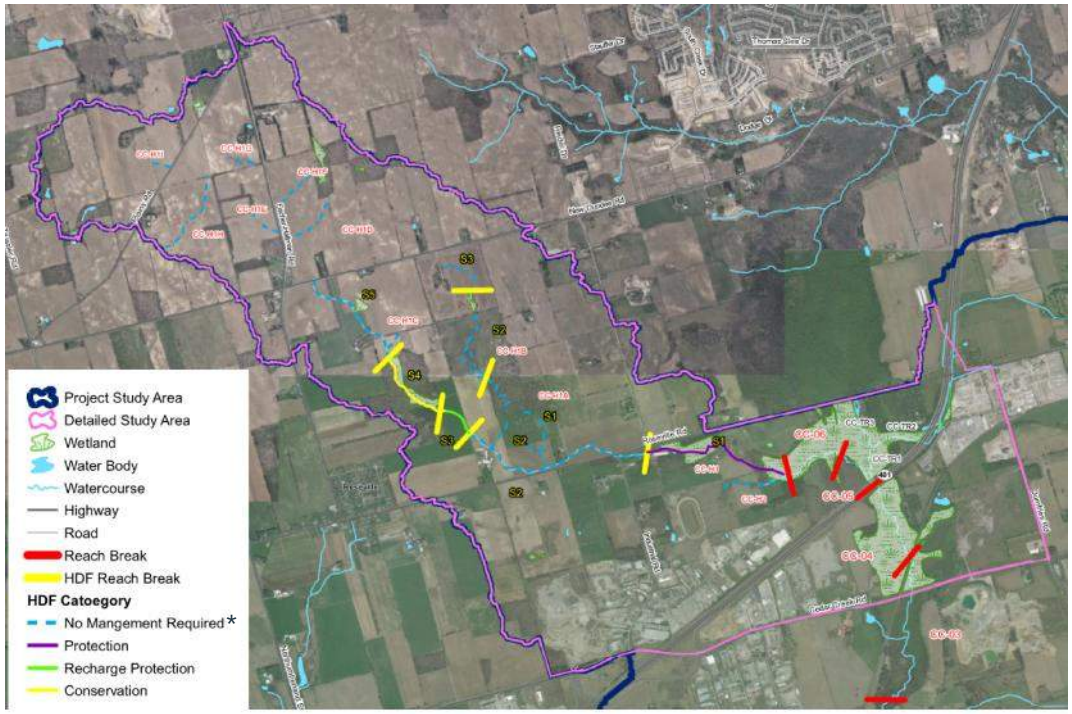
Cedar Creek Scoped Subwatershed Study

Phase 1 - Study Area Characterization: Stream Systems Fieldwork and Analysis



* Management recommendations must follow GRCA's Policies for Straightening, Changing, Diverting, or Interfering with the Existing Channel of a River, Creek, Stream or Watercourse

Findings:

- Headwater Drainage Features (HDFs) are mainly low points in fields which lack defined bed and bank structure
- Only 3 of 18 headwater drainage features assessed were given management recommendations
- **Protection** (important hydrology, riparian and terrestrial function)
- **Recharge Protection**(important recharge function)
- **Conservation** (important riparian and terrestrial function)

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Grand River Conservation Authority
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Cedar Creek Scoped Subwatershed Study

Study Process and Scope

We are Here

Phase 2 Impact Assessment and Management Plan

- Identify and assess potential impacts of land use scenarios in the Detailed Study Area on subwatershed resources and functions
  - Two scenarios: No development; and potential development.
- Develop a Preferred Management Plan
- Establish monitoring and implementation strategies




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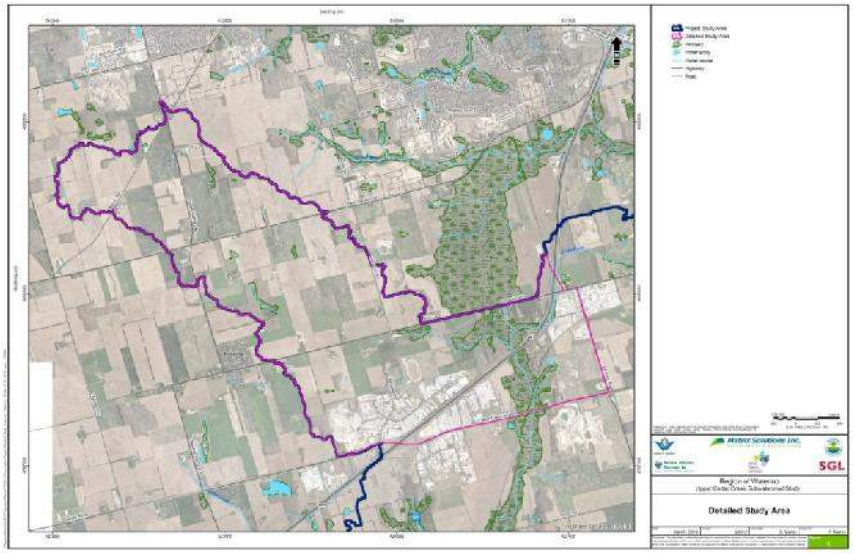
Cedar Creek Scoped Subwatershed Study

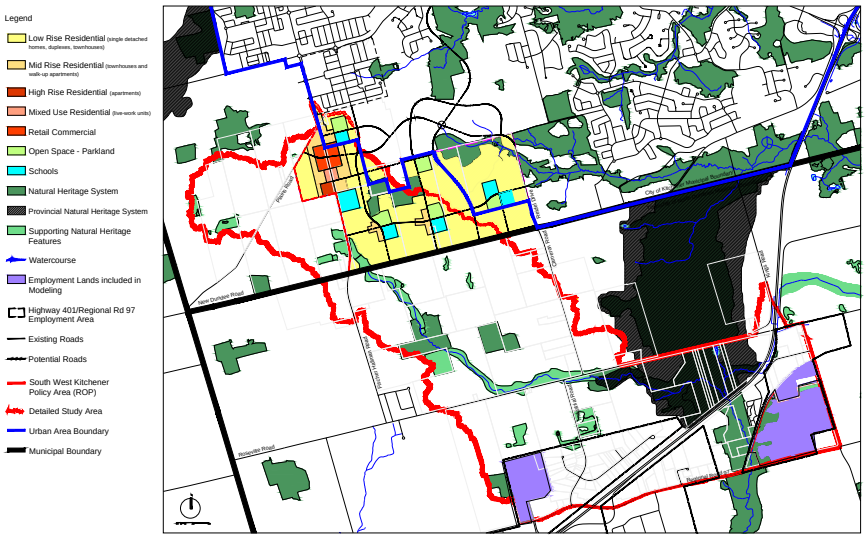
Conceptual Land Use Planning Exercise: Purpose

To evaluate the potential impacts of a change in land use on the form, function and linkages of environmental resources in the watershed. A conceptual land use model was developed and is being compared to impacts from existing land uses.

Existing Land Use



Conceptual Land Use Plan



Disclaimer: The land use concept has been established solely for the purpose of analytical assessments of potential impacts associated with surface and ground water, as well as the associated natural systems. The use of the land use concept for the subject purpose does not suggest any endorsement or support for future land uses.

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Cedar Creek Scoped Subwatershed Study

Phase 2 – Impact Assessment and Management Plan

Potential Impacts of Land Use Change

- Increased hardening of the landscape (e.g. concrete, asphalt, roofs)
  - Limits opportunities for rain/snowmelt to recharge the groundwater system
  - Promotes excess overland runoff, if not mitigated could:
    - change the water balance of the subwatershed
    - increase watercourse erosion
    - degrade channel functions
    - increase flooding potential of downstream properties
- Increased sources of contaminants (e.g. salt/chloride, fertilizers, metals) that may enter the surface water and groundwater system
- Impairment or removal of the existing environmental function of important headwater drainage features

Cedar Creek Scoped Subwatershed Study

Phase 2 – Impact Assessment and Management Plan

Potential Impacts of Land Use Change (cont'd)

- Direct impacts to wildlife and vegetation include vegetation removal, wildlife mortality, reduction in wildlife linkages, fish barriers, stream realignment
- Indirect impacts to wildlife and vegetation include lighting, noise, changes in groundwater discharge and water balance, increased water temperature
- Induced impacts to wildlife and vegetation may arise from human use, dumping, wildlife impacts from pets, contamination

Cedar Creek Scoped Subwatershed Study

Phase 2 – Impact Assessment and Management Plan

Potential Mitigation Measures

Impacts due to urbanization may be mitigated by:

- Constructing ponds or wetlands to control rates of surface runoff and remove pollutants
- Integrating green infrastructure and low impact development practices within potential future urban areas to promote infiltration, reducing the additional surface runoff volume and further removing pollutants from runoff
- Managing headwater drainages features to maintain their function

As no natural outlet is present, stormwater would need to be managed on site.

Cedar Creek Scoped Subwatershed Study

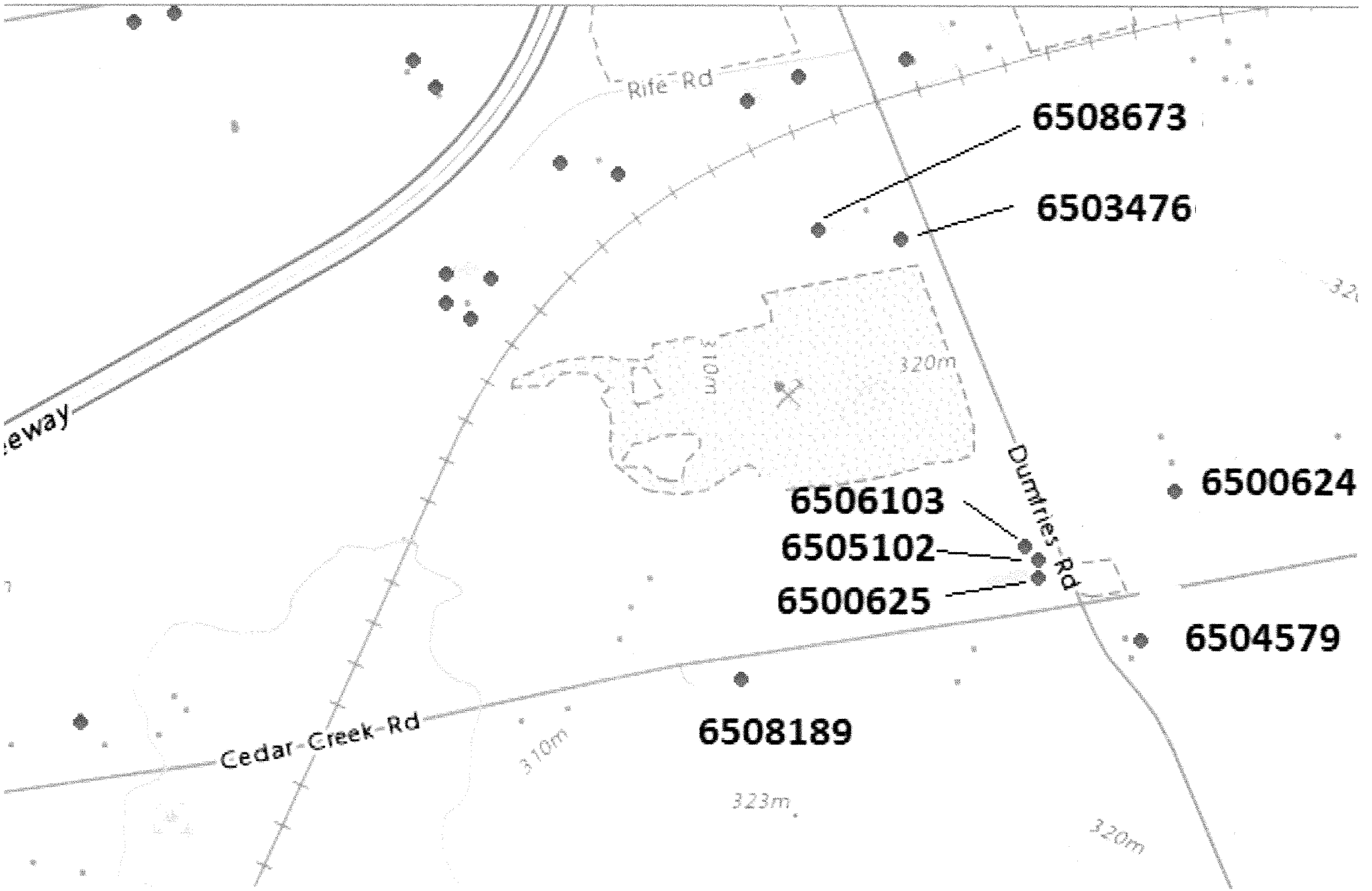
Phase 2 – Impact Assessment and Management Plan

Potential Mitigation Measures (cont'd)

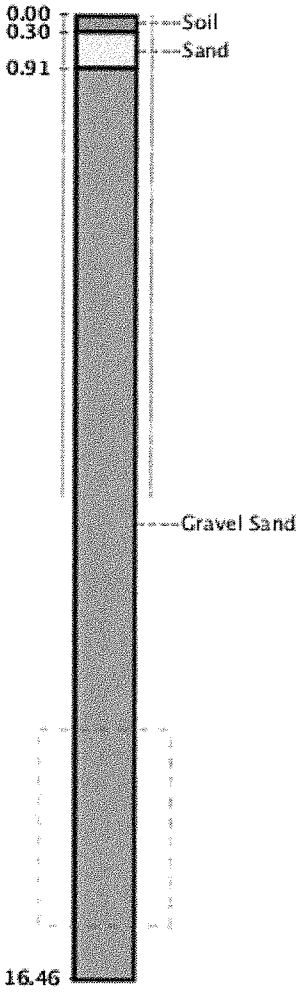
- Potential impacts to wildlife and vegetation may be mitigated by implementing:
  - Sufficient buffers from natural heritage features
  - Stormwater management and Low Impact Development practices
  - Erosion and sediment control during construction
  - Fencing and other methods to delineate natural areas
  - Wildlife linkages, eco-passages, and road calming measures
  - Appropriate placement of trails
  - Timing of construction, permitting, construction inspection and monitoring
  - Maintaining, enhancing and restoring the environmental features within the natural heritage system (i.e. Greenlands Network)

Appendix D: MOE Borehole Logs

Map Viewer


Rife Rd
6508673
6503476
320m
Dumfries Rd
6500624
6506103
6505102
6500625
6504579
Cedar Creek Rd
6508189
310m
323m
320m

GIN Log



View legend

GIN borehole Identifier : ca.on.waterWell.6508673
Borehole Data Provider ID : 6508673
Information Source : Ontario Ministry of Environment
Metadata : Ontario Water Well Information System Metadata
Longitude : -80.411907
Latitude : 43.345644
Online resource : Ontario Water Wells
Date of Drilling :2000-04-19
Length : 16.46m
Elevation : 337.00m
CDEM Elevation : *316*m
CDSM Elevation : *315.043*m
Water Use : Not Used
Location : County: WATERLOO Township: NORTH DUMFRIES TOWNSHIP
Status : Test Hole
Type : Unknown

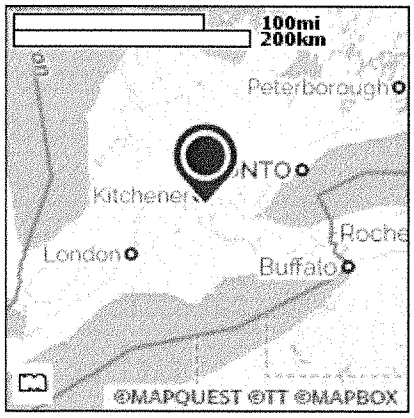
Report an error

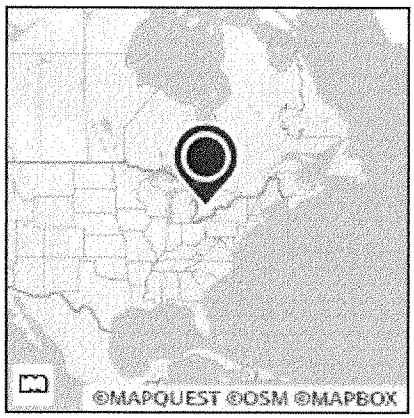
Screen :
- From 12.192 to 15.54m

Sealing :
- From 0 to 8.23m

DEPTH FROM (METERS)	DEPTH TO (METERS)	GIN LITHOLOGY	ORIGINAL LITHOLOGY	POROSITY*	HYDRAULIC CONDUCTIVITY*
0.00	0.30	**Soil** (More Info)	TOPSOIL		
0.30	0.91	**Sand** (More Info)	SAND	[26,53]%	[2E-7,6E-3]m/s
0.91	16.46	**Gravel** (More Info) **Sand** (More Info)	GRAVEL SAND	[24,44]% [26,53]%	[3E-4,3E-2]m/s [2E-7,6E-3]m/s

*Well log. (*Notice: Values taken from literature)*





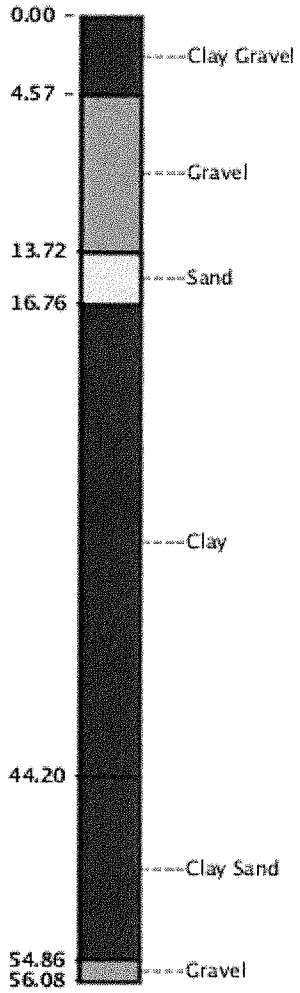
XML

Important Notices

Please use this citation if this data is used in a publication:
Data from: Ontario Ministry of Environment , provided by GIN (Groundwater Information Network).

Accessed at
http://gin.gw-info.net/service/api_ngwds:gin2/en/waterMLData/index.html?

GIN Log



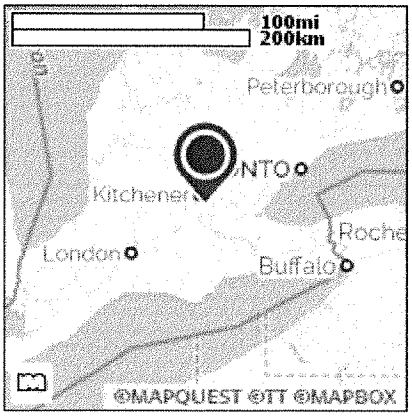
View legend

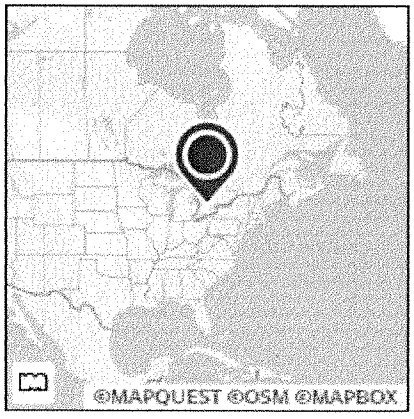
GIN borehole Identifier : ca.on.waterWell.6503476
Borehole Data Provider ID : 6503476
Information Source : Ontario Ministry of Environment
Metadata : Ontario Water Well Information System Metadata
Longitude : -80.410316
Latitude : 43.345464
Online resource : Ontario Water Wells
Date of Drilling :1971-01-20
Length : 56.08m
Elevation : 317.60m
CDEM Elevation : *316*m
CDSM Elevation : *320.511*m
Water Level : 11.58m 1971-01-20
Water Segment : 56.0832, FRESH 1971-01-20
Water Yield : 45.46lpm 1971-01-20
Water Use : Livestock
Location : County: WATERLOO Township: NORTH DUMFRIES TOWNSHIP
Status : Water Supply
Type : Unknown

Report an error

DEPTH FROM (METERS)	DEPTH TO (METERS)	GIN LITHOLOGY	ORIGINAL LITHOLOGY	POROSITY*	HYDRAULIC CONDUCTIVITY*
0.00	4.57	**Clay** (More Info) **Gravel** (More Info)	CLAY STONES	[34,57]% [24,44]%	[1E-11,4.7E-9]m/s [3E-4,3E-2]m/s
4.57	13.72	**Gravel** (More Info)	GRAVEL	[24,44]%	[3E-4,3E-2]m/s
13.72	16.76	**Sand** (More Info)	MEDIUM SAND	[26,53]%	[2E-7,6E-3]m/s
16.76	44.20	**Clay** (More Info)	CLAY	[34,57]%	[1E-11,4.7E-9]m/s
44.20	54.86	**Clay** (More Info) **Sand** (More Info)	CLAY MEDIUM SAND	[34,57]% [26,53]%	[1E-11,4.7E-9]m/s [2E-7,6E-3]m/s
54.86	56.08	**Gravel** (More Info)	GRAVEL	[24,44]%	[3E-4,3E-2]m/s

*Well log. (*Notice: Values taken from literature)*





XML

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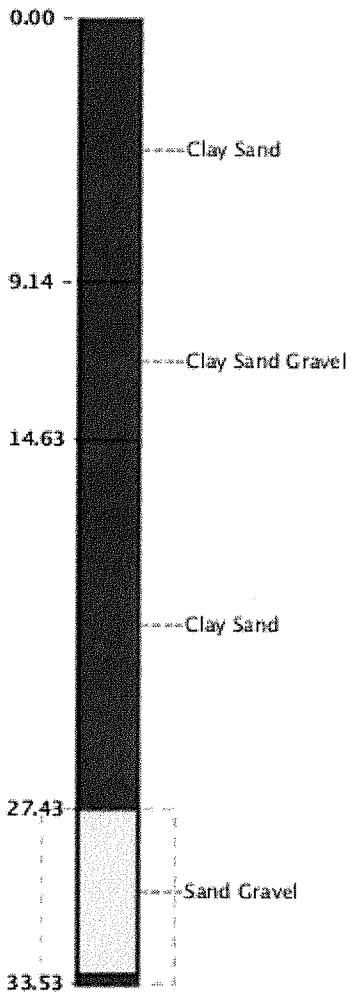
GIN Log



View legend

GIN borehole Identifier : ca.on.waterWell.6506103
Borehole Data Provider ID : 6506103
Information Source : Ontario Ministry of Environment
Metadata : Ontario Water Well Information System Metadata
Longitude : -80.407930
Latitude : 43.339527
Online resource : Ontario Water Wells
Date of Drilling :1987-08-06
Length : 33.53m
Elevation : 323.09m
CDEM Elevation : *321*m
CDSM Elevation : *322.081*m
Water Level : 15.24m 1987-08-06
Water Segment : 27.432, FRESH 1987-08-06
Water Yield : 136.38lpm 1987-08-06
Water Use : Public
Location : County: WATERLOO Township: NORTH DUMFRIES TOWNSHIP
Status : Water Supply
Type : Unknown

Report an error

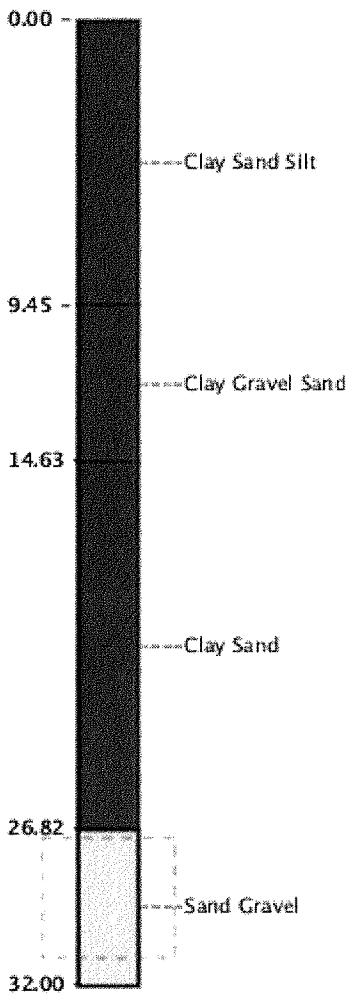
Screen :

- From 27.432 to 33.53m

DEPTH FROM (METERS)	DEPTH TO (METERS)	GIN LITHOLOGY	ORIGINAL LITHOLOGY	POROSITY*	HYDRAULIC CONDUCTIVITY*
0.00	9.14	**Clay** (More Info) **Sand** (More Info)	CLAY SAND	[34,57]% [26,53]%	[1E-11,4.7E-9]m/s [2E-7,6E-3]m/s
9.14	14.63	**Clay** (More Info) **Sand** (More Info) **Gravel** (More Info)	CLAY SAND GRAVEL	[34,57]% [26,53]% [24,44]%	[1E-11,4.7E-9]m/s [2E-7,6E-3]m/s [3E-4,3E-2]m/s
14.63	27.43	**Clay** (More Info) **Sand** (More Info)	CLAY SAND	[34,57]% [26,53]%	[1E-11,4.7E-9]m/s [2E-7,6E-3]m/s
27.43	33.22	**Sand** (More Info) **Gravel** (More Info)	COARSE SAND GRAVEL	[26,53]% [24,44]%	[2E-7,6E-3]m/s [3E-4,3E-2]m/s
33.22	33.53	**Clay** (More Info) **Sand** (More Info)	CLAY SAND	[34,57]% [26,53]%	[1E-11,4.7E-9]m/s [2E-7,6E-3]m/s

*Well lag. (*Natice: Values taken fram literature)*

GIN Log



View legend

GIN borehole Identifier : ca.on.waterWell.6505102
Borehole Data Provider ID : 6505102
Information Source : Ontario Ministry of Environment
Metadata : Ontario Water Well Information System Metadata
Longitude : -80.407661
Latitude : 43.339282
Online resource : Ontario Water Wells
Date of Drilling :1980-08-06
Length : 32.00m
Elevation : 320.04m
CDEM Elevation : *321*m
CDSM Elevation : *321.667*m
Water Level : 16.46m 1980-08-06
Water Segment : 26.8224, FRESH 1980-08-06
Water Yield : 68.19lpm 1980-08-06
Water Use : Public
Location : County: WATERLOO Township: NORTH DUMFRIES TOWNSHIP
Status : Water Supply
Type : Unknown

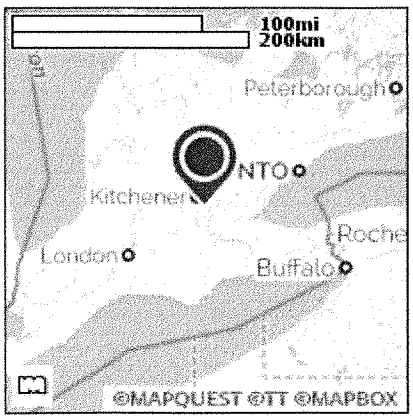
Report an error

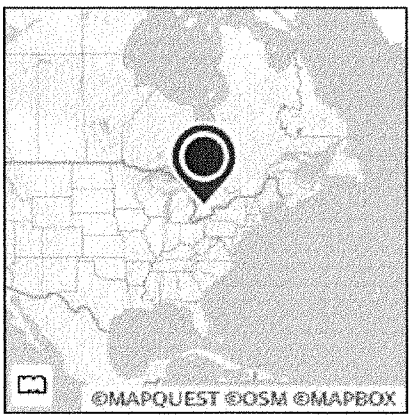
Screen :

- From 27.1272 to 31.09m

DEPTH FROM (METERS)	DEPTH TO (METERS)	GIN LITHOLOGY	ORIGINAL LITHOLOGY	POROSITY*	HYDRAULIC CONDUCTIVITY*
0.00	9.45	**Clay** (More Info) **Sand** (More Info) **Silt** (More Info)	CLAY SAND SILTY	[34,57]% [26,53]% [34,61]%	[1E-11,4.7E-9]m/s [2E-7,6E-3]m/s [1E-9,2E-5]m/s
9.45	14.63	**Clay** (More Info) **Gravel** (More Info) **Sand** (More Info)	CLAY GRAVEL SAND	[34,57]% [24,44]% [26,53]%	[1E-11,4.7E-9]m/s [3E-4,3E-2]m/s [2E-7,6E-3]m/s
14.63	26.82	**Clay** (More Info) **Sand** (More Info)	CLAY SAND	[34,57]% [26,53]%	[1E-11,4.7E-9]m/s [2E-7,6E-3]m/s
26.82	32.00	**Sand** (More Info) **Gravel** (More Info)	COARSE SAND GRAVEL	[26,53]% [24,44]%	[2E-7,6E-3]m/s [3E-4,3E-2]m/s

*Well log. (*Notice: Values taken from literature)*





GIN Log

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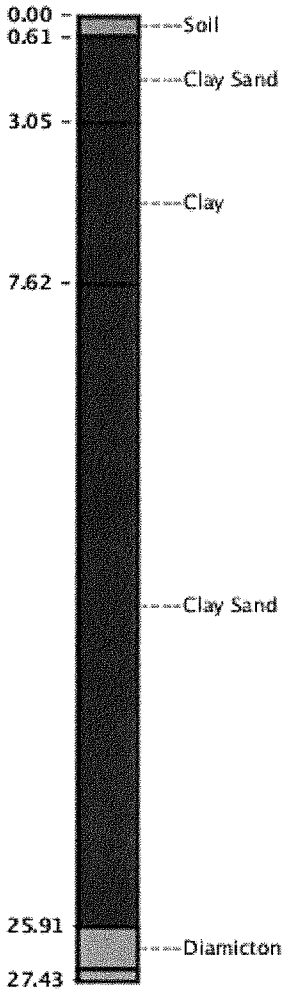
Borehole Data Provider ID : 6500625
Information Source : Ontario Ministry of Environment
Metadata : Ontario Water Well Information System Metadata
Longitude : -80.407665
Latitude : 43.338922
Online resource : Ontario Water Wells
Date of Drilling :1965-11-08
Length : 27.43m
Elevation : 321.56m
CDEM Elevation : *321*m
CDSM Elevation : *321.504*m
Water Level : 17.68m 1965-11-08
Water Segment : 27.1272, FRESH 1965-11-08
Water Yield : 113.65lpm 1965-11-08
Water Use : Public
Location : County: WATERLOO Township: NORTH DUMFRIES TOWNSHIP
Status : Water Supply
Type : Unknown

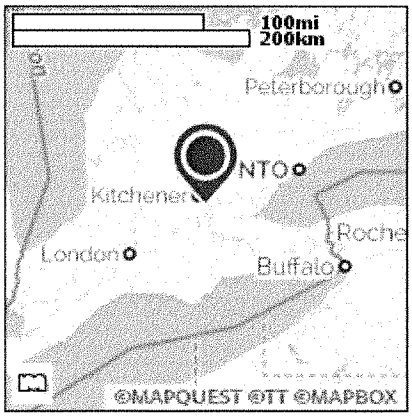
Report an error

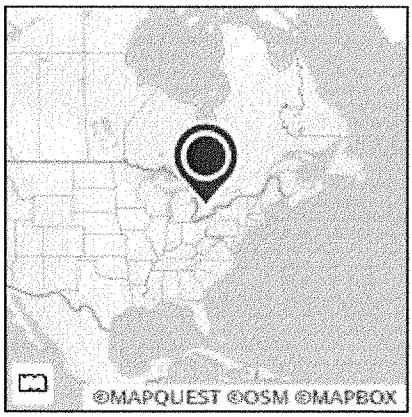


DEPTH FROM (METERS)	DEPTH TO (METERS)	GIN LITHOLOGY	ORIGINAL LITHOLOGY	POROSITY*	HYDRAULIC CONDUCTIVITY*
0.00	0.61	**Soil** (More Info)	TOPSOIL		
0.61	3.05	**Clay** (More Info) **Sand** (More Info)	CLAY MEDIUM SAND	[34,57]% [26,53]%	[1E-11,4.7E-9]m/s [2E-7,6E-3]m/s
3.05	7.62	**Clay** (More Info)	CLAY	[34,57]%	[1E-11,4.7E-9]m/s
7.62	25.91	**Clay** (More Info) **Sand** (More Info)	CLAY MEDIUM SAND	[34,57]% [26,53]%	[1E-11,4.7E-9]m/s [2E-7,6E-3]m/s
25.91	27.13	**Diamicton** (More Info)	HARDPAN		
27.13	27.43	**Gravel** (More Info)	GRAVEL	[24,44]%	[3E-4,3E-2]m/s

*Well log. (*Notice: Values taken from literature)*

View legend





XML

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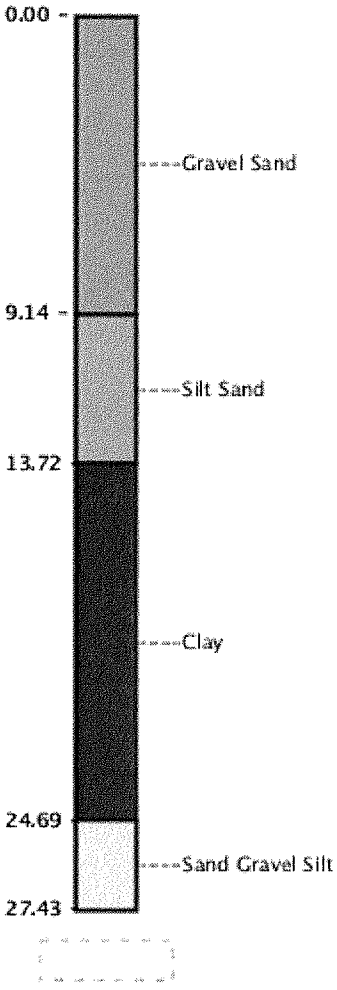
Data from: Ontario Ministry of Environment , provided by GIN (Groundwater Information Network).

Accessed at

GIN Log



View legend

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Borehole Data Provider ID : 6508189
Information Source : Ontario Ministry of Environment
Metadata : Ontario Water Well Information System Metadata
Longitude : -80.413385
Latitude : 43.336953
Online resource : Ontario Water Wells
Date of Drilling :1997-10-23
Length : 27.43m
Elevation : 313.00m
CDEM Elevation : *313*m
CDSM Elevation : *311.551*m
Water Level : 6.40m 1997-10-23
Water Segment : 26.5176, FRESH 1997-10-23
Water Yield : 45.46lpm 1997-10-23
Water Use : Industrial
Location : County: WATERLOO Township: NORTH DUMFRIES TOWNSHIP
Status : Water Supply
Type : Unknown

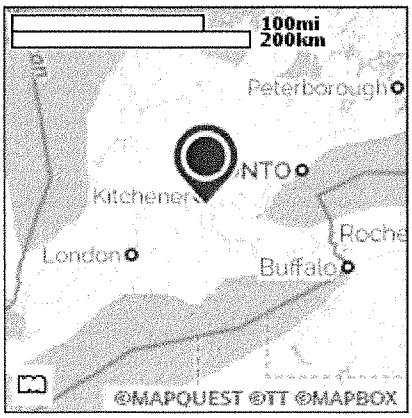
Report an error

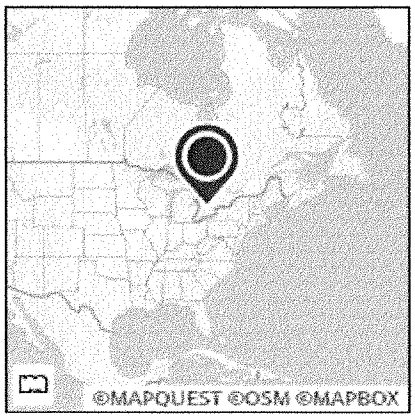
Screen :

- From 28.3464 to 29.57m

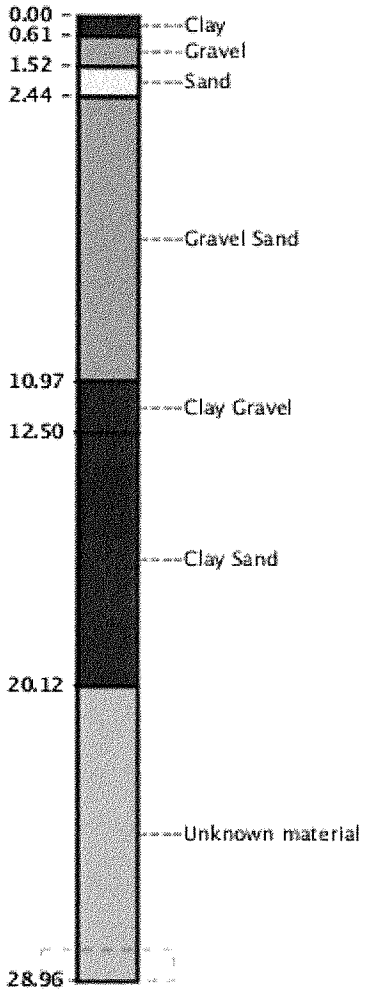
DEPTH FROM (METERS)	DEPTH TO (METERS)	GIN LITHOLOGY	ORIGINAL LITHOLOGY	POROSITY*	HYDRAULIC CONDUCTIVITY*
0.00	9.14	**Gravel** (More Info) **Sand** (More Info)	GRAVEL SAND	[24,44]% [26,53]%	[3E-4,3E-2]m/s [2E-7,6E-3]m/s
9.14	13.72	**Silt** (More Info) **Sand** (More Info)	SILT FINE SAND	[34,61]% [26,53]%	[1E-9,2E-5]m/s [2E-7,6E-3]m/s
13.72	24.69	**Clay** (More Info)	CLAY	[34,57]%	[1E-11,4.7E-9]m/s
24.69	27.43	**Sand** (More Info) **Gravel** (More Info) **Silt** (More Info)	SAND GRAVEL SILT	[26,53]% [24,44]% [34,61]%	[2E-7,6E-3]m/s [3E-4,3E-2]m/s [1E-9,2E-5]m/s

*Well log. (*Notice: Values taken from literature)*





GIN Log



View legend

GIN borehole Identifier : ca.on.waterWell.6504579
Borehole Data Provider ID : 6504579
Information Source : Ontario Ministry of Environment
Metadata : Ontario Water Well Information System Metadata
Longitude : -80.405703
Latitude : 43.337742
Online resource : Ontario Water Wells
Date of Drilling :1977-02-23
Length : 28.96m
Elevation : 321.56m
CDEM Elevation : 322m
CDSM Elevation : 322.292m
Water Level : 18.29m 1977-02-23
Water Yield : 36.37lpm 1977-02-23
Water Use : Public
Location : County: WATERLOO Township: NORTH DUMFRIES TOWNSHIP
Status : Water Supply
Type : Unknown

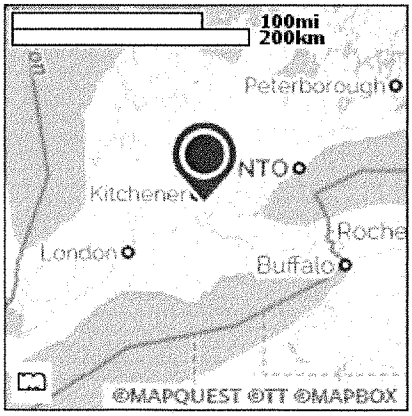
Report an error

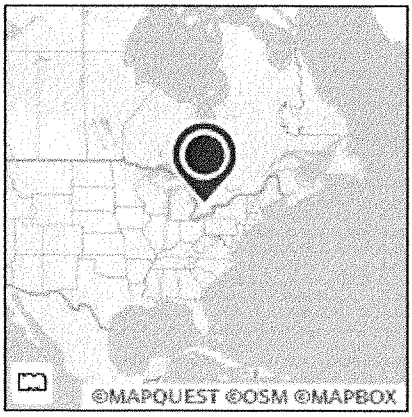
Screen :

- From 28.0416 to 28.96m

DEPTH FROM (METERS)	DEPTH TO (METERS)	GIN LITHOLOGY	ORIGINAL LITHOLOGY	POROSITY*	HYDRAULIC CONDUCTIVITY*
0.00	0.61	**Clay** (More Info)	CLAY	[34,57]%	[1E-11,4.7E-9]m/s
0.61	1.52	**Gravel** (More Info)	GRAVEL	[24,44]%	[3E-4,3E-2]m/s
1.52	2.44	**Sand** (More Info)	SAND	[26,53]%	[2E-7,6E-3]m/s
2.44	10.97	**Gravel** (More Info) **Sand** (More Info)	GRAVEL SAND	[24,44]% [26,53]%	[3E-4,3E-2]m/s [2E-7,6E-3]m/s
10.97	12.50	**Clay** (More Info) **Gravel** (More Info)	CLAY GRAVEL	[34,57]% [24,44]%	[1E-11,4.7E-9]m/s [3E-4,3E-2]m/s
12.50	20.12	**Clay** (More Info) **Sand** (More Info)	CLAY SANDY	[34,57]% [26,53]%	[1E-11,4.7E-9]m/s [2E-7,6E-3]m/s
20.12	28.96	**Unknown material** (More Info)	UNKNOWN TYPE		

*Well log. (*Notice: Values taken from literature)*

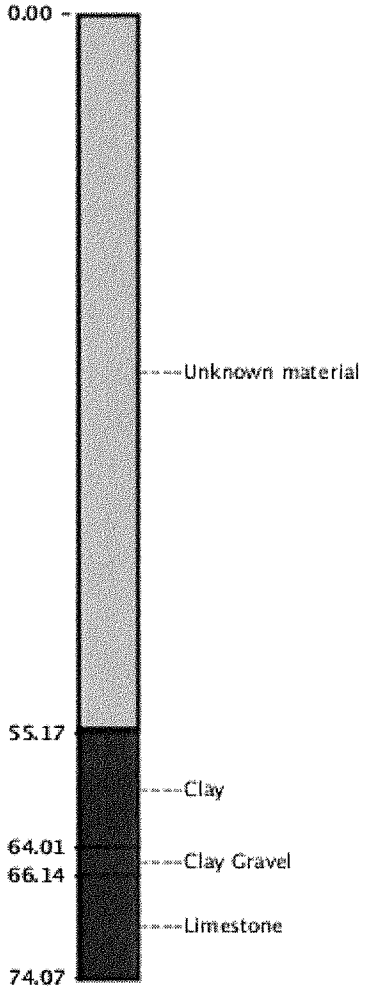




GIN Log

Report an error

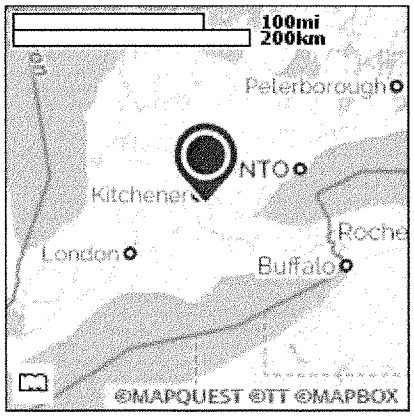
GIN borehole Identifier : ca.on.waterWell.6500624
Borehole Data Provider ID : 6500624
Information Source : Ontario Ministry of Environment
Metadata : Ontario Water Well Information System Metadata
Longitude : -80.405058
Latitude : 43.340620
Online resource : Ontario Water Wells
Date of Drilling :1957-03-16
Length : 74.07m
Elevation : 321.56m
CDEM Elevation : *321*m
CDSM Elevation : *321.06*m
Water Level : 18.29m 1957-03-16
Water Segment : 73.7616, FRESH 1957-03-16
Water Use : Livestock
Location : County: WATERLOO Township: CAMBRIDGE CITY (NORTH DUMFRIES)
Status : Water Supply
Type : Unknown

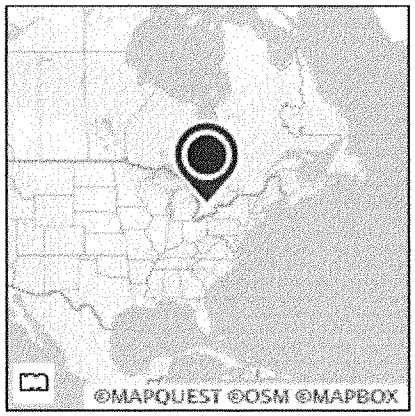


View legend

DEPTH FROM (METERS)	DEPTH TO (METERS)	GIN LITHOLOGY	ORIGINAL LITHOLOGY	POROSITY*	HYDRAULIC CONDUCTIVITY*
0.00	54.86	**Unknown material** (More Info)	PREVIOUSLY DUG		
54.86	55.17	**Sand** (More Info)	MEDIUM SAND	[26,53]%	[2E-7,6E-3]m/s
55.17	64.01	**Clay** (More Info)	CLAY	[34,57]%	[1E-11,4.7E-9]m/s
64.01	66.14	**Clay** (More Info) **Gravel** (More Info)	CLAY STONES	[34,57]% [24,44]%	[1E-11,4.7E-9]m/s [3E-4,3E-2]m/s
66.14	74.07	**Limestone** (More Info)	LIMESTONE	[7,56]%	[1E-9,6E-6]m/s

*Well log. (*Notice: Values taken from literature)*





XML

Important Notices

Please use this citation if this data is used in a publication:
Data from: Ontario Ministry of Environment , provided by GIN (Groundwater Information Network).

Accessed at
http://gin.gw-

Appendix E: Agency Correspondence

Region of Waterloo

PLANNING, HOUSING AND
COMMUNITY SERVICES

150 Frederick Street, 8th Floor
Kitchener ON N2G 4J3 Canada
Telephone: 519-575-4533
Fax: 519-575-4449
www.regionofwaterloo.ca

Jane Gurney
519-575-4500 Ext. 3454

October 4, 2013

Mr. J. Stephen Stone, RPP, MCIP
Director of Planning
Township of North Dumfries
1171 Greenfield Road, RR #4
Cambridge ON N1R 5S5

Re: Industrial Subdivision Pre-Submission Consultation
D5D Enterprises Ltd
Regional Road #97 and Regional Road #47
Township of North Dumfries

The Region has reviewed the pre-submission consultation request submitted for approximately 149.5 acres of land generally located at the northwest corner of Cedar Creek Road (Regional Road #97) and Dumfries Road (Regional Road #47), and offers the following comments for your consideration.

The applicant's proposal is for the creation of an industrial subdivision on the lands currently occupied by a gravel pit. The proposed lot configuration of the property includes an internal road traversing the property from Regional Road #47 on the east side of the property to Regional Road #97 on the south side of the property, with 14 lots fronting the proposed road. The proposed lot sizes range from 3.4 acres to 17.8 acres, with the majority of the lots under 9 acres (3.6 ha).

Although the Regional Official Plan (ROP) designation of the subject property may support the proposed type of development, the Regional Official Policies Plan (ROPP) does not. Comments are provided below for information purposes, however, the applicant is advised that due to the status of the ROP as being under appeal and not yet in force and effect, the Region cannot consider the subject proposal at this time.

Regional Policy Designations

The subject lands are designated as Non-Prime Agricultural Areas & Other, within the Agricultural Resource Area, by the Regional Official Policies Plan (ROPP), as depicted in ROPP Maps 3 and 6. The ROPP also identifies the majority of the western edge of the property as being within or adjacent to an Environmentally Sensitive Area, and a Provincially Significant wetland occupies the property.

The Regional Official Plan (ROP), which was adopted by Regional Council in June 2009 and approved with revisions by the Province in December 2010, is currently under appeal and not yet in force and effect, designates the subject lands as Prime Industrial/Strategic Reserve (Unserviced), within the Highway 401/Regional Road 97 Employment Area. The subject lands contain Core Environmental Features (Provincially Significant Wetlands and ESPA 41 – Cedar Creek Spillway) and they are contiguous to the Dumfries Carolinian Environmentally Sensitive Landscape (ESL). The proposal has been assessed based on the Region's policies which are relevant to the designations identified above, and the following information is provided for the applicant's information as it may be applicable if applications are made. However, as the proposal does not conform to the policies of the ROPP, and due to the status of the ROP, the Region cannot consider an application related to this proposal at this time.

ROP Policies under 2.F pertain to the lands as they are part of the Highway 401/Regional Road 97 Employment Area. Of particular note is Policy 2.F.2, which states that the Prime Industrial Area/Strategic Reserve (Unserviced) lands will be developed as parcels greater than eight hectares (approximately 20 acres) in size, unless otherwise comprised by such considerations as design limitations associated with environmental features, property configurations, the provision of local roads or existing development. Further, ROP Policy 2.F.4 specifies that lands within the Highway 401/Regional Road 97 Employment Area will be planned to meet or exceed a density target of 25 jobs per hectare, and any applications would be required to provide details as to how these targets will be met. The Region is not supportive in principle of the division of the subject property into smaller lots, as currently proposed. This is partially based on the information available from the last Regional inventory completed, the 2008 Regional Industrial and Business Park Vacant Land Inventory. Additional information would be required, on a regional level, to assess the need for the land in parcels of the sizes currently proposed.

Although there are notable environmental features on the property, they are generally isolated to the western portion of the property and do not provide compelling justification for the creation of so many lots which do not meet the minimum lot size of this area.

Land Use Compatibility

The subject property borders an existing church. A feasibility assessment should be provided with an Official Plan Amendment application and/or Zoning By-law amendment application in order to demonstrate that the proposed developments will comply with the D-6 Guidelines, *Compatibility Between Industrial Facilities and Sensitive Land Uses*. A detailed analysis will be required with a Plan of Subdivision application which details the potential impacts of the new development on the adjacent sensitive use.

Environmental Planning

As stated above, the subject lands contain Core Environmental Features, including the Cedar Creek Spillway. Cedar Creek is a significant cold water creek which provides fisheries habitat. A Stormwater Management Strategy will be required which identifies how stormwater management will be approached over the entire property in order to ensure that there are no impacts to the

Cedar Creek spillway. Impacts to be addressed through the approach will need to include, but may not be limited to, water cooling, and deposition of sediment.

Policy 7.C.9 of the ROP only permits development or site alteration on lands contiguous to Core Environmental Features where an Environmental Impact Statement (EIS) has demonstrated to the satisfaction of the Region that the proposed development would not result in adverse environmental impacts on Core Environmental Features. To this end, the applicant will be required to submit an EIS to the satisfaction of the Region prior to approval. The Terms of Reference (ToR) for the EIS will include, but may not be limited to, the following:

a. confirmation of an ecologically appropriate boundary of Core Environmental Features within the subject lands;
b. delineation and design of suitable buffers between the proposed development and Core Environmental Features;
c. a biophysical survey to identify natural habitats and/or populations of Regionally significant plant and animal species on the subject lands that might be adversely affected by the proposed development;
d. maintaining quantitative and qualitative aspects of hydrological and hydrogeological regimes sustaining Core Environmental Features through design and operation of a stormwater management system required to support the proposed development;
e. content of a during-development and post-development monitoring program; and
f. stewardship plan for the portion of Core Environmental Features on the subject property.

A site inspection will be required to help determine the ToR for the EIS related to this application. Please contact Tim Van Hinte, Environmental Planner at 519-575-4500, Ext. 3649 or tvanhinte@regionofwaterloo.ca to schedule the inspection.

Transportation Planning

Regional Road Dedication

At this location Regional Road 47 (Dumfries Road) has a designated road allowance width of 100 feet (as designated in the ROP). The Region has determined that no road widening is required along the Dumfries Road frontage at this time. However, a road dedication will be required along Regional Road 97 (Cedar Creek Road) which has a designated road allowance width of 100 feet. The Region estimates a 7 foot road dedication will be required across the frontage of Regional Road 97. Additionally, should the internal road to the subdivision be a municipal street, 25 foot daylighting triangles at the intersecting streets to the Regional roads will also have to be dedicated. The lands must be conveyed to the Region of Waterloo for road allowance purposes and must be conveyed without cost and free of encumbrance.

The Applicant must engage an Ontario Land Surveyor to prepare a draft reference plan which illustrates the required road allowance widening. Prior to registering the reference plan the OLS should submit a draft copy of the plan for review by the Transportation Planning Group. Four copies of the registered plan are to be provided to the Region of Waterloo. The Applicant's Solicitor will prepare the land transfer document and submit the document to the Regional Legal Assistant (Crystal Ladd, 519-575-4709) for registration.

Traffic Site Circulation & Access

A Transportation Impact Study is required for this application. A pre-consultation meeting with the Transportation Consultant is required to discuss the scope of the study.

Before Regional clearance can be provided for any application, any recommended and approved off site works would require an approved functional design, approved cost estimate, letter of credit, and a signed agreement to the satisfaction of the Regional Solicitor.

Transportation Planning staff is generally in support of the locations of the proposed access points onto Dumfries Road and Cedar Creek Road depicted in the concept plan, which identifies one access point to each Regional Road. The applicant is to ensure that adequate visibility is met at each of the proposed accesses.

A Regional Road Access Permit is required for the closure of the existing accesses, and for the new accesses. The accesses shall conform to the Regional Access Policy with the appropriate design width and turning radii. The fee for Commercial permits is $200. In accordance with recent changes to the Regional Access Permit Application form, please refer to http://www.regionofwaterloo.ca/en/doingBusiness/RoadandTrafficPermits.asp for the application process. This condition may be waived to Site Plan.

Stormwater Management

Preliminary Storm Water Management, Site Servicing and Lot Grading Reports/Plans addressing impacts to the Region's rights-of-way will be required. Detailed reports/plans as related to the transportation requirements may be deferred until future Site Plan submission; the applicant is advised that this does not apply to the Stormwater requirements identified above under the heading "Environmental Planning".

Servicing Strategy

A detailed servicing strategy will be required in order to demonstrate how the proposed lots are to be serviced and to verify appropriate capacities to do so through private services.

Future Applications

It is anticipated that an Official Plan Amendment and Zoning By-law Amendment application will be submitted to the Township first, to be followed by an application for a Plan of Subdivision. The Region is the approval authority for Official Plan Amendments, and payment of a processing and approval fee to the Region is required following the local Council's adoption of an Official Plan Amendment. The applicant is advised that the Plan of Subdivision will be processed through the Region of Waterloo and a pre-submission meeting will be required which will identify the supporting documentation required with the Plan of Subdivision application. The Region's fees will be those in effect at the time they are paid; current fees are available through Region of Waterloo website, however, they are subject to change.

Sincerely,

Jane Gurney

Jane Gurney, AICP, RPP, MCIP
Principal Planner

cc. A. Galloway, Dryden, Smith & Head

Alex Galloway

From: Steve Stone <sstone@northdumfries.ca>
Sent: August-06-13 9:28 AM
To: alexg@dsh.ca
Subject: FW: Pre-consultation - Proposed Dry Industrial Subdivision - Part Lots 25 and 26, Concession 11

GRCA preliminary comments.

J. Stephen Stone, MSc, BES, MCIP, RPP
Director of Planning - Township of North Dumfries
1171 Greenfield Road, RR4
Cambridge ON N1R 5S5
P: 519-621-0340 ext. 25
F: 519-623-7641
TF: 1-800-563-5595
sstone@northdumfries.ca

-----Original Message-----
From: Andrew Herreman [mailto:aherreman@grandriver.ca]
Sent: Friday, August 02, 2013 5:11 PM
To: Steve Stone (sstone@northdumfries.ca)
Subject: Pre-consultation - Proposed Dry Industrial Subdivision - Part Lots 25 and 26, Concession 11

Hi Steve,

Information currently available at this office indicates that the property contains Roseville Swamp - Cedar Creek Wetland Complex, Cedar Creek, floodplain, and the allowances adjacent to these features. Consequently, a portion of the property is subject to Ontario Regulation 150/06 - Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation. Any future development within the regulated area will require prior written approval from the GRCA in the form of a permit pursuant to Ontario Regulation 150/06.

The GRCA would require the following to be submitted for the OPA, ZBA, and Plan of Subdivision:

* Environmental Impact Study (EIS) in conformance with the Cedar Creek Subwatershed Study (a terms of reference for the EIS in conformance with the GRCA EIS Guidelines should be submitted)

* Stormwater Management Report

* Preliminary Grading Plans

* Functional Servicing Report

* Hydrogeological Report

Planning Overview
Proposed Industrial Subdivision
Lands of D5D Enterprises Limited
Regional Road #97 and Regional Road #47

1. INTRODUCTION

Dryden, Smith & Head Planning Consultants Ltd. has been retained by D5D Enterprises Limited to prepare and submit applications and supporting documents for the development of the former Rumney Galliher licenced aggregate lands into a dry industrial development/subdivision. The subject lands are located on part of Lots 25, 26 and 27, Concession XI, Township of North Dumfries in the Regional Municipality of Waterloo and contain an area of approximately 149.5 acres. The subject lands are bounded by Cedar Creek Road (Regional Road #97), Dumfries Road (Regional Road #47) and the Canadian Pacific Railway Line (C.P.R.).

2. GENERAL SITE INFORMATION

a. Location

The subject property is located at the intersection of Cedar Creek Road (Regional Road #97) and Dumfries Road (Regional Road #47) in the Township of North Dumfries in the Regional Municipality of Waterloo.

b. Access

The subject property has frontage and direct access to Cedar Creek Road (Regional Road #97) and Dumfries Road (Regional Road #47). Any new access for development will be subject to obtaining additional access permits from the Regional Municipality of Waterloo for either Regional Road.

The existing access on Dumfries Road may be relocated. The intent is to move the Dumfries Road access approximately 200 metres closer to Cedar Creek Road (Regional Road #97) to allow for better access for the proposed dry industrial/development.

c. Legal Description

The subject lands are legally described as Part 1 - Plan 67R-1477) and Part of Lots 25, 26 and 27, Concession XI, Township of North Dumfries in the Regional Municipality of Waterloo. The municipal address for the subject property 2224 Cedar Creek Road.

d. Size of Property

Total area of the site is approximately 149.47 acres. A copy of the survey (June, 1979) can be made available upon request.

e. Existing Use

The subject property is currently in use as a licensed gravel pit operation. A portion of the lands

are being used for outdoor storage, a single family residence and a small shop. The subject property is licenced as a gravel pit operation. The gravel resources have, for the most part, been mined out and the Ministry of Natural Resources will request the release of the license in due course. It is not feasible or practical to retain the operating pit licence. Any aggregate materials that may remain on site will be used as part of the rehabilitation and in the construction of internal roads, parking areas, storage areas, etc.

f. Proposed Use

Attached is a concept plan for the proposed development of the subject property. The concept plan shows a proposed plan of subdivision for the area under application. The final plan for development will evolve as additional studies are completed and comments are received from the agencies circulated. There is an opportunity to allow the use of this property for industrial uses that may rely on railway service. This is one of the few areas in the Township and Region where it would be possible to provide rail service to an industrial area. The subject property abuts the CPR railway line and an extension of a spur line into the property is possible.

The comments from the agencies, the findings of our consultants' studies, input from the agencies, Region, Township and abutting property owners will all have a bearing on the final plan configuration.

A formal plan of subdivision along with additional supporting studies will be prepared and submitted at a later date with the application for zone change and future site plan approvals.

g. Topography and Vegetation

The subject property is a semi active gravel pit operation. Prior to development, it will be necessary to undertake a site survey to establish current topography and contours.

There are three pockets of treed areas left on the property. One is abutting the former Rife property and the other two are abutting the C.P.R. line. It is proposed to leave these areas intact. A Scoped Environmental Impact Statement will be completed to evaluate these areas.

3. MUNICIPAL SERVICES

a. **Sanitary Sewer** - No sanitary sewers - future development will be on private septic systems

b. **Storm Sewer** - No storm sewers - future development will need to address runoff from the property via storm water management practices, ponds, etc.

c. **Water Supply** - No municipal water is available - water supply will be provided by individual private wells.

d. **Other Services**

Gas - Gas is available at Dumfries Road # 47. Any development of the subject property will have to address the extension or use of existing services.

Hydro - Hydro is currently available to the site. Cambridge and North Dumfries Hydro

Electric Commission will likely require a servicing agreement and an economic evaluation prior to development.

Bell Canada - Telephone service is available in the area.

4. OFFICIAL PLAN DESIGNATIONS

a. Regional Municipality of Waterloo Official Policies Plan (Current)

Map 6 of the Regional Official Policies Plan, designates the subject property as "Agricultural Resource Area". It also neighbours the Highway 401 and Regional Road 46 Industrial Commercial Area.

Map 5 of the Regional Official Policies Plan, designates a portion of the subject property as Mineral Aggregate Resource Area.

Map 9 of the Regional Official Policies Plan identifies Cedar Creek Road as Regional Road #97 and Dumfries Road as Regional Road #47. Future access to the Regional Roads will be controlled and regulated by the Region.

b. Regional Municipality of Waterloo Official Policies Plan (Council adopted - June 2009)

Map 3e of this plan designates the subject lands as "Prime Industrial Strategic Reserve (Unserviced).

c. Township of North Dumfries Official Plan (Present)

Map 6 of the Township of North Dumfries designates the property as Rural Area - Agricultural under the Land Use map.

Map 7 - The Agricultural Resource Area – designates the subject property as Non-Prime agricultural areas and others.

A portion of the subject lands are designated as Mineral Aggregate Resource Area. This area is currently licensed for gravel extraction. A small portion of the subject lands are considered to be Environmentally Sensitive and has Environmental Constraints placed on them. These areas will require an Environment Impact Statement.

d. Township of North Dumfries Official Plan (Proposed)

Map 2 of the DRAFT Official Plan indicates that the subject lands are designated as Prime Industrial/Strategic Reserve (Unserviced). DRAFT Section 2.67 contains the following policies regarding this designation.

> *The Prime Industrial/Strategic Reserve (Unserviced) designation applies to portions of the Highway 401/Regional Road 97 Employment Area designated on Maps 2 and 2.27. Lands within this designation are intended to provide additional opportunities for employment growth and business development within the township. Development within the Prime Industrial/Strategic Reserve (Unserviced) designation will generally be limited*

to privately serviced logistics and warehousing uses that require close access to the Highway 401 corridor to efficiently move goods into and out of the region.

Lands designated as Prime Industrial/Strategic Reserve (Unserviced) will be developed as parcels greater than eight hectares in size, unless otherwise compromised by such considerations as design limitations associated with environmental features, property configurations, and the provision of new local roads or existing development.

Notwithstanding Policy 2.6.7.2, where monitoring clearly demonstrates that there will be a critical shortfall in the inventory of unserviced lands available in the short to medium term to meet the needs of new and expanding businesses requiring lot sizes less than eight hectares, the Township may permit, through an amendment to this Plan, the creation of smaller parcels to meet those needs."

5. INDUSTRIAL SEPARATION

There is only one sensitive land use in close proximity to the future industrial development. The existing church/former school. As noted previously, berms have been provided to give noise attenuation protection to the property. As a condition of approval we expect that the Township and Region will place the subject lands under site plan control and limit the types of industrial uses permitted on the property. Setbacks, building orientations, parking area, loading areas, etc. can be regulated to provide additional protection to the church property. Depending on the types of industrial uses, Noise Attenuation measures and Minimum Distance Separation requirements can be imposed on the future development.

6. CULTURAL HERITAGE AND ARCAEOLOGY

There are no buildings of heritage value on the subject property. The property has been stripped of all top soil and some of the top soil has been stockpiled in the berms and in various areas on the property. It is not possible to complete an archaeological assessment of the site. The site had been mined and the gravel removed from the property. Any artifacts that may have been on the site, have been removed or disturbed.

7. NATURAL HERITAGE

As part of the development process we propose to undertake a scoped EIS Environmental Assessment Report. This report will deal with the two small environmentally sensitive areas next to the CPR line and the small existing woodlot next to the former Rife property.

8. DRAFT PLAN OF SUBDIVISION AND SITE PLAN CONTROL

A Draft Plan of Subdivision will be required to subdivide these lands. A concept plan is provided. Additional development control has been put in place. Site Plan approval will be required prior to the development or redevelopment of the subject property for any commercial or industrial development.

9. ZONING

a. Existing Zoning

The Township of North Dumfries Zoning By law 689-83 zones the subject property Z14 (Pits and Quarries). For any use other than Pits and Quarries and agricultural uses a Zone Change Application and approvals will be required.

b. Proposed Zoning

The proposed zoning for the subject lands is Zone 9 from the Township of North Dumfries Zoning By-law 689-83. This zone allows for Dry Industrial and Commercial Uses.

10. PLAN OF SURVEY/REFERENCE PLAN

Total area of the site is approximately 149.47 acres or (60.49 hectares +/-) (Subject to final survey).

11. COMPATIBILITY ISSUES

We have reviewed the existing land uses surrounding the subject property. To the north is an industrial use, brick/block company located on the former A. Rife property. To the west is the Regional Police recreational centre, campground and wood lot. South, across Cedar Creek Road is a licensed gravel pit on the lands of Wallace Moore, his former residence, which appears to be severed from the gravel pit, and an agricultural operation. In the south east corner of the property is a church/former school. East of Dumfries Road is a small cemetery and a farming operation.

The church is considered a sensitive land use and measures must be taken to address the impact future industrial uses may have on the future use of this facility. When this was a school, large earth berms and fencing were placed along the limits of the school property to provide noise attenuation measures, visual screening and fencing. It is proposed to retain these berms as part of the future development of the property. Regardless of how the subject property develops, the church will still be impacted by the heavy traffic from Regional Road #97 and Regional Road #47 and the active gravel pit operation directly across the road.

The other use which may be considered as sensitive is the campground and trailer park area used by the members of the Regional police Association. The Regional Police Recreation center has been located in this industrial area for many years, surrounded by Highway 401, Canadian Pacific Railway line, industrial uses and the active gravel pit on the subject property. To address compatibility issues, it may be necessary to prepare a noise assessment of the area, proposed uses and traffic analysis of the highway system to best determine location of future road access in relation to the church property. Consideration will have to be given regarding set backs from the church property as per MOE Land Use Compatibility Guidelines, orientation of buildings, storage areas next to the church and types of industrial uses permitted in the zoning approvals.

12. GEOTECHNICAL INVESTIGATION

A Geotechnical soil assessment will need to be done for road and construction design purposes.

13. TRAFFIC ANALYSIS

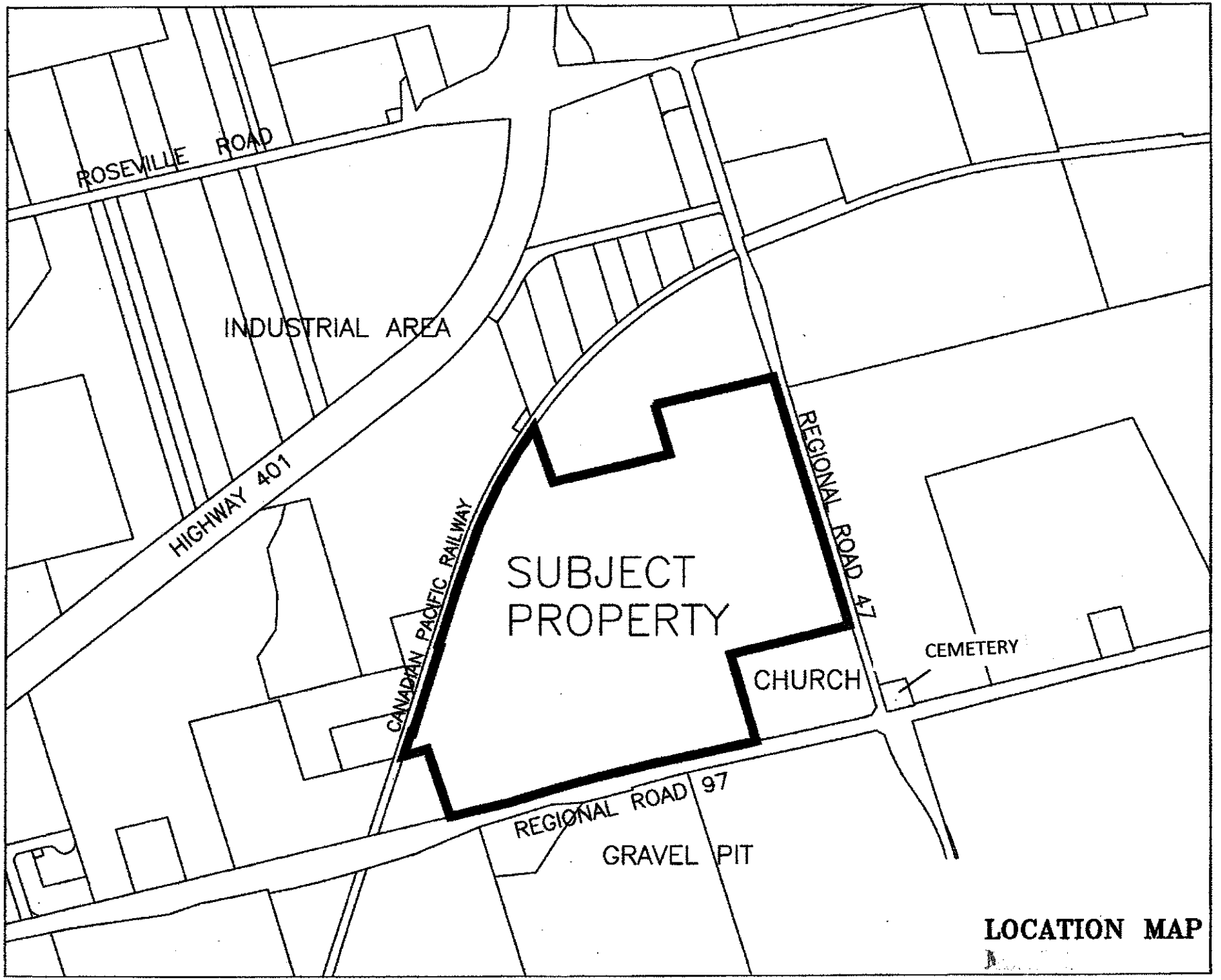
As part of the future development process (Subdivision, Site Plan Approval and Zone Change) a traffic analysis of the area and the proposal for the development of the subject property for industrial and commercial development may need to be prepared.

14. PIT LICENSE

An active Pit license is still in effect. As a condition for the future development of this site, application will be made to the Ministry of Natural Resources to have the license withdrawn.

15. ENVIRONMENTAL IMPACT ANALYSIS

We anticipate that we will be retaining an environmental consultant to prepare a scoped Environmental Assessment of the woodlot and treed areas on site.



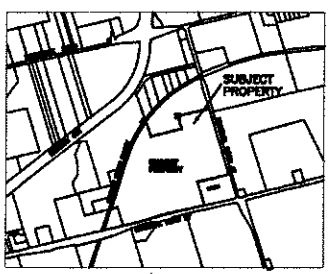
LOCATION MAP

CONCEPT PLAN

PART OF LOTS 25 & 26
CONCESSION 11
Township of North Dumfries
Regional Municipality of Waterloo

SUBJECT PROPERTY
SHOWN THUS
APPROXIMATELY 150± ACRES

KEY PLAN



FOREST LIMITS

ADDITIONAL LANDS OF THE APPLICANT

SCALE IN METRES

DRYDEN & SMITH & HEAD

HIGHWAY 401

DRY INDUSTRIAL / COMMERICIAL

L O T 2 6

L O T 2 5

C O N C E S S I O N X I

CANADIAN PACIFIC RAILWAY

REGIONAL ROAD 47 / DUMFRIES ROAD

WOODLOT

4.6ac±

4.0ac±

3.9ac±

4.4ac±

3.4ac±

9.9ac±

8.8ac±

6.1ac±

8.8ac±

17.8ac±

6.3ac±

9.6ac±

CHURCH

7.8ac±

6.3ac±

EXISTING ENTRANCE

REGIONAL ROAD 97

CEDAR CREEK ROAD

C O N C E S S I O N X

L O T 2 6

L O T 2 5

Meritech Engineering 1315 Bishop Street North Suite 202 Cambridge ON N1R 6Z2 t 519.623.1140 f 519.623.7334