TULLOCH ENGINEERING

Corporation of the City of Sault Ste. Marie

MacDonald Avenue Drainage Environmental Study Report

February 2016

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Revision Log

Revision #	Revised By	Date	Issue / Revision Description
0	-	Jan 5, 2016	Draft – For Client Review
1	PMc	Feb 4, 2016	Draft – For Client Review Following Comments Received
2	PMc	Feb 23, 2016	Final

Tulloch Signatures

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EXECUTIVE SUMMARY

Introduction

Street flooding on MacDonald Avenue has occurred fairly regularly in the Brien Avenue area, as a result of the storm sewer system backing up during heavy rain falls. As a result, homes on the south side have experienced basement and surface flooding in driveways and on front lawns. A class environmental assessment is being undertaken by the City of Sault Ste. Marie's (the City) Engineering and Planning Department to look for ways to reduce the frequency of flooding in the area. In 2012 a Storm Sewer Capacity Analysis and Condition Assessment was completed by Tulloch Engineering for the storm drainage area. The report concluded the storm sewer is inadequate to convey flows from a 2-year storm without the presence of surface flooding on MacDonald Avenue in the vicinity of Brien Avenue. The City's design standard is for storm sewers to have capacity to convey 1 in 10 year storm events. The critical capacity restrictions occur on Pim Street from Borron Avenue to MacDonald Avenue, and along MacDonald Avenue from Pim Street to Brien Avenue.

Class Environmental Assessment

Infrastructure projects undertaken by municipalities must follow a Class Environmental Assessment process, which is a streamlined approach used for routine and predictable projects to fulfill the requirements of the Environmental Assessment Act. The Class EA process was developed to ensure that environmental concerns are addressed and public consultation is sought.

Alternative Solutions

As part of this Class EA alternative solutions have been developed to address the flooding concerns. These alternatives primarily address surface flooding. As detailed in the report basement flooding needs to be addressed through compliance with the Sewer Use Bylaw and various flood proofing techniques.

The first public open house was held in January 2014 to present the problem/opportunity along with alternative solutions and to seek input. Alternative solutions included complete sewer replacement of all undersized sewers to the St Mary's River, underground storage, constructing relief sewers to other systems, and temporarily storing excess water in Penhorwood Park.

Based on public input during the first open house, the study area limits were expanded to include temporary storage of water in the natural ravine south of MacDonald Avenue, between Alworth Place and Pine Street.

Storm sewer improvements would also be needed to better convey storm water flows to the ravine. A second open house was held in November 2015 to present the preferred solutions for both conveyance improvements and storm water management in the ravine, along with various design concepts.

Preferred Solution

After evaluating the alternatives the preferred solution is to redirect storm water flows from the top end of the MacDonald Avenue storm water catchment area to the natural ravine east of Alworth Place, on

the south side of MacDonald Avenue. This will reduce the potential for flooding on the street to the 1 in 10 year design storm average.

The drainage in the ravine flows to the Ontario Ave/Pine Street storm sewer system. The addition of extra water into this system would exceed its capacity. Thus, in addition to redirecting flows here from MacDonald Avenue, the preferred solution also includes constructing a small dam and control structure near Ontario Avenue, to temporarily store excess water during major rainfalls until the Ontario/Pine Street storm system can handle the flows.

Preferred Conveyance Solution

Two new storm sewer installations were considered; one draining from the MacDonald Ave/Brien Avenue intersection to the ravine, the second one draining from the Campbell Ave/MacDonald Avenue intersection to the ravine. The former would result in a deep (4-5 m) sewer that would be expensive to construct due to its depth and its proximity to adjacent utilities. As well a sewer at this depth would interfere with the lateral house connections to the sanitary sewer main.

The latter is less costly and provides the required relief to the MacDonald Avenue system. Thus the preferred conveyance solution is to redirect excess flow by constructing a storm sewer from Campbell Avenue easterly to outlet into the ravine.

Preferred Temporary Storage Solution

The volume of water stored in the ravine can be altered based on the height of the control structure. The options include meeting the 1 in 10 year design standard, or controlling all flow that could drain into the ravine, including overland flow, during a major event, up to a 1 in 100 year storm. Analysis indicates a maximum water level of 1.2 m would result after a 1 in 10 year storm, and it only needs to be increased 0.5 m to meet storage requirements for a 1 in 100 year event. Given the added protection this offers the properties south of Ontario Avenue along Pine St, the preferred solution for storage is to create a dam and control structure in the ravine just north of Ontario Avenue to retain a 1 in 100 year rainfall event. The maximum storage depth would be approximately 1.7 m. This would cover a relatively small area at the south end of the ravine. The stored water would drain out in about 5 hours after the end of the storm event.

The control structure's actual location and dimensions would be finalized once the project is approved and survey and design work is completed.

MACDONALD AVENUE DRAINAGE

CLASS ENVIRONMENTAL STUDY REPORT

PHASE 1: PROBLEM OR OPPORTUNITY

1 INTRODUCTION

1.1 BACKGROUND AND PURPOSE OF REPORT

The City of Sault Ste. Marie has initiated this Class Environmental Assessment (Class EA) to identify and evaluate alternative ways to reduce the frequency of flooding along MacDonald Avenue, east of Pim Street, in the Brien Avenue area. There has been a history of street surface flooding during heavy rainfall events and subsequent basement flooding in nearby buildings.

Due to these concerns, Tulloch Engineering Inc. was retained by the City of Sault Ste Marie to complete a Class Environmental Assessment (EA) to study the storm drainage in the area and recommend ways to reduce flooding frequency. This Environmental Study Report (ESR) documents the decision making process leading to the selection of the recommended solution.

1.2 DESCRIPTION OF STUDY AREA

As outlined in Figure 1, (all figures can be found in the appendices) the initial study area for the Class EA study included MacDonald Avenue between Poplar Avenue and Alworth Place/Campbell Avenue. The initial study area was chosen based on the occurrences of street flooding and basement flooding in the area. As a result of resident input at Public Information Centre #1, the study area was expanded to include the potential for storage of excess flows in the ravine south of MacDonald Avenue, immediately east of Alworth Place. This revised study area is indicated in Figure 1, as well.

1.3 PREVIOUS STUDIES

In 2012, a "*Storm Sewer Capacity Analysis and Condition Assessment*" was completed by Tulloch Engineering for the storm drainage area involving the study area on MacDonald Avenue. Figure 2 depicts the subject drainage area. The pipe capacity analysis and pipe condition assessment was initiated by the City following an August 15, 2011 resolution of City Council:

> *Whereas several homes on the south side of MacDonald Avenue between Brien Avenue and Poplar Avenue have experienced repeated extensive flooding whenever very heavy rainfall occurs; and*

Whereas these heavy rain patterns are becoming more common; and
Whereas a dip in MacDonald Avenue in this area results in an accumulation of up to two feet of water leading to the strain on the system in that area;
Therefore Be It Resolved that engineering staff review and report back to Council within two months with a recommendation for a solution to address this issue.

Following this resolution, staff recommended an analysis of the storm drainage system in the MacDonald Avenue area be undertaken by Tulloch Engineering, which was completed in 2012. The report "*Storm Sewer Capacity Analysis and Condition Assessment - MacDonald Avenue Storm Sewer*" is available upon request. In summary it concludes:

"A hydraulic capacity check of the storm sewer progressed from the intersection of Pim Street and Borron Avenue, upstream throughout the storm sewer network. The results indicate the storm sewer is inadequate to convey flows from a 2-year storm without the presence of surface flooding on MacDonald Avenue in the vicinity of Brien Avenue. The critical capacity restrictions occur on Pim Street from Borron Avenue to MacDonald Avenue, and along MacDonald Avenue from Pim Street to Brien Avenue." Storm sewer plan and profile sketches are provided in Figures 3a – 3d.

The following preliminary alternatives to address the flooding issues were considered feasible and suggested in the study:

1. Storm sewer replacement
2. In-line temporary quantity storage
3. Install a relief sewer(s) to provide overflow capacity, connecting MacDonald Avenue to Poplar Avenue and/or Bellevue Avenue.
4. Redirection of the MacDonald Avenue storm sewer from Crawford Avenue east, to drain the Crawford Avenue and Campbell Avenue sub-watershed easterly to the ravine near Weldon Avenue. Natural depressions in the park may allow for storm water management techniques to be implemented.
5. Accept occasional flooding.
6. Continue to encourage property owners to isolate themselves from the storm sewer system, if direct gravity connections still exist.

1.4 History of Flooding

There have been numerous instances of flooding associated with the study area on MacDonald Avenue. The City Council resolution of August 15, 2011 was prompted by flooding after a 31.4 mm rainfall on August 7, 2011.

Records from the City's Department of Public Works and Transportation indicate service request calls were received following two major rainfalls in 2013: a large rainfall on September 9/10, 2013 and a November 17, 2013 rainfall. As indicated by several area residents heavy rainfall events have resulted in

street flooding and basement damage in previous years as well, as described by several residents during the January 15, 2014 Public Information Centre (PIC). It was noted that some of the basement flooding was related to sanitary sewer backup in past years and not necessarily related to the storm sewer capacity. It was also noted sanitary and storm sewer backups into basements can be addressed through flood proofing techniques.

1.5 Problem Statement

The problem can be stated as follows: Both surface flooding and basement flooding has occurred in the MacDonald Avenue area (the study area) in part due to the inadequacy of the storm sewer system to handle storm water flows to current City standards and in part due to the lack of flood proofing of adjacent homes. Solutions are needed to reduce the frequency of flooding being experienced.

2 Class Environmental Assessment Process

Municipal infrastructure projects are required to meet the requirements of the Ontario Environmental Assessment (EA) Act. The Municipal Class EA (October 2000, as amended in 2007/2011) applies to a group or "class" of municipal road, water and wastewater projects which occur frequently and which have relatively minor and predictable impacts. These projects are approved under the EA Act, as long as they are planned, designed and constructed according to the requirements of the Class EA document. A flow chart detailing the Municipal Class Environmental Assessment Planning and Design Process is included in Appendix 1.

The selection of a preferred alternative is subject to the Class Environmental Assessment planning process, as outlined in the Municipal Class Environmental Assessment document. The preferred solution will be found through the key principles of environmental assessment planning:

Consultation

Reasonable range of alternatives

Consideration of effects on all aspects of the environment

Systematic evaluation

Clear documentation

Traceable decision making

The specific requirements of the Class EA for a particular project depend on the type of project, its complexity and the significance of environmental impacts. Stormwater issues are covered under the Water and Wastewater section of the Municipal Class EA. To assist proponents in determining the status

of projects, four categories of projects are identified in the Municipal Class EA document, including Schedule "A","A+", "B" and "C" projects:

Schedule A

These projects are limited in scale, have minimal adverse environmental effects, and typically consist of normal maintenance and operational activities. These projects are considered pre-approved and may proceed without following the full Class EA planning process.

Schedule A+

These projects are also limited in scale, have minimal adverse environmental effects, and are considered pre-approved, but there is a requirement for public notification prior to construction or implementation of the project. The purpose of the notification is to inform the public of projects occurring in their local area. Although the public is informed of the project, there is no appeal mechanism to the Ministry of the Environment and Climate Change (MOECC); any concerns raised can be addressed at the municipal council level.

Schedule B

These projects have the potential for some adverse environmental effects, thus requiring a screening process involving mandatory contact with directly affected public and relevant review agencies. If all concerns can be adequately addressed, the project may proceed. These projects generally include improvements and minor expansions to existing facilities.

Schedule C

These projects have potential for significant environmental effects and are subject to the full planning and documentation procedures specified in the Class EA document. An Environmental Study Report must be prepared and submitted for review by the public and relevant review agencies. If all public and agency comments and issues can be adequately mitigated during the public review period, the project may proceed. These projects generally include construction of new facilities or major expansions to existing facilities.

2.1 SCHEDULE SELECTION

The Storm Sewer Capacity Analysis and Condition Assessment Report listed a number of alternatives that were considered feasible methods of addressing the flooding issues. In order to determine the appropriate Class EA schedule of these various solutions, the Municipal Class Environmental Assessment documents offer the following definitions to assist:

2.1.1 Schedule "A" Activities

Municipal Wastewater Management Projects Description # 1:

"normal operations… modify, repair, reconstruct existing facilities,… relining, repairs and renovations to existing sewage collection systems"

It can be concluded that regular sewer repairs and replacement of existing sewers are considered to be Schedule A activities.

Municipal Wastewater Management Projects Description # 11:

"Establish new or replace or expand existing storm water detention/retention ponds or tanks and appurtenances including outfall to receiving water body providing all such facilities are in either an existing utility corridor or an existing road allowance."

It can be concluded that establishing stormwater retention/detention ponds is considered a Schedule A activity, provided they are in road allowances or utility corridors.

2.1.2 Schedule "B" Activities

Municipal Wastewater Management Projects Description # 2:

"Establish new stormwater retention/detention ponds and appurtenances or infiltration systems including outfall to receiving water body"

It can be concluded that establishing a stormwater retention/detention pond is considered a Schedule B activity if it is established in a location other than in a road allowance or utility corridor.

2.1.3 Schedule "C" Activities

Municipal Wastewater Management Projects Description #10:

"Construct a new dam or weir in a watercourse"

It can be concluded that establishing a stormwater retention/detention pond is considered a Schedule C activity if it is established in a watercourse, through the construction of a dam or weir.

2.1.4 Initial Schedule Selection

Based on the above, the study was initially considered a Schedule B activity, given one of the options previously suggested in the capacity study involves the establishment of stormwater detention/retention ponds off road, potentially on municipal parkland. (As noted in Section 6, the schedule selection was changed to a Schedule C, to consider the use of a natural ravine for storm water management.)

2.2 Publication Notice – Notice of Study Commencement

In order to notify affected/interested residents of the study, a Notice of Study Commencement was published in the Sault Star December 7 & 14, 2013 (Appendix 2). A study area (Figure 1) was determined based on the problem statement. The notice was also mailed to all property owners in the area using owner information obtained from the City. In addition, notices were mailed to other parties with potential interest: Garden River First Nation, Batchewana First Nation, Métis Nation of Ontario, Sault Ste Marie Region Conservation Authority, EA Coordinator Ministry of the Environment, and Ward 2 City Councillors.

PHASE 2: ALTERNATIVE SOLUTIONS

3 Inventory of Existing Conditions

3.1 Existing Drainage Conditions

3.1.1 Overview of the Drainage System

Sanitary Sewer System

The MacDonald Avenue area is serviced by both storm sewers and sanitary sewers. The sanitary sewer system is not part of the Environmental Assessment undertaking, however it is noted that the sanitary system can also back up or surcharge, if excessive storm water gets into the system, either through infiltration of storm/ground water into the system, or from inflows from weeping tile or sump pump connections. If excessive storm water finds its way into the sanitary drainage system, basement flooding can also occur. For this reason the City, through the Sewer Use Bylaw 2009-50 and the Ontario Building Code has emphasized the need to isolate basements from the effects of surcharged sanitary sewers (flood proofing) through the use of back check valves, sump pumps, disconnection of weeping tile etc.

Storm Sewer System

The storm drainage system in the MacDonald Avenue area is the subject of this class EA. The system is a series of storm sewer pipes, draining downhill by gravity and conveying water from rainfall and melting snow. Catchbasins connected to the sewers intercept surface runoff along the streets; whereas ditch inlets connected to the sewers intercept runoff from swales between rear yards and from topographically low/depressed areas.

The principal feature of the storm sewer system in this area is a 375 mm storm sewer draining westerly along MacDonald Avenue from Campbell Avenue to Pim Street and then south on Pim. The storm drainage on MacDonald Avenue is split between Pim Street and Pine Street just east of Campbell Avenue.

Minor and Major Drainage Systems

Storm sewers are designed to convey flows during the most frequent rainfall events and are designed for a certain magnitude of storm event and thus make up the "minor" drainage system. Flows that exceed the capacity of the storm sewers are typically conveyed along the ground surface (i.e. "overland") accumulating in low spots on roads, in parks or on private property. The overland system makes up the "major" drainage system since it conveys flows in excess of the minor system during larger magnitude, more infrequent storm events.

The overland paths generally follow the paths of the flows in the storm sewers, however in some cases the paths differ. In addition, the overland flow path can encounter depression areas or road "sag points" that can result in ponding of stormwater.

Current design standards for new developments require the designer to consider overland flow routes and to accommodate the flows from large storm events using municipal property whenever possible, until it reaches the receiving body – a natural river, creek or other water body. The 375 mm diameter storm sewer on MacDonald Avenue was installed in 1955, before major drainage system routes were considered. When the capacity of the sewer is exceeded surface ponding/flooding occurs on MacDonald Avenue near the Brien Avenue intersection. Prior to the relatively new residential development on the south side of the street, it appears excess water would top the south curb and drain southerly, eventually getting into the upper Simpson Street storm sewer, via Ontario Avenue, below the escarpment.

Surface Flooding at road sag point - MacDonald Avenue at Brien Avenue Nov 17, 2013

The construction of new residential homes on the south side of the street within the past 15 to 20 years has resulted in raised yard elevations. Once deep enough, the overland flow route now takes the water westerly along MacDonald Avenue toward Poplar Avenue, and then southerly towards the Pim Street hill.

Ponding can also occur in parking lots or other depressed areas such as parks or private grassed areas. Flows typically fill up a depression area once catchbasins can no longer handle the volume of water and then eventually continue along the overland flow path.

Although detention of stormwater along the overland flow paths can help to reduce the rate of runoff downstream, it can also cause problems if the ponding is excessive. Ponding would typically be considered excessive if it causes undue risk to the safety of the public or results in significant damage to property during a specified magnitude storm event.

As noted in the 2012 Storm Sewer Capacity Analysis and Condition Assessment the 375 mm storm sewer that services this area is inadequate to convey flows from a 1 in 2-year storm. As a result the sewer surcharges relatively frequently and surface flooding occurs. Basements directly connected to it are also prone to flooding if they have not been flood proofed in accordance with the municipal sewer use bylaw.

Storm Sewer and Road Construction History

Street history cards in the City's Engineering Department indicate the 375 mm (15 inch) diameter storm sewer on MacDonald Avenue, between Pim Street and Brien Avenue was installed in 1955, and extended to Crawford Avenue in 1958. The storm sewers between Crawford Avenue and Pine Street were installed in 1961.

Road construction, including curbs and gutter and asphalt pavement took place following the storm sewer installation. In 1957 the road was built from Pim Street to Brien Avenue, and in 1962 it was completed from Brien Avenue over to Pine Street. Prior to storm sewers and curb and gutter, a two lane road, with roadside ditches was in place.

Cross culverts were installed prior to the original road construction across the top end of the ravine system east of Weldon Avenue. The top two branches of the ravine are visible in Penhorwood Park on the north side of MacDonald Avenue. These cross culverts were installed to ensure the north ends of the ravine system drained southerly under the road. The date of installation of these original cross culvert installations is unknown, but appear to have been clay tile. When the pipe draining the westerly ravine failed 10 to 15 years ago, Public Works connected the west branch of the ravine with the east branch by excavating and installing a pipe between the catchbasins found in the bottoms. The pipe draining the easterly ravine under MacDonald Avenue was lined with a 200 mm PVC pipe approximately 10 years ago, once it showed signs of pipe failure. Thus both ravine branches and their associated catchment areas (Penhorwood Park and F.H. Clergue School site) drain south under MacDonald Avenue through a single 200 mm diameter pipe.

3.1.2 City of Sault Ste Marie Storm Drainage Policies and Practices

There are a number of policies, practices and guidelines that are in place in Sault Ste Marie that have an impact on storm drainage in the City. These are described below.

City of Sault Ste Marie Official Plan

The City's Official Plan sets goals for environmental sustainability. Official Plan goals that relate to the issues being addressed in this study include:

- To encourage protection of natural environmental features which are located on both public and private lands
- To recognize the linkages between and among natural heritage features and areas, surface water features and ground water features
- To encourage watershed planning in the region
- To encourage stewardship practices throughout the community

- To utilize the best available information when managing development that affects the natural environment

1965 Proctor and Redfern Storm Sewer Design Document

In 1965 Proctor and Redfern, Consulting Engineers undertook a comprehensive review of the City's sanitary and storm drainage systems and drainage design practices, as well as reviewing sewage treatment and future sewer needs for a twenty year period. The resulting *City of Sault Ste Marie Drainage Report* recommended the use of a 1 in 10 year return period storm when designing storm drainage systems in the City. An Intensity- Duration Frequency graph was developed and provided in the report along with an Intensity-Time of Concentration graph. These were used for many years by City staff and consultants designing drainage works in the City, using the Rational Method. In recent years, this has been revised in order to incorporate additional Intensity Duration Frequency (IDF) data as it became available from Environment Canada weather station at the Sault Ste Marie airport. The 1 in 10 year design storm is still the standard for the City Engineering Department.

The storm sewer installed along MacDonald Avenue was installed in 1955, 10 years prior to the 1965 Proctor and Redfern report. It is assumed it was not designed using a 1 in 10 year return period frequency. It is unknown what method was used by staff or consultants to determine pipe diameters and to design storm sewer systems prior to 1965. As noted in the 2012 "Storm Sewer Capacity Analysis and Condition Assessment" study, the 375 mm storm sewer along MacDonald Avenue appears to be able to carry less than a 1 in 2 year return rainfall event.

Sewer Use Bylaw 4440/Bylaw 2009-50

Sewer Use Bylaw 4440 has been in place since the late 1960's detailing both sanitary and storm sewer use regulations. It was updated in 2009 with Bylaw 2009-50. Both bylaws describe how connections are to be made to sewer mains and methods on how to prevent back flow from sewers into buildings. (flood proofing). A series of schedules are included in the bylaws with sketches showing when back water valves and sump pumps are to be installed. The bylaw correlates with the drainage and sewer connection requirements of the Ontario Building Code.

Ontario Ministry of the Environment (MOE) 2003 Stormwater Management Planning and Design Manual

This manual provides technical and procedural guidance for the planning, design, and review of stormwater management practices. It incorporates provincial best practices and addresses water quantity, erosion control, water quality protection, and water balance principles into the selection and design of Stormwater Management Practices (SWMPs). It has been adopted by the City, and is the basis of the City's policy on quantity control where post development storm water flows from new developments must be equal to, or less than the pre- development flow from the site, for all storms up to the major drainage system design storm (1 in 100 year).

2015 Stormwater Master Plan and Policy

In 2007 City Council approved a stormwater management study and the development of a master plan. The goals of the study were to:

- Update and develop policies for the design of the City storm sewer conveyance system
- Develop policies for the design of stormwater management infrastructure
- Develop a capital works program to implement stormwater management infrastructure

A draft report was issued by R.V. Anderson Associates Limited in 2013, and the final report issued in 2015. A city wide storm water management approach is recommended including the implementation of a new Stormwater Management Policy. The policy addresses storm water quality, as well as quantity. Improvements to storm water conveyance systems at known problem areas are also recommended. The MacDonald Avenue study area is described as a "conveyance issue" in the study.

3.2 Inventory of Natural and Socio-Economic Environments - Initial Study Area

3.2.1 Natural Environment

MacDonald Avenue is located along the top of the first escarpment found north of the St. Mary's River. The road is oriented in an east/west direction, with the general topography slopes south towards the escarpment. The escarpment is cut by several ravines which effect drainage patterns in the area. One ravine cuts northerly from the intersection of Simpson Street and Ontario Avenue. This ravine stops short of MacDonald Avenue, but prior to human development, this was the overland flow route for the study area on MacDonald Avenue, near Brien Avenue (the current road sag prone to flooding). A second ravine cuts up from Ontario Avenue about 180 m west of Pine Street, and as noted earlier, drains Penhorwood Park (see the 1958 topographic map in Figure 4).

The study area has been subject to extensive urban development with the installation of urban services including roads, sewers, watermains and sidewalks. Residential development followed on both sides of the street, through various subdivision developments. The initial study area includes approximately 32 homes.

3.2.2 Soils

The natural soils in the study area consist of lacustrine clay overlaying glacial till, with bedrock (Jacobsville Formation) at a depth of approximately 15 metres. The permeability of the clay is extremely low. As a result, rainfall and snow melt tend to accumulate on the surface and run off, rather than seeping into the ground.

3.2.3 Groundwater Conditions

The static water table varies throughout the escarpment area, and is influenced by topography, surface drainage and the location of the former ravine system in the area. It is assumed the water table is relatively close to the surface, 2-3 metres deep, in the study area.

3.2.4 Socio- Economic Environment

MacDonald Avenue is an urban collector road in Sault Ste Marie, located in Ward 2. Traffic counts in 2011 indicate approximately 5800 vehicles use the road each day. The City's Official Plan lists the area's land use as residential under Land Use, Schedule C. There are no Environmental Constraints noted for the original study area, and no fish habitat or intermittent watercourses. However, the ravine system noted above is in the expanded study area and is considered a "natural constraint". The ravine system is a regulated area by the Conservation Authority under Ontario Regulation 176-06.

Penhorwood Park is a municipal park and is used by area residents for walking and informal sports activities. It is immediately south of F.H. Clergue School. Wintertime sledding in the two natural ravines is also an annual activity by area families.

A review of Schedule E in the Official Plan suggests several areas that have potential for archaeological resources. Penhorwood Park to the east, it is noted, has potential as well as the ravine system in the park and southerly towards Ontario Avenue. Since remedial work is proposed in the ravine system to the south of the park, an archaeological review was undertaken (see Section 7.2.3).

3.2.5 Terrestrial Features – Initial Study Area

As noted, the study area is an urbanized area along both sides of MacDonald Avenue fully developed with residential lots. There are no areas of provincial status such as Environmentally Sensitive Areas (ESAs) or Provincially Significant Wetlands (PSWs) within the study area. The area is covered primarily by asphalt and concrete roads, driveways and sidewalks, with houses and cultivated lawn areas. Where vegetation cover exists, it consists primarily of grassed lawn areas and native trees that were planted. Based on current site conditions, it is deemed unlikely that any rare species would be expected to be encountered predominately due to the lack of naturalized habitat. Wildlife habitat is minimal, and any habitat that does exist would not be subject to reductions with any of the alternative remedial measures that were considered. However, with the expanded study area to include a natural ravine, an environmental study was undertaken, as discussed in Section 7.

3.2.6 Aquatic Features – Initial Study Area

The study area does not include any aquatic habitat, with storm drainage taking place in underground concrete sewers. Aquatic features in the expanded study area are discussed in the Natural Environment: Existing Conditions and Impact Assessment Report, Section 7.2.

3.2.7 Economic Loss Issues Within the Study Area

As noted, basement flooding and surface water accumulation has occurred in the past following major rainfall events. Property owners have suffered economic loss as a result primarily due to water damage in basements. Storm water has entered buildings in the study area from storm and sanitary sewer connections. Surfacing flooding at road sag points has also affected traffic and presented potential safety hazards to motorists and pedestrians walking on sidewalks, until the storm sewer system is able to drain the accumulated water away. As building owners take steps to flood proof their buildings to

prevent storm water entry, basement flooding incidents are expected to decrease. (See Section 3.1.2 Sewer Use Bylaw 2009-50)

4 Investigation of Potential Remedial Measures

4.1 Lot Level (Source) Controls, Conveyance Controls and End of Pipe Controls

Remedial solutions to handling excess storm water can be divided into three types of control: lot level or source controls, conveyance controls and end of pipe controls. Lot level or source controls are applied on a lot by lot basis in order to reduce peak flows and runoff volumes and enhance runoff quality. Examples include roof leader disconnects, rain barrels, pervious driveways and soak away pits or infiltration trenches. To have a positive impact, they are best suited to smaller drainage areas (< 2 ha) and incorporated during original subdivision design. Because of the cost associated with retro fitting existing development, it is difficult to obtain substantial flow reduction by voluntary means.

Conveyance controls address the piped sewer system and include the use of underground storage in large diameter super pipes or use of catch basin inlet controls to slow water entry into the sewer system.

End of pipe controls include wet and dry pond storage, use of wetlands and other storm water management facilities. Storage ponds receive water from a conveyance system, store it temporarily and eventually discharge it to a receiving water body. End of pipe controls are widely used for flood and erosion control as well as for water quality improvement.

4.2 Surface Flooding versus Basement Flooding

The problem statement addresses both surface flooding and basement flooding. In order to investigate remedial solutions it is necessary to differentiate between these two consequences of excessive storm water flows.

As noted in Section 3.1.2, the 10 year return period storm is the standard used by the City for storm sewer design. It is based on rainfall intensity duration data from Environment Canada. Thus, a 10 year rainfall event has a 10% probability of occurring in any given year. A sewer designed to this standard is expected to successfully convey the runoff from many rainfall events, but there is a 10% chance each year it will be subjected to more stormwater than it can handle, with resulting flooding. Surface flooding during a rainfall is usually tolerated if it only results in temporary ponding in road sag points and other low lying areas.

Basement flooding often results in financial losses and is not considered tolerable to building owners. Thus, a 10 year design storm standard that is adequate for storm sewer design for road drainage systems is not adequate with regard to basement flooding. The solution to basement flooding is to flood proof buildings to prevent water entry, from either a surcharged sewer or overland flow. Conformance to Bylaw 2009-50 (Section 3.1.2) provides the best means of preventing basement flooding from

surcharged sewers. Gravity storm sewer connections should not be used to connect buildings to sewers that are subject to frequent surcharging.

Basement flooding can also be the result of overland flow during rainfall events. This can be addressed by lot grading techniques and the use of swales to direct overland flow away from foundations.

The following alternative solutions therefore address the reduction of surface flooding in relation to the City's storm sewer design standard. It is also recognized that reducing surface flooding will lessen the potential for basement flooding, but property owners still need to consider flood proofing techniques.

4.3 ALTERNATIVES

Based on the 2012 "Storm Sewer Capacity Analysis and Condition Assessment", various alternatives were investigated based on technical, environmental, social and economic merits in an effort to develop a preferred solution. Three additional alternatives/concepts were added subsequent to the 2012 report:

1) Based on comments received from a local resident at PIC #1, the ravine on the south side of MacDonald Avenue east of Alworth Place was investigated for storage/stormwater management possibilities.
2) The use of passive means of reducing flows (lot level controls) was added to the flood proofing of homes alternative.
3) The possibility of diverting flows from the Pim/MacDonald intersection, north westerly to the large ravine crossing the Blake Avenue road allowance (north of the former St. James School property) was added.

The do nothing alternative represents current conditions and was used as a baseline that the alternatives were compared to. It was noted that the preferred solution may be a combination of various alternatives.

Therefore, the alternatives investigated were:

1. Storm sewer replacement along MacDonald Avenue and sections of Pim Street with larger diameter pipe (conveyance improvement).

2. In-line temporary storage of excess flows within the existing roadway using oversized pipes or box culverts (conveyance control method).

3. Off-line storm water storage/management by using the two natural ravines located in Penhorwood Park for temporarily storing excess flows. The two ravines currently drain south to the Ontario Avenue storm sewer system (end of pipe control).

4. Install relief pipes to provide overflow capacity to the existing storm sewers on Poplar Avenue and/or Bellevue Avenue, which drain south to Summit Avenue (conveyance improvement).

5. Install a relief sewer from the MacDonald Ave/Pim Street intersection west of MacDonald Avenue and north on Blake Street, diverting storm water flows to the large ravine system located there (conveyance improvement).

6. Storm water storage/management by using the natural ravine on the south side of MacDonald Avenue, east of Alworth Place which drains south to Ontario Avenue (end of pipe control).

7. Peak flow/runoff reduction techniques while accepting street flooding from time to time, emphasizing the need for all homes to be flood proofed without gravity connections to the storm sewer (lot level or source control).

8. Do nothing.

5 EVALUATION OF ALTERNATIVES

5.1 EVALUATION CRITERIA

In order to evaluate the alternative solutions, the following evaluation criteria were developed. The ratings are shown in the chart below, and should be read as the higher the number of asterisks (***) the better the expected result (i.e. the less impact on the environment or the lower cost).

1) How well will the alternative solve the problem, as identified in the problem statement?
2) Are impacts to the natural environment minimized? (How well does the alternative meet the environmental sustainability goals of the City's Official Plan? Will water quality be improved?)
3) All undertakings have some negative impacts on people (residents, business owners, motorists, cyclists, pedestrians, tourists, etc), possibly short and/or long term. To what extent does the alternative minimize the negative impacts on the social, cultural or economic environments?
4) How significant are the impacts to private and/or public property? This criterion considers both the short term effects of construction and the long term benefits of the alternative solution to properties involved.
5) Cost implications: How cost effective is the alternative in solving the problem?

5.2 Evaluation Results

	Alternative #1 Sewer replacement	Alternative #2 Underground storage	Alternative #3 Temporary storage in Penhorwood Park	Alternative #4 Relief sewers to lower Poplar and Bellevue	Alternative #5 Relief sewer to ravine NW of MacDonald/ Pim	Alternative #6 Ravine storage south side MacDonald	Alternative #7 Runoff reduction techniques/ flood proofing	Alternative #8 Do nothing
Effectiveness	*****	***	****		*	*****		NA
Natural Environment	***	***	**	***	**	**	***	NA
Cultural, social, economic environments	***	***	*	***	***	***	**	NA
Property effects	***	***	**	***	***	***	**	NA
Costs		*	****	**	**	****	***	NA
Totals (if effective)	14	13	13		11	17		NA
Class EA Schedule	A	A	B	A	C#	C#	A	NA

Construction of a new dam or weir in a watercourse is a Schedule C project.

5.3 Evaluation Rationale

Alternative 1: Storm Sewer Replacement with Larger Diameter Pipe

Concept:

This alternative involves replacing all undersized storm sewers with larger diameter pipes with more capacity to convey storm water flows. The system would be sized to convey a 1 in 10 year design storm before the sewers would start to surcharge. The MacDonald Avenue storm sewer drains to Pim Street, and then continues down Pim Street to the St Mary's River. Other than a replaced section across Wellington Street E, the 525 mm diameter sewer is the original sewer installed on Pim Street and is also undersized. Replacement of most of the Pim Street storm sewer, from MacDonald to the St Mary's River would also be necessary in order to convey the increased flow volumes down to the St Mary's River, without causing downstream flooding.

Expected Results:

Surface flooding in the study area would be reduced to the recommended frequency by the City's standards. Basement flooding risk would also be reduced.

Challenges:

Storm sewer construction has high capital costs. When any major construction is planned in a roadway, the City also needs to assess the condition and adequacy of adjacent infrastructure (road base, curb and gutters, sanitary sewer and watermain) to decide if other services should be replaced as part of the project, prior to rehabilitating the road surface. This analysis frequently demonstrates a need to replace other aging infrastructure, resulting in complete reconstruction of the road at considerable cost.

To replace the MacDonald Avenue and Pim Street storm sewers would thus have high capital costs, and would probably dictate complete reconstruction of MacDonald Avenue and 1.3 km of Pim Street. Water quality is not enhanced by storm sewer conveyance directly to the St Mary's River.

Alternative 2: In-Line Stormwater Storage Within Existing Roadway

Concept:

This alternative involves the temporary storage of runoff water in underground box culverts or large diameter pipes (super pipes), releasing it slowly during and after a storm event. Storage would be provided along the MacDonald Avenue road allowance, somewhere between Pim Street and Crawford Avenue.

Expected Results:

Surface flooding would be reduced to the recommended frequency by the City's standards if the storage volume provided is adequate. Basement flooding risk would also be reduced. If storage is adequate downstream flow rates should not increase.

Challenges:

Providing an adequate volume of storage in underground vaults or super pipes has high capital costs. Finding adequate locations that do not interfere with other underground utilities, in particular gravity sanitary drain connections from adjacent homes would also be a challenge. Due to the relatively shallow depths of the existing storm sewer system on MacDonald Avenue, only a shallow system could be utilized to permit gravity drainage.

Alternative 3: Off-Line Storm water Storage/Management by Using the Two Natural Ravines Located in Penhorwood Park for Temporarily Storing Excess Flows.

Concept:

This alternative involves the temporary storage of runoff water "off line" or away from the storm sewer system. Storage could take place in Penhorwood Park by directing excess flows from the MacDonald Avenue storm sewer into the two natural ravines in the park. The stored water would drain out slowly, down to the Ontario Avenue/Pine Street storm sewer system as the storm event passes. As depicted in the following photo from November 17, 2013 rainfall event, this is already happening to a degree.

Water accumulating in ravine north of MacDonald Avenue Nov 17, 2013

Expected Results:

Surface flooding would be reduced to the recommended frequency by the City's standards if the storage volume provided is adequate. Basement flooding risk would also be reduced. If storage is adequate, downstream flow rates down to Ontario Avenue should not increase.

Challenges:

The use of these ravines for temporarily storing storm water has raised concerns about safety for children, as they are located in a public park just south of F.H. Clergue School. The ravines provide tobogganing opportunities in the winter, so if a fence is considered, winter activities would be restricted. The two ravines have limited volume to store runoff from major rainfall events.

Alternative 4: Install Relief Pipes to Provide Overflow Capacity to the Existing Storm Sewers on Poplar Avenue and/or Bellevue Avenue

Concept:

This alternative involves extending the storm sewers on Poplar and/or Bellevue Avenues northerly and connecting them to the MacDonald Avenue storm sewer. Excess flows would be diverted south along these systems, to the Summit Avenue storm sewer, where it drains over to Pim Street.

Expected Results:

Surface flooding would be reduced in the study area. Basement flooding risk would also be reduced for basements subject to basement inflow from surcharged sewers.

Challenges:

The degree of relief to the study area is not adequate to meet City standards and the capacity and condition of the small diameter sewers on Poplar Avenue, Bellevue Avenue and Summit Avenue are not adequate to take additional flow. These systems are old and undersized by today's standards.

In addition downstream surcharging from Pim Street southerly may increase due to increased flows if the pipe network is not able to handle the increased flow rate. Improvements may be needed or storage provided downstream along the drainage route to the St. Mary's River.

Alternative 5: Install a Relief Sewer from the MacDonald Avenue/Pim Street Intersection to the Natural Ravine to the North West

Concept:

This alternative involves installing a new storm sewer on MacDonald Avenue west of Pim Street draining to Blake Street, then northerly to the large ravine located there. Thus, partial flows from the Pim Street storm sewer catchment area would be diverted into the Elgin Street storm sewer system.

Expected Results:

Surface flooding would be reduced in the study area. Basement flooding risk would also be reduced for basements subject to basement inflow from surcharged sewers.

Challenges:

The degree of relief in the study area is not adequate to meet City standards due to the distance from the current area of flooding and the capacity of the existing 375 mm storm sewer.

Downstream sewers in the Elgin Street system are also known to be challenged. Surcharging of the inlet near the MacDonald/ Trelawne intersection currently occurs, due to frequent debris blockage on the inlet grating and inadequate downstream pipe capacity. Additional diverted water would compound the surcharging unless storm water management techniques are employed. The effects on this natural ravine system would also need to be considered.

Alternative 6: Stormwater Storage/Management by Using the Natural Ravine on the South Side of MacDonald Avenue, East of Alworth Place which Drains South to Ontario Avenue.

Concept:

This alternative involves redirecting some of the flow in the MacDonald Avenue storm sewer system to drain easterly and then into the natural ravine on the south side of MacDonald Avenue. A control structure would allow excess water to be stored temporarily, which would then drain out slowly, down to the Ontario Avenue/Pine Street storm sewer system as the storm event passes. In keeping with the City's preference for attenuating stormwater flows, a dry pond (i.e. a detention rather than a retention pond) would be utilized for storm water management. The property involved is owned by the City of Sault Ste Marie, including the ravine south of MacDonald Avenue, sloped lands on both sides, and all property along the north side of Ontario Avenue over to Pine Street.

Expected Results:

Surface flooding would be reduced to the recommended frequency by the City's standards if enough of the drainage area can be redirected and the storage volume provided is adequate. Basement flooding risk would also be reduced. If storage is adequate, downstream flow rates to the Ontario Avenue/Pine Street storm sewer system should not increase. As an added benefit, it may be possible to provide storage volumes large enough to permit the retention of larger storm water events (1 in 100 year), thus reducing peak flows in the Pine Street storm sewer system, a system with known capacity issues. Water quality improvements would occur with the proposed storm water management facility.

Challenges:

The ravine is a natural ravine, with steep side slopes and covered in mature vegetation and trees. Incorporating occasional water storage by building a control structure at the south end presents some challenges to the natural environment. Erosion of the stream bed is also a concern. Access to the facility for maintenance will need to be provided from Ontario Avenue.

Alternative 7: Use of Peak Flow/Runoff Reduction Techniques While Accepting Above Normal Frequency of Street Flooding, Emphasizing the Need for All Homes to be Flood Proofed and all Gravity Connections to the Storm Sewer Removed.

Concept:

This alternative involves the use of more passive methods to reduce the amount of flow in the sewer system by infiltrating it into the ground as much as possible or reducing the peak flow in the sewer by spreading out the runoff over a longer period of time. Methods include: disconnecting roof leaders from

the sewer system; disconnection of weeping tile and using sump pumps with splash pads rather than direct storm sewer connections; inlet controls on catchbasins; encouraging the use of rain barrels, perforated pipes etc.

Emphasis would continue to be put on ensuring basements are flood-proofed and any direct gravity connections are removed.

Expected Results:

There would be some improvement to the current street flooding risks and frequency of occurrences. Basement flooding risk would be reduced.

Challenges:

Obtaining satisfactory results and acceptance of above normal periodic street flooding would be a challenge. When saturated or frozen ground conditions exist, excess water doesn't infiltrate into the ground, becoming overland flow. Surface flooding at road sag points would be increased by the use of inlet controls on catchbasins. It is expected peak flows in the sewer would not be reduced substantially nor would instituting these methods on private property be easy. Because of the cost associated with retro- fitting existing development, it is difficult to obtain substantial flow reduction by voluntary means.

Alternative 8: Do Nothing

Concept:

No measures are proposed to mitigate the existing surface and building flooding problems.

Expected Results:

No change to current flooding risks and frequency of occurrences. This alternative represents baseline conditions and its evaluation is required by the Municipal Class EA process. It is not preferred since the identified problems are not addressed.

6 Consultation – Public Open House #1

A Public Open House was conducted to consult with the public and interested parties on January 15, 2014. Notice was published in the Sault Star January 4 & 11, 2014 and placed on the City website. The notice was also mailed to all residents and other interested parties on the contact list including Garden River First Nation, Batchewana First Nation, Métis Nation of Ontario, Sault Ste Marie Regional Conservation Authority, EA Coordinator Ministry of the Environment, and Ward 2 City Councillors.

A summary of the open house and copies of all written comments received can be found in Appendix 3.

6.1 Preferred Solution

Following input from the open house and based on the evaluation results, it was concluded that the preferred solution was the temporary ravine storage of excess flows by creating a storm water management pond in the ravine south of MacDonald Avenue, just east of Alworth Place. This is described above in Alternative 6.

6.2 Revised EA Schedule

In Section 2.1.4 the initial assessment placed the project into a Schedule B. Given that the construction of a dam or weir across a water course in considered a Schedule C activity under the Municipal Class EA documents, the project was considered under Schedule C and thus was moved into Phase 3.

6.3 Expanded Study Area

As noted previously, consideration of the ravine for storage expanded the initial study area, since the initial area did not include the ravine south of MacDonald Avenue. The revised study area limits are shown in Figure 1. The owners of properties in the expanded area were added to the contact list.

PHASE 3: ALTERNATIVE DESIGN CONCEPTS FOR THE PREFERRED SOLUTION

7 Design Alternatives

7.1 Identification of Alternative Design Concepts for the Preferred Solution

There are several design concepts for Alternative 6 that address the problem statement i.e. to reduce the frequency of flooding in the MacDonald Avenue area. Detailed design will need to be completed once the preferred solution is confirmed, prior to construction. Alternative designs focused on:

1) Diverting storm water flows from the MacDonald Avenue catchment area to the ravine by means of a new easterly draining storm sewer. The location and length of this storm sewer needs to be investigated, to provide relief from flooding in the Brien Avenue area.
2) Converting the natural ravine south of MacDonald Avenue to a storm water management facility, where excess storm water can be stored and outflow regulated by means of a control structure just north of Ontario Avenue.

The alternative conveyance improvement designs therefore include:

Alternative Conveyance Design #1

This alternative involves the construction of a relief sewer of suitable diameter in the existing road or boulevard, intercepting the existing storm sewer at the Campbell Avenue intersection. The lower Campbell Avenue and Weldon Avenue drainage areas would therefore be diverted. The proposed new east flowing storm sewer would be connected to the existing west flowing sewer at a common maintenance hole, thereby also allowing surcharge relief for the existing system.

Alternative Conveyance Design #2

This alternative involves the construction of a relief sewer of suitable diameter in the existing road or boulevard, intercepting the existing storm sewer further west at the Brien Avenue intersection. Thus, a larger catchment area would be diverted easterly, including lower Brien Avenue, Crawford Avenue, Campbell Avenue and Weldon Avenue. The east flowing and west flowing systems would be connected, providing additional relief once surcharging begins.

The alternative ravine storm water management improvement designs include:

Alternative Storage Design #1

This alternative involves construction of a control structure about 30 m north of Ontario Avenue and 130 m west of Pine Street. The control structure would allow normal storm water volumes to pass and drain to the Pine Street storm sewer but retain above normal flows up to the City's 1 in 10 year design storm frequency. Accumulated water would be released through a small diameter orifice over a period of time, once the storm event/snow melt has subsided. In keeping with the City's storm water management guidelines, a dry pond (retention pond) would be created, and all stored water would drain away over a period of time. Events larger than the 1 in 10 year design frequency would top the control structure and become overland flow on Ontario Avenue. This would be an improvement to the current situation whereby flow frequently becomes overland flow on Ontario Avenue due to the small diameter storm sewer and easily blocked inlet system that exists for the ravine drainage.

Alternative Storage Design #2

This alternative includes building a control structure in the same location that allows normal volumes to pass and drain to the Pine Street storm sewer, but retains above normal flows up to the City's 1 in 100 year design storm frequency in a retention pond, then releasing the stored water over a period of time, once the storm event/snow melt has subsided. In keeping with the City's storm water management guidelines, a dry pond (retention pond) would be created, and all stored water would drain away over a period of time. The added benefit for this storage design is a reduced peak flow in the downstream sewer system on Pine Street during major rainfall events.

7.2 Detailed Inventory of the Natural, Social and Economic Environments

7.2.1 Social and Economic Environments

See Section 3.2.

7.2.2 Natural Environment

A review and inventory of the natural environment was completed by Tulloch Environmental in September 2014. The report: "Natural Environment: Existing Conditions & Impact Assessment; *MacDonald Ave Stormwater Management Ravine Diversion"*, is attached in Appendix 4.

The report concludes:

"*A background records review and site investigation were conducted to obtain information on the existing natural features in and around the study area.*

The SSMCA noted that the area and proposed work would fall under the Development, Interference with Wetlands and Alteration to Shorelines and Watercourse Regulation O. Reg. 176/06. A permit will be required for the installation of the outlet control structure.

No SAR (Species at Risk) or rare wildlife were identified within the study area. It is highly recommended that construction be avoided during the migratory bird breeding period (beginning of April- End of August). A minimal loss of wildlife habitat is expected due to the proposed work.

Some loss of vegetation will occur due to the construction of the outlet control structure and the associated retention of storm water; however all of the identified species were either non-native or common throughout the area.

The MacDonald Avenue storm water management ravine diversion is expected to result in primarily short term impacts to environmental resources. No significant residual effects are expected, provided the mitigation measures in Section 6 are implemented.

The observations and results obtained during these investigations are representative of the conditions encountered during the 2014 site visit. Many species are migratory and may occur within the area during some years and not others. Habitat (vegetation communities) also changes over time and may become more or less suitable for SAR. Tulloch has used its best professional judgment to interpret the site investigation observations along with the background information and provided accurate conclusions."

The mitigation and protection measures outlined in the report are discussed below.

7.2.3 Archaeological Assessment - Cultural Environment

A Stage 1-2 archaeological assessment was conducted by Horizon Archaeological Inc. to document the cultural heritage significance of the proposed retention pond area and surrounding natural ravine. It is attached in Appendix 5. The report was forwarded to the Ministry of Tourism, Culture and Sport for review and entry into the Ontario Public Register of Archaeology Reports.

The Stage 1- 2 archaeological assessment was conducted on September 3, 2014 in accordance with the Ontario Heritage Amendment Act and the Standards and Guidelines for Consultant Archaeologists.

In conclusion, based on the information gathered, Horizon Archaeological Inc. concluded the area requires no further assessment.

7.2.4 Potential Impacts of the Alternative Designs and Ways to Mitigate

Alternative Conveyance Design Concept #1

This alternative involves the construction of a relief sewer of suitable diameter (375 mm up to 450 mm) in the existing road or boulevard, intercepting the existing storm sewer at the Campbell Avenue intersection. The lower Campbell Avenue and Weldon Avenue drainage areas would therefore be diverted. The environmental impact of this design is predictable as it involves installing approximately 130 m of storm sewer on a municipal road. The sewer would outlet into the ravine east of Alworth Place and would connect to the existing storm sewer system at the intersection of MacDonald and Campbell Avenue. The sewer would be 1.5 to 2.0 m deep and would be located approximately 3 m south of the centre line, in line with the existing storm sewer. Standard construction techniques would be used and environmental impacts can be mitigated through best practices.

Alternative Conveyance Design Concept #2

This alternative involves the construction of a relief sewer of suitable diameter (375 mm up to 675 mm) in the existing road intercepting the existing storm sewer further west at the Brien Avenue intersection. Thus, a larger catchment area would be diverted easterly, including lower Brien Avenue, Crawford Avenue, Campbell Avenue and Weldon Avenue. The environmental impact of this design is also predictable and it involves installing approximately 340 m of storm sewer on a municipal road. The sewer would also outlet into the ravine east of Alworth Place and would connect to the existing storm sewer system at the intersection of MacDonald Avenue and Brien Avenue.

Due to the longer distance and existing road profile, the sewer would be quite deep, getting to approximately 4.2 m under the road at the ravine. This depth of excavation would result in a trench of 7-8 m wide at the top. Road restoration would thus be expensive requiring a new asphalt road surface, curb and gutter removal and replacement. There is a major power line just south of the south curb that would need to be temporarily supported. In addition, several existing sanitary lateral house connections

would conflict with the deeper sewer. Approximately 60 m of new sanitary main would need to be constructed in the south boulevard to eliminate this grade conflict.

Standard construction techniques would be used and environmental impacts can be mitigated through best practices.

Alternative Storage Design Concept #1

This alternative involves construction of a control structure about 30 m north of Ontario Avenue and 130 m west of Pine Street. The control structure would restrict peak discharge. Normal storm water volumes would flow through the facility and drain into the Pine Street storm sewer but above normal flows, up to the City's 1 in 10 year design storm frequency, are retained and released over a period of time, once the storm event/snow melt has subsided. In keeping with the City's preference for storm water management facilities, a dry pond (retention pond) would be built.

Preliminary design results indicate "storage volume of approximately 500 m^3 would be required for a 1 in 10 year return period storm event. This would result in a maximum pond depth of 1.2 metres.

Detailed design work will include best practices for dry extended detention ponds to permit proper facility maintenance, the trapping of suspended pollutants, and removal of deposited sediment and debris. The MOE's "Stormwater Management Planning and Design Manual" (2003) will be used for detailed design. The design will include:

- An emergency spillway designed to accommodate overtopping beyond the design storm
- The pond would be designed to empty within 72 hours following the end of the storm event

The impacts of creating a temporary storage pond in this ravine are noted in the Natural Environment Report: Existing Conditions & Impact Assessment in Appendix 4. They include short term impacts associated with construction operations which may be reduced through appropriate use of the mitigation techniques outlined in the report.

There is potential to disturb wildlife species during construction. Mitigation strategies detailed in the report should be followed, including doing any clearing outside of the April 1st to August 31st migratory bird nesting season. If this is not possible, a migratory bird nest check during the year of construction should be conducted, and an appropriate buffer/setback be incorporated if nests are found.

Alternative Storage Design Concept #2

This alternative includes building a control structure in the same location that allows normal volumes to pass and drain to the Pine Street storm sewer, similar to Design #1 but retains above normal flows up to the City's 1 in 100 year design storm frequency in a retention pond, then releasing the stored water over a period of time, once the storm event/snow melt has subsided.

Control Structure

Similar to Alternative Design #1, the detailed design will use the MOE's "Stormwater Management Planning and Design Manual" (2003).

The impacts of this alternative are similar to Design #1, since the only difference in the size of the footprint of the pond under peak flow conditions. The water level in the storage pond, during a hundred year event, would be 0.5 m higher and have a somewhat larger footprint in the ravine. The impacts of this alternative are similar to the first alternative and can be mitigated in a similar manner. As noted, results need to be confirmed with survey work in the ravine once a construction timeline is developed and detailed design is undertaken.

The benefits to design #2 include an increase in protection from downstream flooding of Ontario Avenue, Pine Street and the adjacent properties.

7.2.5 Evaluation of Conveyance and Storage Designs

The evaluation of conveyance and storage designs involves balancing several factors:

- technical feasibility and effectiveness
- impacts on the natural environment
- impacts on the cultural, social and economic environments
- effects on private and public property
- financial costs

7.2.6 Selection of Preferred Conveyance Design Concept

Of the two alternative conveyance design concepts, constructing a new storm sewer to drain westerly from Campbell Avenue is the preferred solution. The solution is technically feasible, will provide relief from street flooding for the City standard 1 in 10 year rainfall event, and is the least difficult and expensive. As noted, best practices for construction activities can mitigate environmental impacts.

7.2.6.1 Selection of Preferred Storage Design Concept

The preferred storage design concept is alternative #2 which involves building a control structure about 30 m north of Ontario Avenue and 130 m west of Pine Street that can retain flows up to the City's 1 in 100 year design storm frequency. The differences in water elevations, construction costs and environmental impacts are relatively minor when compared to the downstream benefits of retaining runoff from future storm events with an expected frequency of between 10 and 100 years. The added benefit includes water quality improvements that can be obtained with temporary dry pond storage. Currently there is no quality control taking place for this drainage system.

A plan view of the preferred solutions can be found in Figure 5.

8 CONSULTATION – PUBLIC OPEN HOUSE #2

A Public Open House was conducted to present the preferred alternatives and to consult with the public and interested parties on November 12, 2015. Notice was published in the Sault Star on October 31 & November 7, 2015 and placed on the City website. The notice was also mailed to all residents and other interested parties on the contact list including Garden River First Nation, Batchewana First Nation, Métis Nation of Ontario, Sault Ste Marie Regional Conservation Authority, EA Coordinator Ministry of the Environment, and Ward 2 City Councillors.

A summary of the open house, the public notice, information bulletin and copies of all written comments received can be found in Appendix 6. Previous comments from the MNR and SSM Region Conservation Authority have also been brought forward (see Tulloch Report: "Natural Environment: Existing Conditions & Impact Assessment" in Appendix 4).

9 MONITORING

Monitoring will be required, both during the construction phase and while the facility and sewer systems are in operation.

Construction Activity

The Existing Conditions & Impact Assessment Report (Appendix 4) outlines mitigating measures to protect terrestrial and wildlife concerns during construction. Best practices should also be incorporated to address erosion and sedimentation potential and negative impacts on water quality during construction. Typical mitigation measures should address refueling and maintenance, traffic control, disposal of excavated material, sensitive areas, silt and dust control, site clearing and noise. Tree cutting should be minimized, and all temporary erosion and sediment controls should be inspected on a regular basis throughout the project.

Operation and Maintenance

Maintenance is an important part of an urban stormwater management system. Means to protect the environment should be incorporated into the designs to facilitate future maintenance activities. The following is an outline of the principal operation and maintenance activities that should be undertaken on an ongoing, scheduled basis:

- Inspection and cleaning of catch basin and manhole sumps in the sewer system, as per the municipal storm sewer maintenance policy.

- Inspection of inlets and outlets for the stormwater management facility and debris removal as required.
- Inspection of stream bed for erosion along the open water course.
- Maintenance of vegetation around the facility.
- Review accumulated sediment and periodic removal of sediments with appropriate Public Works staff and equipment.

10 APPROVALS

Implementation of the preferred alternatives will be subject to the receipt of all necessary approvals. Following City Council approval of the project and budget approval, two other formal approvals will be required:

Conservation Authorities Act

Implementation of stormwater management in the natural ravine south of MacDonald Avenue will require Sault Ste Marie Region Conservation Authority approval under Ontario Regulation 176-06. An application will need to be submitted. The application will define measures to protect sensitive lands during construction in order to minimize the negative impacts of the project on the natural features of the area. Site restoration and any post construction enhancements to disturbed areas will also be presented.

Ontario Water Resources Act

Construction of storm sewers and stormwater management facilities are subject to the Ontario Water Resources Act. Consequently, the project will require an Environmental Compliance Approval from the MOECC.

11 PRELIMINARY COST ESTIMATES FOR PREFERRED DESIGNS

The preferred designs have a preliminary cost estimate of $1,088,300, including contingencies, an allowance for utility relocations, and engineering costs. The detailed cost estimate is found in Appendix 7.

12 CONCLUSION

The preferred solution to address the flooding issues outlined in this study consists of two activities:

- The construction of a new storm sewer on MacDonald Avenue from Campbell Avenue easterly, to outlet into the ravine, to City design standards.
- The construction of a storm water management facility in the natural ravine between MacDonald Avenue and Ontario Avenue to retain up to a 1 in 100 year rainfall event.

In addition to the construction of these storm water conveyance and storage facilities, it is recommended that private property owners continue to flood proof buildings in the study area through the various techniques described.

PHASE 4: ENVIRONMENTAL STUDY REPORT

13 NOTICE OF STUDY COMPLETION AND PROVISION OF ENVIRONMENTAL STUDY REPORT FOR PUBLIC REVIEW

The completion of this Environmental Study Report (ESR) and filing of the Notice of Study Completion concludes the Class EA process for this project. The ESR is made available to the public for review upon request for thirty (30) calendar days. If concerns regarding the project cannot be resolved in discussion with the City of Sault Ste Marie, a person or party may request that the Minister of the Environment and Climate Change make an order for the project to comply with Part II of the *Environmental Assessment Act* (referred to as a Part II Order), which requires an Individual Environmental Assessment. Requests must be received by the Minister within the 30-day review period. If no new or outstanding concerns are brought forward during the review period, the City may complete detailed design and construction of the project.

14 REFERENCES

City of Sault Ste Marie 2015 Stormwater Master Plan and Policy

City of Sault Ste Marie Official Plan 1996, Amended 2003, City website November 2012

City of Sault Ste Marie Sewer Use Bylaw 4440/Bylaw 2009-50

Geotechnical Study, City of Sault Ste Marie; The Trow Group, January 1977

Ministry of Transportation Drainage Management Manual, Drainage and Hydrology Section, Transportation Engineering Branch, MTO 1995-1997.

Municipal Engineers Association, Municipal Class Environmental Assessment, October 2000, as amended in 2007 and 2011.

Ontario Building Code Act 1992 as amended, www. Ontario.ca

Ontario Ministry of the Environment, 2003 Stormwater Management Planning and Design Manual

Proctor and Redfern, City of Sault Ste Marie Drainage Report, December 1965

Storm Sewer Capacity Analysis and Condition Assessment, MacDonald Avenue Storm Sewer, January 2013, Tulloch Engineering

Visual OTTHYMO V 3.0

HY-8 Culvert Analysis V 7.30

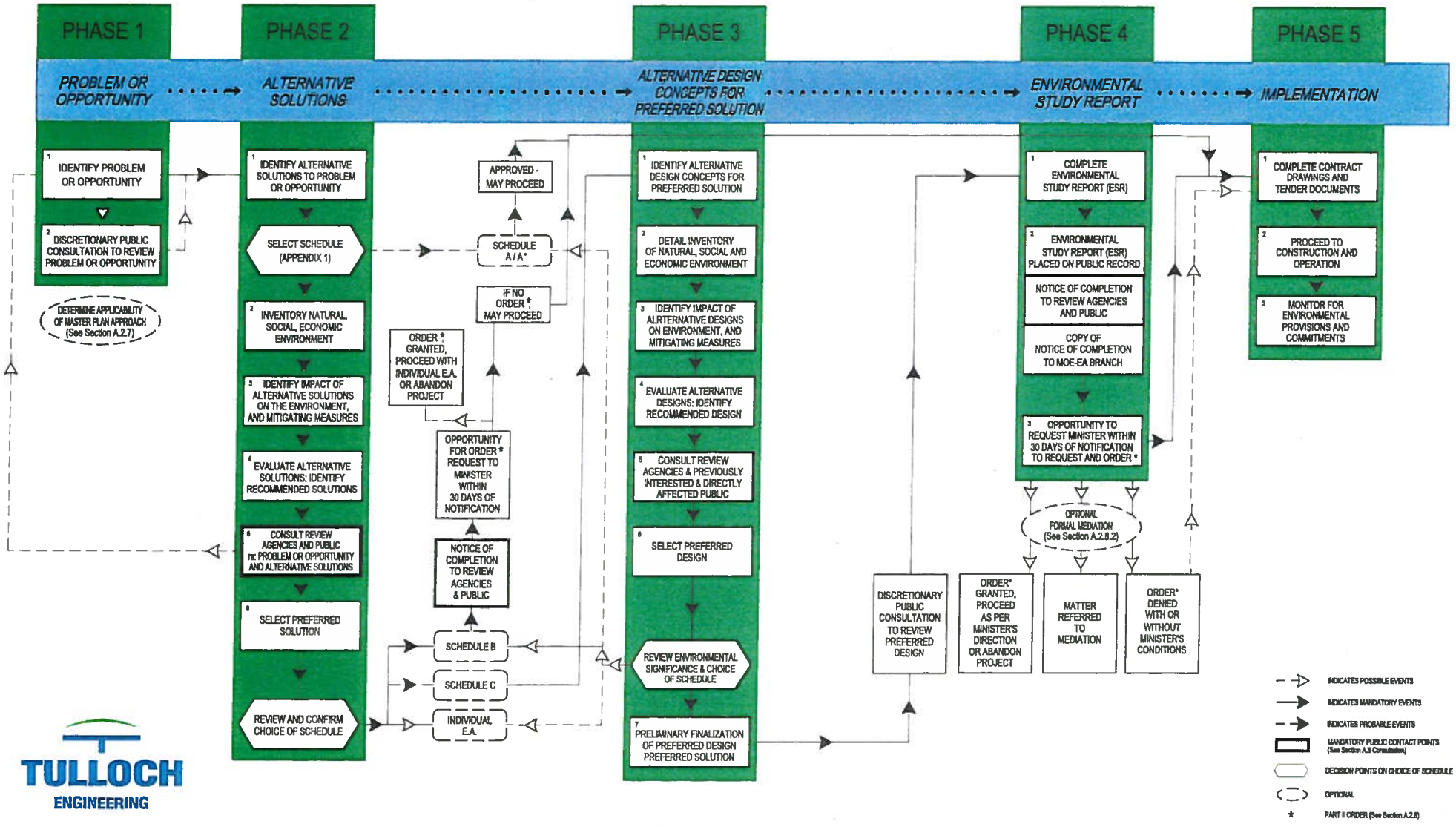
APPENDIX 1

Municipal Class EA Planning Process Flow Chart

EXHIBIT A.2

MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA



TULLOCH ENGINEERING

APPENDIX 2

Published/Mailed Notice of Commencement

Notice of Study Commencement

Flooding in the McNabb Street and MacDonald Avenue Areas

McNabb Street Area Storm Drainage Review
Class Environmental Assessment Study #1

The City of Sault Ste Marie has initiated a Class Environmental Assessment (EA) to review the storm water drainage system in the vicinity of McNabb Street, Pim Street and Willow Avenue. The intent of the study is to determine the preferred method of reducing the frequency of local flooding in the lower Willow Avenue, McNabb Street and upper Pim Street areas.

MacDonald Avenue Area Storm Drainage Review
Class Environmental Assessment Study #2

The City has also initiated a Class Environmental Assessment (EA) to review the storm water drainage system in the MacDonald Avenue area, east of Pim Street. The intent of this study is to determine the preferred method of reducing the frequency of local flooding on MacDonald Avenue between Poplar Avenue and Alworth Place.

The Process
These studies are being carried out in accordance with the planning and design process as outlined in the Municipal Engineers Association *Municipal Class Environmental Assessment* (2000, as amended in 2007) document. They will define the problems in both areas, identify and evaluate alternative solutions and determine a preferred solution in consultation with the public, the City and regulatory agencies.

A key component of the study will be consultation with interested stakeholders (public and review agencies). Public Information Centres (PICs) will be held as the studies proceed, at a location and date to be announced, to gather public input, and then to present the information gathered, an evaluation of alternative solutions, an assessment of impacts of proposed undertakings and identification of reasonable measures to mitigate any adverse impact. Upon completion of the studies, two individual Project Files with recommendations will be prepared for public review and comment.

How to Get Involved

Public consultation is invited. The City wants to ensure that anyone interested in either of these studies has the opportunity to get involved and provide input before any decisions are made on future corrective action. To get involved in the study you can contact us at any time to express your interest and/or be added to the study contact list, or interested persons can attend the Public Information Centres once scheduled. All property owners in the immediate study areas have been placed on the contact list already. ***Further details regarding the PICs including the times and locations will be advertised and mailed to those on the contact list in a subsequent notice, in the coming months.***

For more information, please contact:

Pat McAuley P. Eng.
Tulloch Engineering
71 Black Rd Unit 8
Sault Ste Marie ON.
P6B 0A3
Phone (705) 949 1457
pat.mcauley@tulloch.ca

Don Elliott, P. Eng.
City of Sault Ste. Marie
99 Foster Drive
Sault Ste. Marie, ON
P6A 5X6
Phone (705) 759-5329
d.elliott@cityssm.on.ca

Information will be collected in accordance with the *Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

APPENDIX 3

Public Open House #1 Information

Notice of Public Information Centre

Flooding in the McNabb Street and MacDonald Avenue Areas

McNabb Street Area Storm Drainage Review
Class Environmental Assessment Study #1

The City of Sault Ste Marie has initiated a Class Environmental Assessment (EA) to review the storm water drainage system in the vicinity of McNabb Street, Pim Street and Willow Avenue. The intent of the study is to determine the preferred method of reducing the frequency of local flooding in the lower Willow Avenue, McNabb Street and upper Pim Street areas.

MacDonald Avenue Area Storm Drainage Review
Class Environmental Assessment Study #2

The City has also initiated a Class Environmental Assessment (EA) to review the storm water drainage system in the MacDonald Avenue area, east of Pim Street. The intent of this study is to determine the preferred method of reducing the frequency of local flooding on MacDonald Avenue between Poplar Avenue and Alworth Place.

The Process
These studies are being carried out in accordance with the planning and design process as outlined in the Municipal Engineers Association *Municipal Class Environmental Assessment* (2000, as amended in 2007) document. They will define the problems in both areas, identify and evaluate alternative solutions and determine a preferred solution in consultation with the public, the City and regulatory agencies.

A key component of the study will be consultation with interested stakeholders (public and review agencies). A Public Information Centre (PIC) will be held:

Wednesday January 15, 2014

in the Thompson Room - Civic Centre

from 3:00 p.m. to 7:00 p.m.

Consultants and municipal staff will be available to discuss the drainage issues in the two study areas, and get input from interested parties on possible solutions.

The public is invited on a come and go basis between 3 p.m. and 7 p.m. to visit and provide input or have questions answered.

A second PIC will be scheduled to present findings once all potential solutions have been evaluated in both study areas and preferred solutions are determined.

Upon completion of the studies a Project File will be prepared for each project for public review and comment.

For more information, please contact:

Pat McAuley P. Eng.
Tulloch Engineering
71 Black Rd Unit 8
Sault Ste Marie ON.
P6B 0A3
Phone (705) 949 1457
pat.mcauley@tulloch.ca

Don Elliott, P. Eng.
City of Sault Ste. Marie
99 Foster Drive
Sault Ste. Marie, ON
P6A 5X6
Phone (705) 759-5329
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Information will be collected in accordance with the *Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

TULLOCH ENGINEERING

Structural Civil & Municipal Contract Administration Environmental Geotechnical Mechanical & Electrical Inspection & Testing

Public Information Centre McNabb St and MacDonald Ave Environmental Assessments

January 15, 2014, 3:00 p.m. to 7:00 p.m.

Thompson Room - Civic Centre

Representatives in attendance:

City of Sault Ste Marie representatives: Don Elliott, 3:00 p.m. to 7:00 p.m.

Carl Rumiel, 3:00 p.m. to 6:30 p.m.

Tulloch Engineering representatives: Pat McAuley, 3:00 p.m. to 7:00 p.m.

John McDonald, 3:00 p.m. to 7:00 p.m.

Public participation:

Public attendance: 18 people signed in on sign in sheet (attached)

2-3 people declined to sign in, but reviewed info/took handouts

Information material on walls and tables:

Drainage areas outlined on air photos for both study areas

Photos of November 17th flooding in both areas

1958 compiled drawing of topographic information, showing ravine system before filling

Drainage Area maps showing all property lines

Plan and profile drawings from 2012 study, showing hydraulic grade line from 2 year event

Municipal Class E.A document

Copies of "Storm Sewer Capacity Analysis and Condition Assessment" reports for both study areas, completed in 2012

List of Alternatives with concepts/expected results as handouts and in an 11x17 format

Sign in sheets, comment sheets

71 Black Road, Unit 3
Sault Ste. Marie, ON
P6B 0A3
www.tulloch.ca

Phone: (705) 949.1457
Fax: (705) 945.5092
saultstemarie@tulloch.ca

Summary:

Discussion took place with most visitors concerning the extent of the drainage problems, and their perspectives with regard impact on their homes or businesses. The wall mounted photos of the November 14, 2013 flooding were of great interest and started discussion. The general intent of the open house was to obtain information from property owners as to their perspective on the drainage issues, and explain the various alternatives that will be explored in the EA process. Everyone was asked to take a comment/question sheet and either fill it out that night, or to take it with them and return it (mail or emailed comments) to either Don Elliott or Pat McAuley.

Questions and area of interests were split between the two study areas. Two elected councillors from the City attended.

Various comments/ issues that were raised:

- Group Health Centre has done considerable work flood proofing their building after several major basement flooding events. MET Engineering (Tim Janzen) provided them the expertise on protecting the basement from both sanitary and storm water entry into the basement.
- the Sept 10 rainfall event caused some minor flooding possibly due to a failed check valve
- A lateral drain from the building has been installed and drains westerly to the 1050 storm sewer on an easement along the west side of the GHC property
- GHC would consider allowing underground storage on their property, in the vicinity of the depression to the north west

- A number of residents (on MacDonald Ave, Brien Ave, and Weldon Ave) experienced basement flooding in 2013 from sanitary sewer backups. The purpose of these EAs was explained to them (addressing storm sewer issues). Discussions then took place on ways to flood proof their homes from sanitary sewer backups, by following the schedules in the Sewer Use Bylaw. The installation of sump pumps for weeping tile water, and the use of check valves was explained a number of times to residents with recommendations to talk with a plumber.

- Concerns were raised with the use of the ravines in Penhorwood Park for temporary storage. Standing water in a park, and concerns with children's safety was raised as well as the use of the ravines for winter sledding. It was suggested that storage would be better if the ravine on the south side of MacDonald was used instead, south towards Ontario Avenue. This will be added to the options to be explored for the MacDonald Ave E.A. to see if it is feasible.

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Fax: (705) 945.5092
saultstemarie@tulloch.ca

- It was also suggested that if storm sewers are replaced on MacDonald Ave that they be upsized, to ensure they do not continue to surcharge – that the cost of oversize piping would be minimal

- The centreline crown elevation on MacDonald Ave should be checked. Would it be possible to allow for better overland flow down the street if the crown was lowered?

- It was noted that the intersection of Montgomery Avenue and Brien Ave floods with heavy rainfall. The basins don't seem to be able to take the flow

- It was pointed out the backyards of the neighbourhoods north of MacDonald Ave all have rear yard drainage along the common property lines, draining south to inlet basins near the MacDonald Ave sidewalk. This swale and the basins need to be kept clear of leaves and debris.

- The catchbasins on MacDonald Ave were affected by leaf accumulation during the recent flooding, and changing the basins to side inlets would be beneficial

PMc

16/01/2014

71 Black Road, Unit 3
Sault Ste. Marie, ON
P6B 0A3
www.tulloch.ca

Phone: (705) 949.1457
Fax: (705) 945.5092
saultstemarie@tulloch.ca

McNabb St and MacDonald Ave Environmental Assessment Studies

Public Information Centre

Wednesday January 15, 2014

Thompson Room Civic Centre 3:00 p.m. to 7:00 p.m.

Please Sign In:

NAME	ADDRESS	PHONE	EMAIL ADDRESS
DAVE MURPHY	9 ALWORTH PLACE		
Lorraine M. Bacon	250 McNabb		
J Armstrong	10 MacDonald		
Kim Caruso	235 McNabb		
FRANK KIZZO	240 McNABB		
TIM GOUNY	191 POPLAR AVE		
SEV + TIM LANTHIER	208 MACDONALD AVE		
Jason Bertrim	642 Great Northern Road		
M McQuaid	35 FOREST AVE		
Pat Mick	50 Grey Ave		
BRIAN WATKINS	54 CHURCHILL		
ROBERT RATTLE			
[illegible]	225 MACDONALD AV		

Please Sign In:

NAME	ADDRESS	PHONE	EMAIL ADDRESS
DAVID SPINA	213 MACDONALD AVE		
GORD DION	3 WELDON AVE		
Paul & Heather McDonald.	166 Brian Ave.		

Pat McAuley

From: Tim Gowan
Sent: Tuesday, December 10, 2013 5:34 PM
To: pat.mcauley@tulloch.ca
Cc: d.elliott@cityssm.on.ca; c.rumiel@cityssm.on.ca; [illegible] na
Subject: Environmental Assessment Study 1 - 191 Poplar Avenue

Hi Pat

Hopefully retirement is going well - looks like you are still working. Thought you told me that were going to give that up last time I was talking to you.

Anyway, my wife & I live at 191 Poplar Avenue (backing on Poplar Park) and we are in Study Area 1. We have always had some trouble with water pooling in our back yard after a heavy rain but this past year has been the worst. It never dried up. We had trouble cutting the grass and raking leaves, and right now we have a bit of a skating rink out there. It was so bad in the fall that the soil (mostly clay) was boiling up through the grass when we walked on it.

I have also discussed this today with Carl Rumiel of the City's Engineering Department and Carl said that he would send someone out to look at the issue as well. Hopefully, we can find a solution and this may be good timing as we understand that some sort of water collection system is planned for Poplar Park. Our backyard is significantly lower than our front yard and drainage such as it is goes toward the park.

Donna and I plan to attend the Information Sessions when they are scheduled. Hopefully our issues can be addressed at the same time as the bigger problem is solved. Please call or email me if I can provide further info. Otherwise, we will talk then. Have a great day!

Thanks

Tim & Donna Gowans

Pat McAuley

From: Dave Murphy [redacted] m]
Sent: Wednesday, [redacted] 7:09 PM
To: d.elliot@cityssm.on.ca; pat.mcauley@tulloch.ca
Subject: Please Advise

Don and Pat:

Thank you for providing a "Notice of Study Commencement" regarding flooding in the McNabb Street and MacDonald Avenue areas. The Notice states that "To get involved in the study you can contact us at any time to express your interest and/or be added to the study contact list". Thru this e-mail, I would like to both express my interest and be added to the study contact list.

The Notice further states that "The City has also initiated a Class Environmental Assessment (EA) to review the storm water drainage system in the MacDonald Avenue area, east of Pim Street. The intent of this study is to determine the preferred method of reducing the frequency of local flooding on MacDonald Avenue between Poplar Avenue and Alworth Place".

Given the intent of this study, please advise if this study will also take into consideration the following factors:

. Properties immediately adjacent to the area between MacDonald Avenue between Poplar Avenue and Alworth Place currently are also subjected to a significant amount of water drainage. For example, my home at 9 Alworth Place is immediately adjacent to this area and my property backs onto MacDonald Avenue. My property is significantly lower than MacDonald Avenue resulting in a great deal of water drainage to the back portion of my property during both Spring snow melt and large rainfalls like we have experienced in the past few months. Hopefully, this study will take into consideration immediate adjacent areas as well.

. Also, it will be important that "the preferred method of reducing the frequency of local flooding on MacDonald Avenue between Poplar Avenue and Alworth a Place" will not result in more water being redirected to areas immediately adjacent to this area.

Please advise regarding these matters.

Sincerely,

Dave Murphy
9 Alworth Place

Sent from my iPad=

Pat McAuley

From: Dave Murphy]
Sent: Saturday, January 18, 2014 12:22 AM
To: pat.mcauley@tulloch.ca
Cc: d.elliott@cityssm.on.ca
Subject: Comments - Public Open House #1 (MacDonald Avenue Study Area)

Pat:

Enjoyed our discussion on Wednesday, January 15, 2014 at the Public Open House regarding flooding in the MacDonald Avenue area. The following are some thoughts on the 7 alternatives proposed in Tulloch Engineering's Alternative Solutions document:

. Extreme Weather Events - Some of these alternatives being proposed are expensive. Whether it is flooding in Alberta, a flood & an ice storm in Toronto, flooding events in the Sault, numerous other extreme weather events across Canada and the U.S., it is clear that extreme weather events are happening more frequently. Is Tulloch Engineering confident that the "10 year design" noted in the Alternative Solutions document will be adequate? Understandably, it would be unfortunate to spend significant dollars and not solve the problem.

. Major Issues Using Penhorwood Park For Storm Water Storage - As you know, this is Alternative 3 in Tulloch Engineering's Alternative Solutions document. What are the planning issues related to using Penhorwood Park for storm water storage? Also, Penhorwood Park is located immediately adjacent to a brand new multi-million dollar elementary school. Why would one want to take this beautiful piece of property where there has just been a multi-million dollar investment immediately adjacent and decide to designate this property for storm water storage?As the Alternatives Solutions document notes to "a degree" the two natural ravines in Penhorwood Park are already taking some of the excess flows. Penhorwood Park should not be required to take all the excess flows. This has the potential to impact the Park itself. Please see my e-mail below dated December 12, 2013 that raises additional concerns and impacts on the Park resulting from this alternative.

. Another Alternative - In addition to the 7 alternatives outlined by Tulloch Engineering in the Alternatives Solutions document there would appear to be another alternative worth consideration. Immediately across from Penhorwood Park between the Alworth Place subdivision and the Parkview/Pinewood buildings there is a much larger ravine than the 2 ravines in Penhorwood Park. The Alternative Solutions document on Page 2 states that "The stored water would drain out slowly, down to the Ontario Avenue / Pim Street storm water system as the storm event passes". This is exactly what would happen if the larger ravine (that based on the maps at the Open House appears to be owned by the City) is utilized and there would be no impact on Penhorwood Park.

Thank you for the opportunity for input.

Dave Murphy
9 Alworth Place

Sent from my iPad

On Dec 12, 2013, at 11:17 AM, "Dave Murphy 'rote:

Pat:

Thank you for your quick response below. In all likelihood, I will not be in a position to attend the public meeting in January. Currently, I am awaiting the birth of my grandchild in Toronto. My wife & myself plan on spending a good deal of January in Toronto helping out.

As a result, further to your e-mail below, I would like to share the following thoughts:

. There are a number of ISSUES that will need to be addressed if one of the options "could be to store water temporarily in the two depressions in Penhorwood Park, letting it drain out slowly down to the storm sewer system on Ontario Avenue, as the rainfall event passes".

. From a planning perspective, is it appropriate to use a long time City Park (such as Penhorwood Park) for flood control?

. Penhorwood Park is located immediately adjacent to a brand new multi-million dollar elementary school. How deep will the water get in the two depressions in Penhorwood Park? Will there be any safety concerns with an elementary school located in close proximity?

. Will the area with the water in the two depressions in Penhorwood Park have to be fenced? Will this area be fenced year around? It is important to understand that for at least the past 25 years these depressions have been used by small youngsters in the neighbourhood for winter recreational use.

. How long will the water stay in the two depressions in Penhorwood Park? Will this result in an area for mosquito infestation?

. Etc.

Thanks for the opportunity for input.

Dave Murphy
9 Alworth Place

Sent from my iPad

From: "Pat McAuley" <pat.mcauley@tulloch.ca>
Date: December 12, 2013 at 9:11:12 AM EST
To: "'Dave Murphy'" [redacted]
Cc: <d.elliot@cityssm.on.ca>
Subject: RE: Please Advise

Hello Dave:

As a property owner abutting the study area, you are already included on the contact list, so we will ensure you get all mailings involved throughout the study. We plan on having 2 public information sessions, the first (to be scheduled in January) to get input, and the second to show possible solutions (after we do some hydraulic modeling, assessing impact and cost estimating etc.)

The purpose of the study is to take into consideration issues exactly like you have noted: the effects of street flooding on private property.

I am not sure what you mean by: "will not result in more water being redirected to areas immediately adjacent to this area". We would not recommend directing water to private property, but one of the options could be to store water temporarily in the two depressions in Penhorwood Park, letting it drain out slowly down to the storm sewer system on Ontario Avenue, as the rainfall event passes.

I suggest we have a good discussion at the first PIC.

Pat

Pat McAuley P.Eng. MBA
Senior Director

Tel: 705 949 1457
Fax: 705 949 9606

Tulloch Engineering Inc.
71 Black Rd Unit 8, Sault Ste. Marie, ON P6B 0A3
pat.mcauley@tulloch.ca | tulloch.ca | legal disclaimer

-----Original Message-----
From: Dave Murphy [redacted]
Sent: Wednesday, December 11, 2013 7:09 PM
To: d.elliott@cityssm.on.ca; pat.mcauley@tulloch.ca
Subject: Please Advise

Don and Pat:

Thank you for providing a "Notice of Study Commencement" regarding flooding in the McNabb Street and MacDonald Avenue areas. The Notice states that "To get involved in the study you can contact us at any time to express your interest and/or be added to the study contact list". Thru this e-mail, I would like to both express my interest and be added to the study contact list.

The Notice further states that "The City has also initiated a Class Environmental Assessment (EA) to review the storm water drainage system in the MacDonald Avenue area, east of Pim Street. The intent of this study is to determine the preferred method of reducing the frequency of local flooding on MacDonald Avenue between Poplar Avenue and Alworth Place".

Given the intent of this study, please advise if this study will also take into consideration the following factors:

. Properties immediately adjacent to the area on MacDonald Avenue between Poplar Avenue and Alworth Place currently are also subjected to a significant amount of water drainage. For example, my home at 9 Alworth Place is immediately adjacent to this area and my property backs onto MacDonald Avenue. My property is significantly lower than MacDonald Avenue resulting in a great deal of water drainage to the back portion of my property during both Spring snow melt and large rainfalls like we have experienced in the past few months. Hopefully, this study will take into consideration immediate adjacent areas as well.

. Also, it will be important that "the preferred method of reducing the frequency of local flooding on MacDonald Avenue between Poplar Avenue and Alworth a Place" will not result in more water being redirected to areas immediately adjacent to this area.

Please advise regarding these matters.

Sincerely,

Dave Murphy
9 Alworth Place

Sent from my iPad=

Pat McAuley

From: Dave Murphy
Sent: Thursday, May 01, 2014 8:02 PM
To: d.elliott@cityssm.on.ca; pat.mcauley@tulloch.ca
Subject: MacDonald Avenue Study Area
Attachments: photo 1.JPG; ATT00025.txt; photo 2.JPG; ATT00028.txt; photo 3.JPG; ATT00031.txt; photo 4.JPG; ATT00034.txt

Don and Pat:

Following-up on my earlier e-mails of December 11, 2013, December 12, 2013 and January 18, 2014 regarding the MacDonald Avenue Study Area. You may recall that my e-mail of December 11, 2013 states that "My property (9 Alworth Place) is significantly lower than MacDonald Avenue resulting in a great deal of water drainage to the back portion of my property during both Spring snow melt and large rainfalls". Attached for your files are 4 photographs taken today (Thursday, May 1, 2014) of the back portion of my property. Thank you for your understanding in this matter.

Sincerely,

Dave Murphy

APPENDIX 4

Natural Environment: Existing Conditions & Impact Assessment

"MacDonald Ave. Stormwater Management Ravine Diversion"

By Tulloch Environmental

TULLOCH

Natural Environment: Existing Conditions & Impact Assessment

MacDonald Ave. Stormwater Management Ravine Diversion

Project #: 13-1123

Prepared for:
The Corporation of the City of Sault Ste. Marie
99 Foster Drive, P.O. Box 580
Sault Ste. Marie, ON P6A 5N1
T: 705.759.2500

Prepared by:
Tulloch Environmental
1942 Regent Street, Unit L
Sudbury, ON P3E 5V5

December 16, 2015

TULLOCH
ENVIRONMENTAL

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Appendices

Figures

1. Introduction

1.1 Project Description

Tulloch Environmental, a Division of Tulloch Engineering (Tulloch) has prepared this report for the Corporation of the City of Sault Ste. Marie in support of a Class Environmental Assessment (EA) associated with proposed stormwater control structures that will be designed to store excess water temporarily within two natural ravines in Sault Ste. Marie, Ontario. This report documents the natural environment existing conditions and impact assessments for one of the MacDonald Ave. Stormwater Management Ravine (MacDonald Ave. Ravine) as part of the proposed project. The EA is being carried out in accordance with the planning and design process as outlined in the *Municipal Engineers Association Municipal Class Environmental Assessments*.

A component of the study involves the assessment of the terrestrial and aquatic environment surrounding the proposed works and an evaluation of potential impacts of the proposed work to the surrounding natural areas.

1.1.1 Project Location

The MacDonald Ave. Ravine is located west of Pine Street and South of MacDonald Avenue, within the City or Sault Ste. Marie. The Ravine is located within Lot 7, Concession 2 in the Township of Tarentorus. General UTM coordinates for the ravine are 706385E and 5154690N (NAD83, Zone 17N).

1.1.2 Proposed Work

An outlet control structure and dam will be installed north of Ontario Avenue within the ravine. The installation of the outlet control structure would result in excess flows being stored during major rainfall events thereby reducing downstream flow and flooding occurrences. In addition to the outlet control structure a new storm sewer inlet will be installed from Macdonald Avenue. A storm sewer outlet and drain to the existing storm sewer will also be constructed from the outlet control structure, south.

2. Background Information

Various regulatory agencies and other resources were contacted to obtain background information on the existing natural features in and surrounding the project area. The area investigated included the proposed work area, inclusive of the ravine, plus a 120 m buffer extending beyond the ravine (hereinafter referred to as the study area).

A copy of all correspondence and information received is provided in Appendix I for reference.

The Ontario Breeding Bird Atlas (OBBA) was reviewed to identify local bird species likely to inhabit the area including any species at risk (SAR). Information obtained from the OBBA identified species that were noted in the area during the second breeding bird atlas (2001-2005). Table 1 outlines the listed species which are considered federal and/or provincial SAR and potentially in the area. Species are federally designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) under

the *Species at Risk Act* (SARA) Schedule 1 list. Species are provincially designated by the Committee on the Status of Species at Risk in Ontario (COSSARO) under the *Endangered Species Act* (ESA).

Table 1- SAR species identified to potentially inhabit the area by the OBBA.

Species (Common Name)	Species (Scientific Name)	S-Rank	Federal Listing	Provincial Listing
Black-crowned Night Heron	*Nycticorax nycticorax*	S3B, S3N	–	–
Bald Eagle	*Haliaeetus leucocephalus*	S2N, S4B	–	Special Concern
Peregrine Falcon	*Falco peregrinus*	S3B	Special Concern	Special Concern
Common Nighthawk	*Chordeiles minor*	S4B	Threatened	Special Concern
Chimney Swift	*Chaeutra pelagica*	S4B	Threatened	Threatened
Eastern Wood Peewee	*Contopus virens*	S4B	–	Special Concern
Bank Swallow	*Riparia riparia*	S4B	–	Threatened
Barn Swallow	*Hirundo rustica*	S4B	–	Threatened
Wood Thrush	*Hylocichla mustelina*	S4B	–	Special Concern
Canada Warbler	*Cardellina canadensis*	S4B	Threatened	Special Concern
Bobolink	*Dolichonyx oryzivorus*	S4B	–	Threatened
Eastern Meadowlark	*Sturnella magna*	S4B	–	Threatened
Rusty Blackbird	*Euphagus carolinus*	S4B	Special concern	–

A review of the Natural Heritage Information Centre (NHIC) database was also conducted to delineate significant natural heritage features (plant communities, wildlife concentration areas, areas of natural and scientific interest (ANSI), as well as any rare or historical species. Two species of conservation concern were identified to occur within the 1km squares that encompass the study area (square 16GS0655, 16GS0654, 16SG0554, and 16GS0555). Milksnake (*Lampropeltis triangulum*) a special concern species provincially and oval-leaved billberry (*Vaccinium ovalifolium*) an S3 ranked species were identified to occur within these 1 km squares.

The Sault Ste. Marie Ministry of Natural Resources and Forestry (MNRF) was contacted to gather environmental values information on the study area including any existing sensitivities and environmental constraints. The MNRF identified a noted occurrence of Greene's Rush (provincially tracked S3 rare species) in the Sault Ste. Marie rail yard. The MNRF also noted that there are no other environmental values within 120 m of the ravine. This ravine is not identified as a permanent stream in the MNRF database and there is no known fishery data or Aquatic Resource Area data available.

A list of terrestrial SAR which may be present in the area was compiled using information obtained from the MNRF, and the SARA and ESA lists. The habitats of these species were then compared to the habitat and natural features observed through aerial imaging and range mapping. Species at Risk with a higher potential of occurrence within the study area based on this review of their ranges and habitat are listed in Table 2.

Table 2. SAR that may potentially be found within the study area.

Species (Common Name)	Species (Scientific Name)	Federal Listing	Provincial Listing
Bald Eagle	*Haliaeetus leucocephalus*	–	Special concern
Bank Swallow	*Riparia riparia*	–	Threatened
Barn Swallow	*Hirundo rustica*	–	Threatened
Canada Warbler	*Cardellina canadensis*	Threatened	Special concern
Chimney Swift	*Chaetura pelagica*	Threatened	Threatened
Common Nighthawk	*Chordelies minor*	Threatened	Special concern
Eastern Small-footed Myotis	*Myotis leibii*	–	Endangered
Eastern Whip-poor-will	*Caprimulgus vociferus*	Threatened	Threatened
Eastern Wood-pewee	*Contopus virens*	–	Special concern
Golden-winged Warbler	*Vermicora chrysoptera*	Threatened	Threatened
Little Brown Myotis	*Myotis lucifugus*	–	Endangered
Milksnake	*Lampropeltis triangulum*	Special concern	Special concern
Monarch butterfly	*Danaus plexippus*	Special concern	Special concern
Northern Myotis	*Myotis septentrionalis*	–	Endangered
Olive-sided flycatcher	*Contopus cooperi*	Threatened	Special concern
Rusty blackbird	*Euphagus carolinus*	Special concern	Not listed
Wood Thrush	*Hylocichla mustelina*	–	Special concern

The study area falls under the jurisdiction of the Sault Ste. Marie Conservation Authority (SSMCA). The SSMCA was contacted to provide Notice of Commencement of Study and to request any available information regarding environmental sensitivities, critical fish or wildlife habitat, SAR or operational constraints. There were no known values or sensitivities identified for the area however the SSMCA noted that the area and proposed work would fall under the *O. Reg 176/06 for Development, Interference with Wetlands and Alterations to Shoreline and Watercourses*. A permit will be required for the proposed work.

3. Methodology

Prior to field investigations, all background information was reviewed. Mapping information and aerial imagery were analyzed to assess the general terrestrial composition and topographical landscape of the study area.

A Tulloch ecologist conducted site investigations on September 9 and 10th, 2014. The field investigations consisted of Ecological Land Classification (ELC) to describe the plant communities and to identify potential SAR habitat and other protected habitats. Any plants or animals observed within the study area were also documented. However, many migratory species (e.g. birds) that may use this habitat would likely not be present due to the time of year. The investigations included the identification and documentation of:

- Vegetation communities including plant inventories;
- Potential SAR habitat, significant wildlife habitat or other habitat features;
- Wildlife (birds, mammals, amphibians, reptiles, insects) and evidence of wildlife (ie: scat, tracks, nests, eggs, fur, browse, feathers etc.) including SAR;
- Fish habitat
- Areas of groundwater upwelling and high water table; and
- Potential impacts of the proposed works on species and habitat.

The vegetation communities within the study area were mapped using the Great Lakes- St Lawrence Ecological Lands Classification Methodology (Banton et el., 2009).

4. Description of Environmental Resources

The ravine was surrounded by residential and institutional properties. The slope into the ravine was steep on the north, east and west side with a gradually levelled out section to the south. The ravine included a vegetation cover of forest, with a small wet pocket and cleared area dominated by grasses. Soils within the area were deep, fine mineral, primarily clay and moist to very moist.

4.1 Vegetation Communities

There were no plant SAR or rare plant species observed during field investigations.

Table 3. Ecological Land Classification ecosites identified to occur within the study area.

Ecosite	Vegetation Species List	
G108Tt: Fresh, Silty to Fine Loamy: Mixedwood	*Trees*	Sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), American beech (*Fagus grandifolia*), white ash (*Fraxinus Americana*), trembling aspen (*Populus tremuloides*), large-tooth aspen (*Populus grandidentata*), balsam fir (*Abies balsamea*), white pine (*Pinus strobus*), white birch (*Betula papyrifera*), white spruce (*Picea glauca*), black spruce (*Picea mariana*), red oak (*Quercus rubra*), black ash (*Fraxinus nigra*), Ironwood (*Ostrya virginiana*), Basswood (*Tilia Americana*)
	Shrubs	Beaked hazel (*Corylus cornuta*), fly honeysuckle (*Lonicera canadensis*), bush honeysuckle (*Diervilla lonicera*), hawthorne (*Crataegus* sp.), red osier dogwood (*Cornus sericea*), choke cherry (*Prunus virginiana*)
	Ground Cover	Common burdock (*Arctium minus*), spreading dogbane (*Apocynum androsaemifolium*), nodding thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), Canada fleabane (*Conyza canadensis*), perennial sow thistle (*Sonchus arvensis*), goat's beard (*Tragopogon dubius*), cleavers (*Galium aparine*), curled dock (*Rumex crispus*), spotted joe pye weed (*Eutrochium maculatum*), tall buttercup (*Ranunculus acris*), black snake root (*Sanicula marilandica*), hooked agrimonia (*Agrimonia gryposepala*), large-leaf aster (*Eurybia macrophylla*), wild sarsaparilla (*Aralia nudicaulis*), golden rod species (*Solidago* spp.), false solomon's seal (*Maianthemum racemosuym*), aster species (*Aster* spp.), rose-twisted stalk (*Streptopus lanceolatus*), spinulose wood fern (*Dryopteris carthusiana*), woodland strawberry (*Fragaria vesca*), queen anne's lace (*Daucus carota*), horsetail (*Equisetum* spp.), kidney-leaved violet (*Viola renifolia*), narrow-leaved plantain (*Buckhorn plantain*), hoary plantain (*Plantago media*), cow parsnip (*Heracleum macimum*), marsh timothy (*Muhlenbergia glomerata*), red clover (*Trifolium pretense*), blue cohosh (*Caulophyllum thalictroides*), Canada bluejoint (*Calamagrostis canadensis*), spotted joe pye weed (*Eutrochium maculatum*), cattail (*Typha* spp.), common milkweed (*Asclepia syriaca*), quack grass (*Elytrigia repens*), Canada bluejoint (*Calamgrostis canadensis*), smooth brome grass (*Bromus inermis*)

Photo 1 Understory showing small stream	
Photo 2 Canopy	

Photo 3 Small wet area	
Photo 4 Small area of grasses	

The remainder of the study area consisted of maintained lawn and residential and institutional properties.

4.2 Wildlife

There were no wildlife SAR or rare wildlife species observed during field investigations.

Wildlife, including bird species, were not observed during site investigations. However, these investigations were conducted outside of a time of year conducive to successful identification of breeding birds and their habitat (ie. Migratory bird windows).

4.3 Fish Habitat

No direct or indirect fish habitat was identified within the study area. There was no evidence of any connection to fish habitat, or consistent flow within the ravine. There was no passage for fish at either end of the ravine.

5. Potential Impacts to Environmental Resources

The following section outlines potential impacts that may result from the proposed work within the study area. Short term impacts are those generally associated with construction operations including clearing and grading of vegetation and soils, operation of heavy equipment, stockpiling of materials etc. While these activities have the potential to negatively impact natural features, the implementation of appropriate mitigation measures can reduce their impact. Short term impacts are generally not permanent in nature. Long term impacts are those expected to result in permanent alteration or removal of natural features or habitat within the existing environment, such as the removal of vegetation.

It is expected that this project will result primarily in short term impacts, most of which may be reduced through the use of appropriate mitigation measures outlined in Section 6.

5.1 Vegetation

There will be a minimal loss of vegetation during the construction of the outlet control structure. As the ravine will be seasonally, and in times of major rainfall events, flooded with water, it is likely that most of the vegetation, aside from water tolerant species, will be destroyed. All of the species identified within the study area are non-native or common throughout the region.

5.2 Wildlife

Birds

As site investigations were conducted outside of the migratory bird breeding period, identification of SAR bird habitat could not be completed. Although, it is possible that habitat for SAR birds may occur within the study area, the study area was not identified to be highly suitable for any endangered or threatened SAR birds. Any clearing of vegetation for the construction of the outlet control structure could results in the loss of potential nesting or roosting sites for migratory birds. Noise during construction may also result in the temporary disturbance of birds surrounding the project site. The release of any harmful substance (such as oil) into or in the vicinity of the adjacent riparian and wetland communities during construction activity could also impact migratory birds. Under the *Migratory Bird Convention Act* (MBCA) the destruction of an active migratory bird nest and the release of deleterious substances into water are prohibited. These impacts have the potential to be long-term, if the appropriate mitigation is not followed. Several SAR bird species have general habitat protection and the destruction of this habitat would be in contravention of the ESA.

Reptiles

Reptiles, birds and other wildlife also have the potential of becoming entangled in the gillnet- like mesh netting associated with some heavy duty silt fencing and other erosion control products, if used at the

site (see MNR notice Appendix I). Erosion control products also have the potential to act as barriers to wildlife and impede their movement.

Most species identified within the study area, are not expected to be impacted long term by the temporary loss of habitat cause by the construction activity, or by the storage of water within the ravine.

6. Mitigation Strategies

All mitigation strategies outlined in the following section should be incorporated into the project during the appropriate outlined stages of construction (pre-, during or post-). A pre-construction meeting should be held with all workers to outline the work plan and all environmental constraints associated with working on site. Briefings should be held for any new workers on site.

6.1 Vegetation

It is expected that construction activity will result in a minimal loss of vegetation; however the storage of excess flow waters within the ravine area will potentially destroy most of the vegetation aside from water tolerant species. Most of the species within the ravine area were deemed non-native or common throughout the area. The following mitigation strategies are recommended to limit impacts to vegetation:

Best Practice

- **Minimize vegetation removal:** Avoid riparian vegetation removals. Use existing trails whenever feasible. If removal is necessary, minimize clearing, protect adjacent vegetation and use proper clearing techniques. Where possible use techniques that allow the root system to stay intact; this helps bind the soil and encourages rapid colonization of low-growing plant species. Avoid all vegetation removals wherever possible;
- **Restore native vegetation:** Restorative plantings and seed mixes of species common to the region should be used for erosion control and rehabilitation of disturbed areas, recommended species include those resistant of seasonal flooding, such as: red osier dogwood (*Cornus sericea*), speckled alder (*Alnus incana*), meadowsweet (*Spirea* spp.), willows (*Salix* spp), Bebb's sedge (*Carex bebbii*), soft rush (*Juncus effuses*), path rush (*Juncus tenuis*), joe pye weed, blue vervain (*Verbena hastate*), and blue flag iris (*Iris versicolor*).

6.2 Wildlife

Impacts mainly involve the temporary disturbance of wildlife species and habitat during construction activities. A minimal loss of wildlife habitat is expected due to clearing of the vegetation.

The mitigation strategies listed below are recommended to limit impacts to wildlife during and after construction:

Mitigation to Prevent Impacts to Migratory Birds and Avoid Contravention of the MBCA and ESA

- **Avoid destruction or disturbance of an active migratory bird nest:**

  - Clearing or construction should occur outside of the migratory bird nesting season (beginning of April to end of August; Canadian Wildlife Service). As site investigations were conducted outside of timing conducive to identifying breeding birds and their nests, including SAR, this mitigation is highly recommended.
- **Avoid the release of substances harmful to migratory birds into waters or adjacent areas:**
  - **Equipment**: Operate, store and maintain (e.g., re-fuel, lubricate) all equipment and associated materials in a manner that prevents the entry of any deleterious substance to the water body. Any part of equipment entering the water body or operating on the bank shall be free of fluid leaks and externally cleaned/ degreased.
  - **Spills:** Ensure a Spills Management Plan (including materials, instructions regarding their use, education of contract personnel, emergency contact numbers) is on site at all times for implementation in event of accidental spill. The Ontario Ministry of the Environment operates the Spills Action Centre 24-hours a day; it can be reached at 1-800-268-6060.
  - **Chemicals:** Use only specified amounts and types of fertilizer in areas draining to water bodies. Avoid use of chemical dust suppressants and pesticides/herbicides in areas near or draining to water bodies.

Best Practice Mitigation:

- **Flag the work area:** Access and activity should be limited to the designated work area to minimize disturbance to adjacent wildlife habitat. This area should be delineated in the field using stakes, tape etc. and removed when work is completed.
- **Check work area each day:** Snakes are attracted to the roadway, embankment, temporary stockpiles and machinery, as these surfaces absorb heat from the sun and are suitable for reptile basking. If possible, work areas should be checked for reptiles prior to work each day. If in immediate danger (collision with traffic/construction equipment) reptiles can be moved to adjacent habitat without harm (to worker or reptile) by using a shovel or stick and bucket.
- **Avoid use of erosion control products with plastic netting:** The ”gillnet-like” mesh associated with erosion control products can pose an entanglement hazard to wildlife such as snakes, turtles, birds and other wildlife (see MNR notice Appendix I). Some manufacturers claim these plastic components break down over time however this can take several months under ideal conditions. If possible, the use of erosion control products containing any type of plastic mesh should be avoided. Rock rip rap, various mulches, and polyethylene sheeting may be effective alternatives. Some rolled erosion control products are available without the plastic mesh.
- **Avoid use of heavy duty silt fencing reinforced with mesh netting:** Heavy duty silt fencing constructed with nylon mesh netting reinforcement can pose an entanglement hazard to snakes and other wildlife (see MNR notice Appendix I). If possible, the use of heavy duty silt fencing constructed with nylon mesh netting reinforcement should be avoided. Silt fencing without the mesh netting may be a suitable alternative.
- **Remove temporary erosion control measures:** When work is completed and areas are stabilized temporary erosion control measures (silt fencing, straw bales etc.) should be removed from the work site. These devices can act as a barrier to wildlife and impede their movement.

7. Assessment of Residual Effects

No significant impacts or residual effects are expected upon completion of the MacDonald Ave. storm water management ravine diversion pending the mitigation measures from Section 6 are implemented. There will be some loss of vegetation in the area of the outlet control structure and throughout the ravine due to increased water storage, however all species identified were either non-native or common throughout the area. The majority of wildlife habitat will remain intact.

8. Conclusion & Summary

A background records review and site investigation were conducted to obtain information on the existing natural features in and around the study area.

The SSMCA noted that the area and proposed work would fall under the *Development, Interference with Wetlands and Alteration to Shorelines and Watercourse Regulation O. Reg. 176/06*. A permit will be required for the installation of the outlet control structure.

No SAR or rare wildlife were identified within the study area. It is highly recommended that construction be avoided during the migratory bird breeding period (beginning of April- End of August). A minimal loss of wildlife habitat is expected due to the proposed work.

Some loss of vegetation will occur due to the construction of the outlet control structure and the associated retention of storm water; however all of the identified species were either non-native or common throughout the area.

The MacDonald Ave. storm water management ravine diversion is expected to result in primarily short term impacts to environmental resources. No significant residual effects are expected, provided the mitigation measures in Section 6 are implemented.

The observations and results obtained during these investigations are representative of the conditions encountered during the 2014 site visit. Many species are migratory and may occur within the area during some years and not others. Habitat (vegetation communities) also changes over time and may become more or less suitable for SAR. Tulloch has used its best professional judgment to interpret the site investigation observations along with the background information and provided accurate conclusions.

Respectfully submitted,

Kristan Washburn, MES
Terrestrial Ecologist

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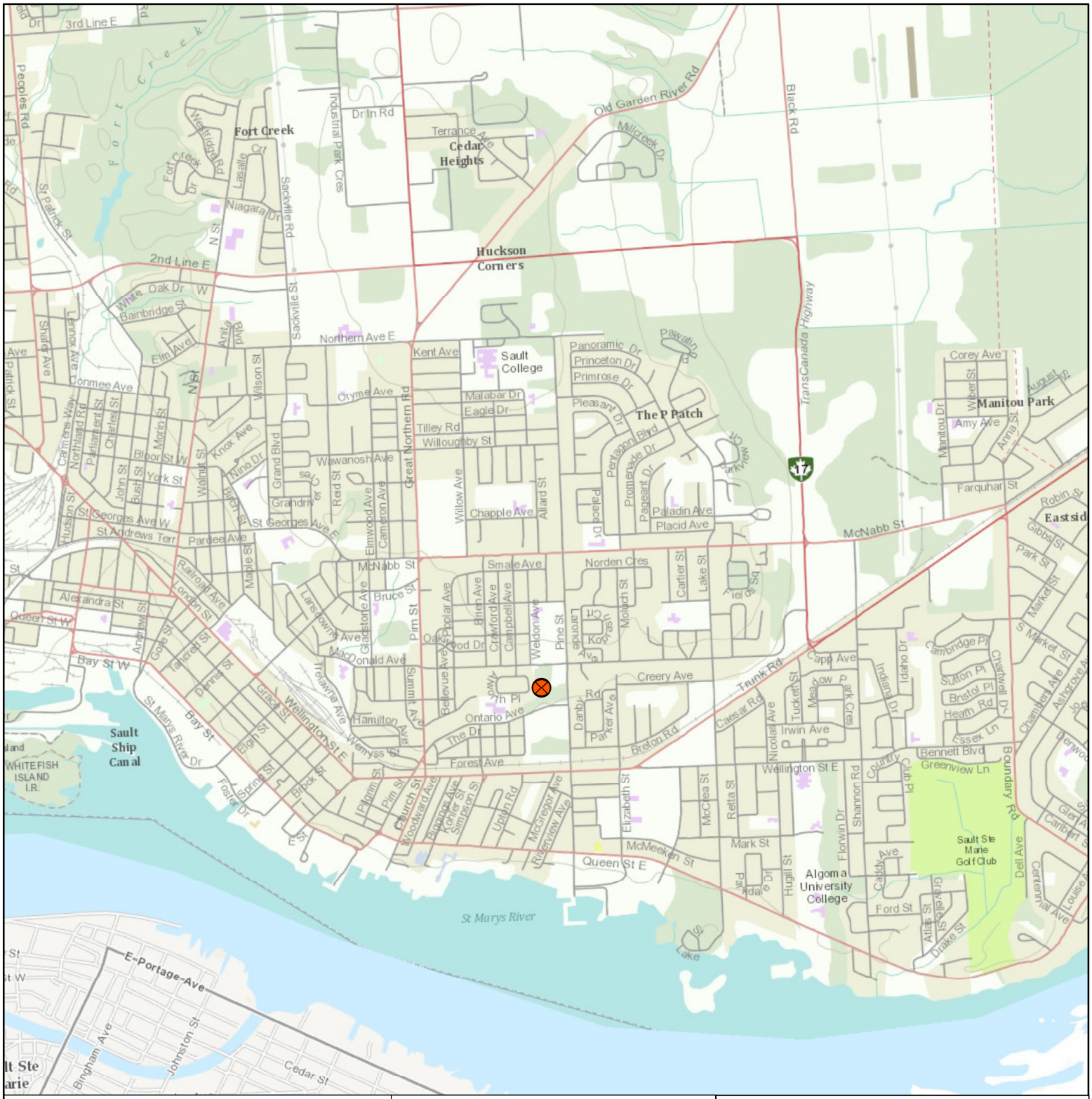
Urban Forest Associates Inc. (2202) SER Ontario Invasive species list. Invasive exotic species ranking for Southern Ontario.

FIGURES



Legend

- Ravine Location

Notes:

Background basemap produced by ESRI
Bing Hybrid Map 2013

TULLOCH ENVIRONMENTAL

0 290 580 1,160 1,740 Meters

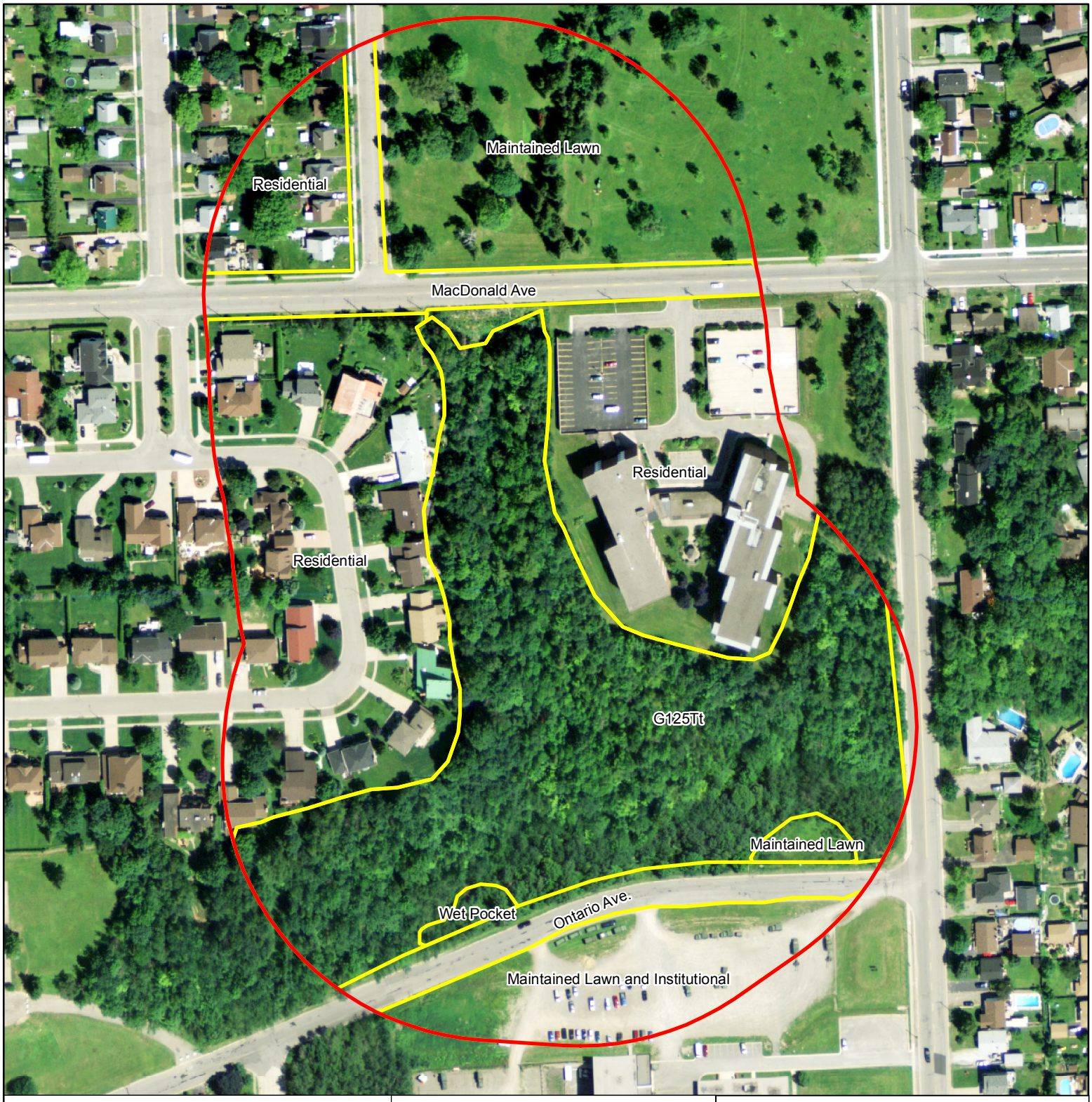
Datum: NAD83
Projection: UTM Zone 16N

N W E S

MacDonald Ave. Stormwater Management Ravine Diversion

General Location Map

Project 131123	Figure 1
SCALE: 1:33,500	Date: December 2014



Legend

- Study Area Ravie 2
- Vegetation Community Boundary

Notes:

Background basemap produced by ESRI
Bing Hybrid Map 2013

TULLOCH ENVIRONMENTAL

0 15 30 60 90 Meters

Datum: NAD83
Projection: UTM Zone 16N

N W E S

MacDonald Ave. Stormwater Management Ravine Diversion

Ecological Land Classification

Project: 131123	Figure 2
SCALE: 1:2,300	Date: December 2014

Appendix I: Background Information and Correspondence

TULLOCH
ENVIRONMENTAL

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August 29, 2014

Greg Cull

Sault Ste. Marie Management Biologist

Ontario Ministry of Natural Resources and Forestry

64 Church Street

Sault Ste. Marie, ON

P6A 3H3

705-941-5125

Dear Mr. Cull,

Re: Natural Heritage Background Information Request (Tulloch Project # 145011)

Sault Ste. Marie Stormwater Management Project

The City of Sault Ste. Marie has retained Tulloch Engineering to conduct a Municipal Class Environmental Assessment in support of proposed improvements to the existing stormwater management system in Sault Ste. Marie, ON.

In response to local flooding during storm events, it is proposed that storm water from the surrounding subdivisions be diverted into two natural ravines. New water control structures, designed to store excess water during storm events and allow it to drain out slowly after the storm has passed, are proposed. The assessment includes a review of available background natural heritage information from regulatory agencies and on-site field assessments.

The project location is within the city limits of Sault Ste. Marie. Ravine 1 is located west of Pim Street and south of Bruce Street. Ravine 2 is located west of Pine Street and south of MacDonald Avenue. A map indicating the area of the proposed work is appended to this letter. The centre of the ravines and study areas are at the following coordinates (UTM Zone 16, NAD 83):

Ravine 1: 705453 E, 5155020 N

Ravine 2: 706389 E, 5154681 N

Tulloch Environmental, a division of Tulloch Engineering, has reviewed the Natural Heritage Information Centre (NHIC) website plus several other online sources to compile a list of existing records of species at risk and significant natural heritage features in the vicinity of the project. Search results indicated one SAR occurrence and one species of conservation concern within the 1 km squares that encompass the study area (Squares 16GS0655, 16GS0654, 16GS0554 and 16GS0555):

- Milksnake (*Lampropeltis triangulum*), Element Occurrence ID 91292, and
- Oval-leaved Bilberry (*Vaccinium ovalifolium*), S-rank 3, Element Occurrence ID 60156.

We have prepared a list of provincially and federally listed SAR that may potentially inhabit the study area based on searches of various other resources, ranges and habitat preferences. A copy of this list is appended to this letter (Table 1). We are requesting that the OMNRF provide, where possible, any additional details, records of occurrences or other information on the species list and occurrences in the list provided.

We also request the following information and guidance from the OMNRF:

- Terrestrial data for the adjacent lands to the ravines, such as:
    - records of species at risk or species of conservation concern

  - timing windows or other restrictions
  - wildlife habitat use, and
  - significant portions of the habitat of any species at risk.

- Fishery data for potential watercourse in Ravine 1 (noted in some topographic maps), including
  - fish community species
  - thermal regime
  - areas of known critical habitat (spawning, etc.)
  - aquatic species at risk (records, local knowledge)
  - barriers to passage
  - in-water work timing windows
  - areas of concern (e.g. known sources of sediment and erosion, sources of pollution, etc.).

A similar request has been submitted to the SSMRCA. It is our understanding that approvals will be required under their CA regulations but that no permits are required for this work under the *Public Lands Act* or *Lakes and Rivers Improvement Act*.

If you have any questions or require additional information please do not hesitate to contact the undersigned at (705) 522-6303.

Thank you for your time and assistance.

Sincerely,

Amy Ingriselli

Fisheries Assessment Specialist

c.c. Pat McAuley, P. Eng. MBA

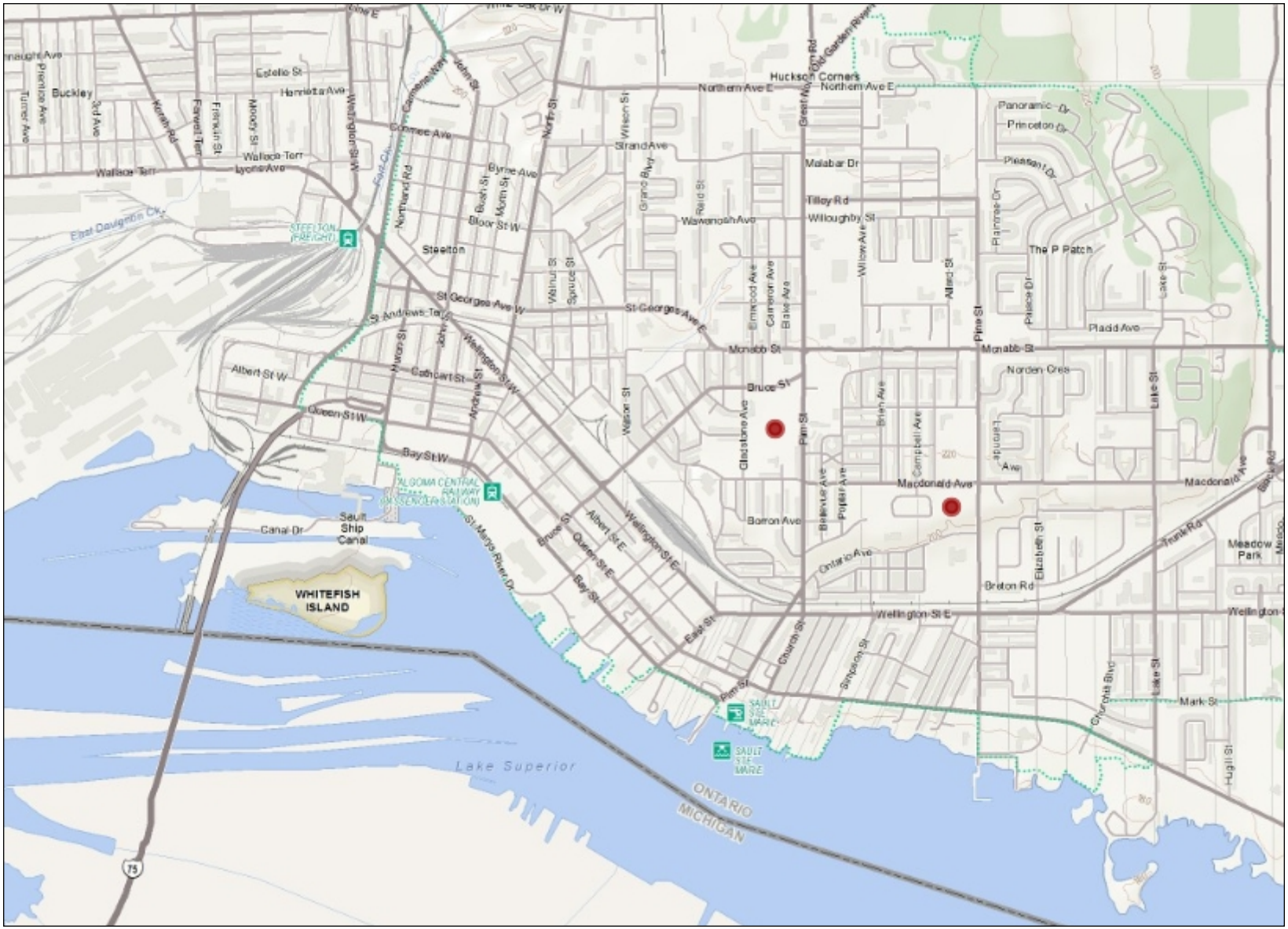
Tulloch Engineering

MINISTRY OF NATURAL RESOURCES AND FORESTRY

Make a Topographic Map

Sault Ste. Marie Stormwater Management

Notes:
Tulloch Environmental



Legend

- Building as Symbol
- Building to Scale
- Runway
- Heliport \ Hospital Heliport
- Seaplane Base
- Ferry Route
- Trail Head \ Trail
- Railway \ Train Station
- Railway with Bridge
- Railway with Tunnel
- Road (Major → Minor)
- Winter Road
- Road with Bridge
- Road with Tunnel
- Primary, Kings or 400 Series Highway
- Secondary Highway
- Tertiary Highway
- District, County, Regional or Municipal Road
- Toll Highway
- One Way Road
- Road with Permanent Blocked Passage
- Road with Address Ranges
- Hydro Line, Communication Line or Unknown Transmission Line
- Natural Gas Pipeline, Water Pipeline or Unknown Pipeline
- Spot Height
- Index Contour
- Contour
- Wooded Area
- Wetland
- Waterbody
- Waterbody Elevation
- Watercourse
- Falls
- Rapids
- Rapids \ Falls
- Rapids
- Rocks
- Lock Gate
- Dam \ Hydro Wall
- Dam \ Hydro Wall
- Provincial \ State Boundary
- International Boundary
- Upper Tier \ District Municipal Boundary
- Lower Tier \ Single Tier Municipal Boundary
- Lot Line
- Indian Reserve
- Provincial Park
- National Park
- Conservation Reserve
- Military Lands

1.6 0 0.79 1.6 km

Scale: 1 : 30,941

Projection: Web Mercator

N

The Ontario Ministry of Natural Resources and Forestry shall not be liable in any way for the use of, or reliance upon, this map or any information on this map. This map should not be used for: navigation, a plan of survey, routes, nor locations.

Table 1. SAR with high potential of occurrence within the study area (based on historical records, habitat and ranges).								
Common Name	**Scientific Name**	**Status**			**Info Source**			
		SARA	**ESA**	**S-Rank**	**EBird[1]**	**OBBA[2]**	**OMNRF[3]**	**NHIC[4]**
Eastern Meadowlark	*Sturnella magna*	-	THR	S4B	✓	✓	✓	
Bobolink	*Dolichonyx oryzivorus*	-	THR	S4B	✓	✓	✓	
Wood Thrush	*Hylocichla mustelina*	-	SC	S4B	✓	✓	✓	
Horned Grebe	*Podiceps auratus*	-	SC	S1B S4N	✓		✓	
Barn Swallow	*Hirundo rustica*	-	THR	S4B	✓	✓	✓	
Chimney Swift	*Chaetura pelagica*	THR	THR	S4B, S4N	✓	✓	✓	
Short-eared Owl	*Asio flammeus*	SC	SC	S2N, S4B	✓		✓	
Bank Swallow	*Riparia riparia*	-	THR	S4B	✓	✓	✓	
Black Tern	*Chlidonias niger*	-	SC	S3B	✓		✓	
Bald Eagle	*Haliaeetus leucocephalus*	-	SC	S2N, S4B	✓	✓	✓	
Eastern Wood-pewee	*Contopus virens*	-	SC	S4B	✓	✓	✓	
Common Nighthawk	*Chordeiles minor*	THR	SC	S4B	✓	✓	✓	
Rusty Blackbird	*Euphagus carolinus*	SC	-	S4B	✓	✓	✓	
Olive-sided Flycatcher	*Contopus cooperi*	THR	SC	S4B			✓	
Least Bittern	*Ixobrychus exilis*	THR	THR	S4B			✓	
Yellow Rail	*Coturnicops noveboracensis*	SC	SC	S4B			✓	
Eastern Whip-poor-will	*Caprimulgus vociferus*	THR	THR	S4B	✓		✓	
Peregrine Falcon	*Falco peregrinus*	SC	SC	S3B	✓	✓	✓	
Red-headed Woodpecker	*Melanerpes erythrocephalus*	THR	SC	S4B	✓		✓	
Wood Thrush	*Hylocichla mustelina*	-	SC	S4B	✓	✓		
Canada Warbler	*Cardellina canadensis*	THR	SC	S4B	✓	✓	✓	
Monarch Butterfly	*Danaus plexippus*	SC	SC	S2N, S4B			✓	
West Virginia White	*Pieris virginiensis*	-	SC	S3			✓	
Common Five-lined Skink	*Plestiodon fasciatus*	SC	SC	S3			✓	
Wood Turtle	*Glyptemys insculpta*	THR	END	S2			✓	
Eastern Cougar	*Puma concolor*	-	END	SU			✓	
Little Brown Myotis	*Myotis lucifugus*	-	END	S4			✓	

Northern Myotis	*Myotis septentrionalis*	-	END	S3			✓	
Milksnake	*Lampropeltis triangulum*	SC	SC	S3			✓	✓
Flooded Jellyskin	*Leptogium rivulare*	THR	THR	S3			✓	
Oval-leaved Bilberry	*Vaccinium ovalifolium*	-	-	S3			✓	✓

1Cornell Lab of Ornithology, eBird web application. July, 2014 for Desbarats, Ontario

2Ontario Breeding Bird Atlas, Second Atlas. Square 17KM73

3Ontario Ministry of Natural Resources and Forestry Species at Risk website http://www.ontario.ca/environment-and-energy/species-risk-ontario-list

4Natural Heritage Information Centre website https://www.ontario.ca/environment-and-energy/natural-heritage-information-centre

Ministry of Natural Resources and Forestry

Sault Ste. Marie District Office
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Ministère des Richesses naturelles et des Forêts

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Ontario

September 15, 2014

Amy Ingriselli
Fisheries Assessment Specialist
Tulloch Environmental
1942 Regent Street Unit L
Sudbury, ON P3E 5V5

SUBJECT: Natural Heritage Background Information Request (Tulloch Project # 145011) – Sault Ste. Marie Stormwater Management Project

Dear: Ms. Ingriselli:

Thank you for your letter dated August 29, 2014, requesting information about species at risk (SAR), terrestrial data for the adjacent lands to the ravines and fishery data for the potential watercourse in Ravine 1. Listed below is information in reply to your letter.

1. MNR's inventory of SAR is incomplete. There is the potential for additional species to be present in and adjacent to the project area. An updated list of all known SAR within Sault Ste. Marie District is included. All species have the potential to be present, should suitable habitat be available. For information on how SAR are protected, please refer to www.ontario.ca/speciesatrisk.

2. It should be noted that the documented occurrences of Milksnake and Oval-leaved Bilberry identified within the 1 km squares that encompasses the study area are historical in nature (greater than 30 years since the observation dates).

3. A review of Table 1 (SAR- potential of occurrence in the study area) provided with your letter revealed no additional records of occurrences, details or information about species at risk in the study area or occurrences of the species shown on the list provided.

4. Terrestrial data for the adjacent lands to the ravines:

    - **Records of species at risk or species of conservation concern** – there is one occurrence of Greene's Rush (provincially tracked S3 rare species of conservation concern) in the Sault Ste. Marie rail yard but the viability of this occurrence, from a 1998, observation is not verified.
    - timing windows or other restrictions – none identified
    - wildlife habitat use – no specific wildlife habitat data available
    - significant portions of the habitat of any species at risk – none identified

/…2

5. Fishery data for potential watercourse in Ravine 1 – this watercourse is not identified as a permanent stream in the Ministry of Natural Resources and Forestry data base and there is no known fishery data (as per the information requested) or Aquatic Resource Area data available for this watercourse. Any plans to increase or divert stormwater into this ravine should consider sediment and erosion control measures that mitigate any environmental impacts from stormwater potentially entering any natural watercourse.

If you have any other questions, please contact me at greg.cull@ontario.ca or 705-941-5108.

Yours truly,

Greg Cull
Management Biologist
Sault Ste. Marie District

TULLOCH
ENVIRONMENTAL

1942 Regent Street
Unit L
Sudbury, ON
P3E 5V5

T. 705 671.2295
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sudbury@TULLOCH.ca
WWW.TULLOCH.ca

August 29, 2014

Rhonda Bateman
General Manager
Sault Ste. Marie Region Conservation Authority
1100 Fifth Line East
Sault Ste. Marie, ON
P6A 6J8
705-946-8530

Dear Ms. Bateman,

Re: Natural Heritage Background Information Request (Tulloch Project # 145011)
Sault Ste. Marie Stormwater Management Project

The City of Sault Ste. Marie has retained Tulloch Engineering to conduct a Municipal Class Environmental Assessment in support of proposed improvements to the existing stormwater management system in Sault Ste. Marie, ON.

In response to local flooding during storm events, it is proposed that storm water from the surrounding subdivisions be diverted into two natural ravines. New water control structures, designed to store excess water during storm events and allow it to drain out slowly after the storm has passed, are proposed. The assessment includes a review of available background natural heritage information from regulatory agencies and on-site field assessments.

The project location is within the city limits of Sault Ste. Marie. Ravine 1 is located west of Pim Street and south of Bruce Street. Ravine 2 is located west of Pine Street and south of MacDonald Avenue. A map indicating the area of the proposed work is appended to this letter. The centre of the ravines and study areas are at the following coordinates (UTM Zone 16, NAD 83):

Ravine 1: 705453 E, 5155020 N

Ravine 2: 706389 E, 5154681 N

Tulloch Environmental, a division of Tulloch Engineering, has reviewed the Natural Heritage Information Centre (NHIC) website plus several other online sources to compile a list of existing records of species at risk (SAR) and significant natural heritage features in the vicinity of the project. Search results indicated one SAR occurrence and one species of conservation concern within the 1 km squares that encompass the study area (Squares 16GS0655, 16GS0654, 16GS0554 and 16GS0555):

- Milksnake (*Lampropeltis triangulum*), Element Occurrence ID 91292, and
- Oval-leaved Bilberry (*Vaccinium ovalifolium*), S-rank 3, Element Occurrence ID 60156.

We have prepared a list of provincially and federally listed SAR that may potentially inhabit the study area based on searches of various other resources, ranges and habitat preferences. A copy of this list is appended to this letter (Table 1). We are requesting that the SSMRCA provide, where possible, any additional details, records of occurrences or other information on the species list and occurrences in the list provided.

We also request the following information and guidance from the SSMRCA:

- Any available terrestrial data for the adjacent lands to the ravines, such as:
    - records of species at risk or species of conservation concern
    - timing windows or other restrictions

  - wildlife habitat use, and
  - significant portions of the habitat of any species at risk.

- Any available fishery data for potential watercourse in Ravine 1 (noted in some topographic maps), including
  - fish community species
  - thermal regime
  - areas of known critical habitat (spawning, etc.)
  - aquatic species at risk (records, local knowledge)
  - barriers to passage
  - in-water work timing windows
  - areas of concern (e.g. known sources of sediment and erosion, sources of pollution, etc.).

The Ontario Ministry of Natural Resources and Forestry has also been contacted for information. We are also asking that the SSMRCA confirm any regulatory permits and/or environmental assessments that may be required of the City under the *Conservation Authorities Act,* etc.

If you have any questions or require additional information please do not hesitate to contact the undersigned at (705) 522-6303.

Thank you for your time and assistance.

Sincerely,

Amy Ingriselli

Fisheries Assessment Specialist

C.C. Pat McAuley, P. Eng. MBA

Tulloch Engineering, Sault Ste. Marie, ON

Sault Ste. Marie Region Conservation Authority
SSMRCA

1100 Fifth Line East
Sault Ste. Marie, ON P6A 6J8
Phone: (705) 946-8530
Fax: (705) 946-8533
Email: nature@ssmrca.ca
www.ssmrca.ca

September 3, 2014

Attn: Amy Ingriselli, Fisheries Assessment Specialist
Tulloch Environmental
1942 Regent Street, Unit L
Sudbury On P3E 5V5

Re: Natural Heritage Background Information Request (Tulloch Project # 145011)
Sault Ste. Marie Stormwater Management Project.

Dear Ms. Ingriselli:

Regarding your request for information and/or comments from our office dated August 29, 2014.

The subject properties, identified in your correspondence as Ravine 1 and Ravine 2 are under the jurisdiction of the Sault Ste. Marie Region Conservation Authority with regard to the O. Reg.176/06 for Development, Interference with Wetlands and Alterations to Shoreline and Watercourses (ravine area with erosion hazard).

Any development within the areas identified as Ravine 1 and Ravine 2 will require a permit from our office that will contain specific conditions.

The subject property is not under the jurisdiction of the Drinking Water Source Protection Program of the Conservation Authority with regard to Drinking Water Source Protection (DWSP).

Our office does not have any current information regarding species at risk or species of conservation concern or habitat use.

Department of Fisheries and Oceans regulates the in-water work windows and a request for fisheries information and/or application is available on their website. Please refer to the enclosed fact sheet.

Sincerely,

Marlene McKinnon, CGS
GIS Specialist

File: DVLP_INQ_TULLOCH_CitySSMStormwaterManagement_20140902.docx

Sault Ste. Marie Region Conservation Authority
SSMRCA

1100 Fifth Line East
Sault Ste. Marie, ON P6A 6J8
Tel: (705) 946-8530
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www.ssmrca.ca

Please note the following changes to our permitting process:

In the past the SSMRCA was a one window stop for residents to access approvals, permits and/or authorizations from several provincial and federal agencies.

It is the responsibility of the applicant to contact other agencies and comply with all existing laws and regulatory requirements. Applicants need to be aware that approvals may also be required from other agencies as well, such as the municipality, Ontario Ministry of Natural Resources and the Federal Department of Fisheries and Oceans. Approval from our agency does not guarantee approval from other agencies.

Ministry of Natural Resources (MNR)

Recent changes to the *Public Lands Act* came into effect on January 1, 2014. Under this act or other acts such as the **Lakes Rivers Improvement Act, applicants** may require an authorization or permit from MNR.

It is the responsibility of the applicant to register via the MNR's Registry and Approval Service Centre or contact them at 1-855-613-4256, Email: mnr.rasc@ontario.ca.

Changes to the Federal Fisheries Act

Recent changes in the *Fisheries Act* which came into effect on November 25, 2013 have changed the way some projects in or near the water are now reviewed.

Applicants can learn more about the new process at www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html or you can contact Fisheries and Oceans Canada directly by phone at 1-855-852-8320 or by email at fisheriesprotection@dfo-mpo.gc.ca.

Information contained on the Fisheries and Oceans Canada website will allow proponents to self-assess their project and if required submit an application.

The SSMRCA will continue to administer *Ontario Regulation 176/06 – Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* using a science based approach as well as the tools provided by the Ontario Conservation Authorities Act in the area under our jurisdiction.

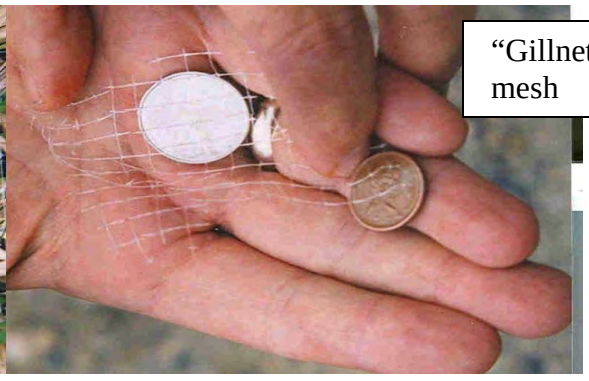
ENVIRONMENTAL ADVISORY:
Erosion Control Netting responsible for fish and wildlife mortality

Erosion control blankets used to prevent erosion employ a “gillnet-like” mesh intended to keep straw mulch, coconut or similar type material in place on stream banks until the establishment of vegetation. Reports from across the province of various wildlife deaths due to entanglement in this mesh have prompted notification of these concerns by the Ministry of Natural Resources. In an effort to prevent fish and wildlife mortality and ensure the protection of threatened or endangered species, please consider alternative products for erosion control.

1. Garter snake fatally entangled in silt fence.

2. Improper installation at a culvert.

Biodegradable versions of the netting are available, however reports indicate that biodegradable mesh is still a risk to wildlife prior to disintegration. Rock rip-rap is an effective alternative. Hydro seeding is also an alternative as long as it is not applied too late in the season. Kevin Brown, Sr. Project Engineer (MNR) has a wide variety of products and can provide contacts for suppliers. Kevin can be reached at (807) 475-1342 or email: **kevin.brown@mnr.gov.on.ca**.



“Gillnet -Like” mesh

An example of a properly stabilized bank using rip-rap can be seen at Mile 10 on the Blueberry Road northeast of Longlac.

Wildlife Mortality Reports:

MNR, Kenora District- Large snapping turtles, mink, snakes and ducklings fatally entangled.

MNR, Geraldton District – Entanglement of 6 garter snakes.

MNR, Parry Sound District – Entanglement deaths of large bodied snakes in heavy duty silt fencing: 2 Eastern Massasauga Rattlesnakes (nationally threatened) and 3 Northern Watersnakes. There are other snakes categorized as species at risk in the area.

MNR, Timmins District – Similar plastic netting fatally entangled migrating songbirds.

MNR, Kemptville District – garden mesh and netting products responsible for killing snakes. In particular, eight Black Ratsnakes (threatened) have been found dead in this type of netting in the last three years.

Northern Illinois University – 3 documented cases of three large milk snakes that perished in the same manner.

A paper has also been written on the subject:
Stuart, J.N., Watson, M.I, Brown, T.L. and C. Eustice. 2001. Plastic Netting: An Entanglement Hazard to Snakes and Other Wildlife. Herpetological Review. 32(3) 162-164.

Conservation Advisory

Heavy Duty Silt Fence May Cause High Mortality in Large-bodied Snake Species

The Ministry of Natural Resources in Parry Sound advises Federal, Provincial and Municipal Government agencies, private construction, engineering and environmental consulting firms about the risk to large-bodied snake species posed by “heavy duty” silt fencing material used in construction practices in Ontario.

The use of “heavy duty” silt fence in areas where large-bodied snakes are found has been shown to cause high levels of mortality. For example, in one 30 metre section of “heavy duty” silt fence installed along the edge of a newly constructed road bed at a river crossing, two Eastern Massasauga Rattlesnakes and three Northern Watersnakes were found entangled and dead. **The Eastern Massasauaga is a nationally Threatened species.**

Any large-bodied snake could become entangled in the reinforcing mesh, including a number of species at risk: the Lake Erie Watersnake (**Endangered**), Eastern Foxsnake, Eastern Hog-nosed Snake, Black Ratsnake, Queen Snake (**Threatened**), and Eastern Milksnake and Northern Ribbonsnake (**Special Concern**).

Silt fencing is commonly used to control erosion in riparian areas along the shorelines of waterbodies, streams and wetlands. Riparian areas are favoured habitats for a number of Ontario's snake species.

Snakes may encounter the silt fencing where it has been erected across or along a movement corridor. They may also be attracted to the thermal properties of the material in order to regulate their body temperature.

The particular type of silt fence that is most dangerous to snakes is constructed with nylon mesh netting reinforcing the regular, woven plastic strand material. The nylon mesh is approximately one inch square. Large-bodied snakes become entangled in this mesh and perish.

There are ways to help prevent snake mortality. Better, on site management of temporary stockpiles of fill could preclude the need for reinforced silt fencing. Keeping fill material several metres back from the fencing helps prevent large volumes of soil from washing into the fence, weighing it down and knocking it over.

For further information contact:

Ron Black
Wildlife Biologist
Ministry of Natural Resources
7 Bay Street
Parry Sound, Ontario
P2A 1S4
(705) 773-4225

APPENDIX 5

Stage 1 and 2 Archaeological Assessment of MacDonald Avenue

And McNabb Stormwater Management Projects,

By Horizon Archaeological Inc.

Stage 1 & 2 Archaeological Assessment of MacDonald Avenue and McNabb Storm Water Management Project Part of Pin 0048, Block 31536 & Part of Pins: 0037, 0021, 0023, 0032 Block 31546, City of Sault Ste. Marie formerly Part Park Lot 10 Concession 3 & Part Park Lot 7 Concession2, Township of St. Mary, District of Algoma

P335-0036-2014

Prepared by:
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Prepared for:
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Date**:**
September 12, 2014

Type of Report**:**
Original

Executive Summary

This report describes the methodology and results of the Stage 1-2 Archaeological Assessment of the MacDonald Avenue and McNabb Storm Water Management Project, as part of a Municipal Class Environmental Assessment. This study was conducted under Archaeological Consulting License P-335 issued to Dayle A. Elder by the Ministry of Tourism, Culture and Sport for the Province of Ontario. This assessment was undertaken in order to recover and assess the cultural heritage value or interest of any archaeological sites within the project boundaries. All work was conducted in conformity with Ontario Ministry of Tourism, Culture and Sport (MTCS) *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011) and the Ontario Heritage Amendment Act (SO 2005).

Horizon Archaeology Inc. was engaged by the proponent to undertake a Stage 1-2 Archaeological Assessment of the study area and was granted permission to carry out archaeological fieldwork by the owner's representative. The study area was subject to Stage 2 Assessment on September 03, 2014. The McNabb project area is located on Lot 7, Concession 2, St. Mary's Township, and runs roughly east-west between Pim Street and Gladstone Avenue, south of Bruce Street, and north of MacDonald Avenue. The project area is a steeply sloped ravine with a narrow meandering water course at its bottom. The rim and upper slopes of the ravine are forested with various sized trees, the lower slopes covered in scrub brush and shrubs, and the ravine bottom with tall flowers and grasses. The winding nature of the water course has formed a narrow discontinuous flood plain in the valley bottom. The largest single portion of the flood plain was located near the project area's southwest border, and measured approximately 10 metres long, and 3 metres wide.

The MacDonald project area is located on Lot 10, Concession 3 of St. Mary's Township, south of MacDonald Avenue, and extends south to Ontario Avenue. Like McNabb, the MacDonald project area was composed of a ravine with a narrow water course at the bottom. At Ontario Avenue, the project area extended to the east to Pine Street. The ravine bottom sloped to the south towards Ontario Street, and the water course in places was not well defined. The slopes of the ravine were tree covered, and the bottom was covered in long grasses. The ravine narrowed to less than two metres at its northern edge. Along Ontario Street, the project area was covered in large bushes and long grasses.

Owing to the narrow irregular flood plain on the McNabb project area, 5 m interval transects were not possible. Test-pits excavated were composed of wet grey soil, and filled with water during excavation. The MacDonald project area was wider and allowed test pitting at 5 m intervals throughout much of its extent, save at the north end where the ravine narrowed drastically. Along the ravine the test pits were composed of light brown wet soil, and water would seep from the test pit sides and bottom. In the south and eastern parts of this project area, test-pits were composed of gravel and sand fill, and were likely disturbed during road construction. No areas that were steeply sloped were subject to Stage 2 Test Pit Assessment.

Based upon the information gathered, Horizon Archaeology Inc is recommending that the MacDonald Avenue and McNabb Storm Water Management Project area requires no further assessment.

Table of Contents

Project Personnel

Consulting Archaeologist:	**Dayle A. Elder, MA (P335)**
Field Director:	**Dayle A. Elder**
Field Staff:	**Victoria Brooks-Elder, MA (P387)**
Photographs:	**Dayle A. Elder**
Archival Research:	**Victoria Brooks-Elder**
Report Preparation:	**Dayle A. Elder**
Maps:	**Proponent**
	Dayle A. Elder

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1.0 Project Context

1.1 Objectives

The objectives of a Stage 1 archaeological assessment, as outlined by the Standards and Guidelines for Consultant Archaeologists (2011), are as follows:

1) To provide information about the property's geography, history, previous archaeological fieldwork and current land conditions
2) To evaluate in detail the property's archaeological potential, which will support recommendations for Stage 2 survey for all or parts of the property
3) To recommend appropriate strategies for Stage 2 survey

The objectives of a Stage 2 archaeological assessment, as outlined by the Standards and Guidelines for Consultant Archaeologists (2011), are as follows:

1) To document all archaeological resources on the property
2) To determine whether the property contains archaeological resources requiring further assessment
3) To recommend appropriate Stage 3 assessment strategies for archaeological sites identified

1.2 Development Context

This report describes the methodology and results of the Stage 1-2 MacDonald Avenue and McNabb Storm Water Management Project, as part of a Municipal Class Environmental Assessment. This study was conducted under Archaeological Consulting License P-335 issued to Dayle A. Elder by the Ministry of Tourism, Culture and Sport for the Province of Ontario.

Horizon Archaeology Inc was engaged by the proponent to undertake a Stage 1-2 Archaeological Assessment of the study area and was granted permission to carry out archaeological fieldwork by the proponent's representative. The proponent plans to develop two relatively small areas within the City of Sault Ste. Marie. The McNabb project area is located south of Bruce Street, running between Pim Street on the east and Gladstone Avenue on the west and is approximately 2.9 hectares in size. Located west of Pine Street the MacDonald Avenue Project Area runs between MacDonald Avenue on the north and Ontario Avenue on the south and is approximately 1.2 hectares in size (**Maps 1 & 2**). The study areas were subject to a Stage 2 assessment, on September 3rd 2014. The mapping provided by the proponent represents the best available.

All records, documentation, field notes and photographs related to the conduct and findings of the these investigations are held at the office of the licensee with copies at the Horizon Archaeology Inc office in North Bay until such time that they can be transferred to an agency or institution approved by the Ontario Ministry of Tourism, Culture and Sport (MTCS) on behalf of

the government and citizens of Ontario.

1.3 Historical Context

1.3.1 Pre-Contact Period

The archaeological chronology of Ontario has been divided up into three Pre-Contact periods: the Palaeo-Indian, Archaic, and Woodland, followed by an intermediate Contact, and finally the Euro-Canadian period.

The Palaeo-Indian sites date 10,000 to 5,000 B.C. , and inhabited a tundra like environment as the glaciers retreated northward. This means that some parts of the region were not ice-free until 6,000 B.C. (Dawson 1983:27-8). The Palaeo-Indians are believed to have been nomadic big-game hunters that followed migrating herds of caribou.

Palaeo-Indian sites date 10,000 to 5,000 B.C. , and inhabited a tundra like environment as the glaciers retreated northward. In such an environment, fruits, nuts and other sources of food harvested from trees or other plants are rare, and it is thought that the Palaeo-Inidans subsisted largely by hunting, trapping and fishing (Ellis 2013: 36). Palaeo-Indian sites are most often located on relic beach ridges associated with glacial lakeshores (Stork 1984). They have also been located at ancient river crossings, places where modern caribou hunters often assemble as the animals my slow and file through a narrow area making them easier to hunt (Ellis 2013: 36).

The predominance of sites being located on ancient strandlines may be more indicative of the survey methodology employed to find them rather than an actual preference for site situation on the part of the Palaeo-Indian peoples of Ontario, as a number of sites have been recovered away from ancient shorelines, for example 60 % of Palaeo-Indian sites in the west coast of Lake Superior were located along river-banks, indicating a more diversified strategy also focussing on fishing and possibly taking of waterfowl (Ellis & Deller 1990: 50, Fox 1975: 33-5, Julig 1994: 34).

Most Palaeo-Indian sites are small, indicating campsites that were inhabited briefly as its occupants followed the seasonal routes and cycles of their prey. Larger sites seem to be associated with migration routes, primarily at river crossing as mentioned above (Ellis 2013: 35-6).

Large, fluted spear points define an Early Palaeo-Indian site. While one of the earliest artefacts in North America, they are also one of the most technologically advanced stone tools on the continent (Ellis 2013: 37-8). Other artefacts encountered include hammerstones, and large choppers, knives / cutting tools, lunate bifaces, and piece esquillee's, possibly employed as wedges for wood or bone working, unifacial triangular end scrapers, beaked scrapers,

spokeshaves, burins or gravers (Ellis & Deller 1990: 43, 47-9).

Late Palaeo-Indian points do not exhibit the same fluting that is present on Earlier assemblages. Two point types are found on Late Palaeo-Indian sites, one group having a concave base with either rounded or pointed ears, and the other group comprising lanceoloate forms (Ellis 1990: 57-8). Most of the lithic tool kit continues from the Early Palaeo-Indian Period, however there a few new forms or tools that appeared, including: drills, and small thumbnail or fan shaped end scrapers replace the unifacial triangular end scraper (Ellis & Deller 1990: 59).

The toolstone recovered from Palaeo-Indian sites in Ontario has been sourced to have been quarried from sites up to 200 km away. However, there is evidence that sites were located specifically with regards to obtaining tool-stone as well (Fox 1975: 34-5, Julig 1994: 216). The tool stone was likely at least roughed out at the quarry site and carried to the site on seasonal routes. Other sources originated further afield from sources in Ohio or Michigan, and were likely obtained through trade (Ellis & Deller 1990: 43). These represent merely the tools manufactured from stone, as any tools made from bone etc would have decomposed over the intervening millennia (Ellis et al 1990: 66) .

Dating between 8000 and 1000 B.C., the Archaic period was a development of the Late Palaeo-Indian. Some typical Early Archaic artefacts have been found on Late Palaeo-Early Archaic sites in the province (Julig 1994: 176, Stork 1987). The Archaic peoples were still nomadic hunter-gatherers, however the greater range of tools has caused some to hypothesise that this indicated a shift from exploiting large-game over a large area to a more extensive, localised range (Ellis et al 1990: 67). This could also be a factor of preservation of perishable materials, as mentioned above. There is also evidence, through presence of imported / exotic cherts, that great distances were still covered during seasonal rounds (Ellis et al 1990: 78).

In southern Ontario, the Archaic is subdivided into Early, Middle, and Late periods, which in turn are further subdivided into horizons based upon point types (Ellis et al 1990). In northern Ontario, there is no such subdivision and the entire period is known as the Shield Archaic (Wright 1972, Hamilton 2013). Areas around the north shore of the Great Lakes, and along the southern border between northwestern Ontario could possibly have been part of the Middle Archaic "Laurentian Archaic" group found in southern Ontario (Hamilton 2013, Ellis et al 1990).

A major change in the Archaic tool-kit from that of the Late Palaeo-Indian period is the appearance of smaller, notched points that replace the large lanceolate forms. This has been thought to indicate a technological advance; the adoption of the spear-thrower, or *atl atl* . Other artefacts typical of the Archaic period include those associated with wood-working such as axes, gouges and adzes (Ellis et al 1990: 65). These woodworking tools have been thought to indicate that the dug-out canoe was introduced during this period.

The Archaic period also witnessed the rise of the "Old Copper" culture centred around Lake Superior."Old Copper" culture is a name given to the people from this area who exploited the available copper veins or outcroppings, and not a distinct Archaic group separate from others based upon material culture, settlement patterns etc. Copper artefacts from this area have been recovered from sites in Southern Ontario, west to into Saskatchewan, and south of Lake Michigan into Illinios (Hamilton 2013: 89). Copper artefacts include spear points, knives, chisels, and celts (Dawson 1966). Most of these artefacts have been found by collectors or out of context and their role in society is open for debate.

No Archaic houses have been identified archaeologically in northern Ontario; they are rare anywhere in the province. The Davidson Site (AhHk-54) along the Ausable River inland from Lake Huron in southern Ontario has revealed a number of features that have been identified as pit-houses, dating to the Late Archaic, predating 3000 BP based upon dates from carbonised remains found in flood deposits above the floor (Ellis et al 2010).

The house was circular, approximately 5 metres in diametre, had a sloping entrance, interior hearth, posts, and a bench surrounding the edges of the structure, and likely possessed a soil or sod roof. It was hypothesised that this structure was a cold weather domicile, owing to the greater insulating properties of pit-houses (Ellis et al 2010: 10). The labour involved in construction of such a house is also believed to indicate a more-or-less sedentary lifestyle, those occupying it relying on stored foodstuffs (Ellis et al 2010: 10).

Burials are also a rare find from the Archaic period. Two have been recovered from the northern reaches of northwestern Ontario, near Big Trout Lake, and date to approximately 5000 BC (Hamilton 2013:85). Burials from southern Ontario date to the Late Archaic, and have been divided into two complexes, the Haldimand and Glacial Kame. While it has been hypothesised that the Haldimand Complex groups interred their dead in what could be the first cemeteries in the province, it is fairly certain that the Glacial Kame culture had deliberate cemeteries to bury their deceased, possibly in an annual ritual or celebration (Ellis et al 1990: 116-8). Haldimand Complex burials included projectile points, chert bifaces, red ochre, copper artefacts including beads and awls, and beaver incisor grave goods (Ellis et al 1990: 116). Glacial Kame burials were composed both of inhumations as well as cremations. Grave goods were rather elaborate, and included bannerstones, bird stones, stone pipes, copper artefacts including adzes, awls and beads, bear maxilla masks, exotic sea shells, and gorgets (Ellis et al 1990: 116-8).

The Sault Ste. Marie area has revealed numerous Archaic period sites. These include the Grandmother Rocks Nanabush / Daigle Garden Site (CdId-4), a site that local First Nations associate with the Grandmother of Nanabush from Ojibwa mythology (ASI 2010: 7). Most sites recovered dated to the Late Archaic and were of lithic scatters, however sites have also yielded complete polished stone adzes, gouges, and a copper serpent effigy (ASI 2010: 7-8). The Money Musk Site revealed two hearths associated with a lithic scatter (ASI 2010: 7).

The Woodland Period is traditionally defined by the introduction of pottery, and as the period progresses, increasing sedentarism, and the introduction and growth of horticulture. Horticulture did not play a role in Woodland northern Ontario as the growing season is too short in most areas, and the soil unsuited to such undertakings. In Southern Ontario corn is considered to be the major crop grown during the Woodland period, and it may have been planted along the Boundary Waters area in Northwestern Ontario, as the micro-climates in the area there may have been suitable (Hamilton 2014: 92). Wild rice was harvested in other parts of the province (Dawson 1980:3, 1981: 34, Taylor-Hollings 1999:1, 100). This allowed for a similar predictable, annual, food source that was able to be stored and consumed over the winter, and allowed for larger population densities than previously (Taylor-Hollings 1999: 100).

In southern Ontario, the Woodland, like the Archaic period, has been subdivided into three phases, Early, Middle and Late, dating between ca. 1000 BC to and 1650 AD. In northern Ontario, the Woodland period has been subdivided into Initial and Terminal Woodland periods. This roughly corresponds to the Middle and Late Woodland periods encountered in the south. The time frame occupied by the Early Woodland in southern Ontario saw the continuation of the Shield Archaic in the Pre-Cambrian Shield area of Ontario.

The Initial Woodland period dates between 200 BC and 1000 AD (Dawson 1981, Hamilton 2013: 93), and the Terminal Woodland from 1000 AD to Contact with Europeans. Terminal Woodland ceramics have been found in conjunction with European trade goods, and have been C^{14} dated to the latter half of the 18^{th} Century (Dawson 1987:37). Throughout the province Ontario, the Woodland period is one of the best studied and understood, though the amount of research of the period in the north lags far behind that in the south.

The inhabitants of northern Ontario during the Initial Woodland period were the Laurel Tradition peoples. Early and Late manifestations of this tradition have been identified, the early phase dating between 200 BC and 500 AD, and the late 500 to 1000 AD. The Laurel Tradition occupies nearly all of the northern parts of the province, save for the very far north, and as far south in Ontario as Lake Nipissing and the French River. The Laurel Tradition spans north and eastern Manitoba, and a small part of Saskatchewan in the west, and extends into northern Quebec to the east, and into northern Minnesota and Wisconsin. Initial Woodland sites are often located along river banks or on the shores of lakes.

Laurel ceramics were produced from either a single lump of clay or by coil manufacture, grit tempered, a smoothed exterior, rims relatively straight with the lip either flattened or rounded (Wright 1967, Wilford Laboratory of Archaeology 2012). There are a variety of decorative techniques utilised on these vessels including a variety of incised, stamped, punctated, embossed, and cord-wrapped stick decorations (Wright 1967, Wilfrid Laboratory of Archaeology 2012).

In the Laurel ceramic sequence, pseudo-scallop shell impressed and combined decorative

techniques are considered early, and dentate stamped dragged, punctated, embossed, as well as plain ceramics are hypothesised to occur later in the period (Wright 1964: 100, Dawson 1980:54-5, 1981). Embossed ceramics which increase in frequency over the Initial Woodland, become a common motif on the succeeding Terminal Woodland Blackduck pottery (Wright 1964: 99, Dawson 1980: 32). The latest Initial Woodland ceramics are Laurel vessels that have Terminal Woodland Blackduck decorative motifs (Dawson 1980: 32).

Early in the Laurel sequence, projectile points continue to resemble the notched points of the Archaic period (Dawson 1981:3). These are later superceded by stemmed points (Dawson 1980: 55). Side scrapers dominate scraper types in the early phases, and end scrapers assume prominence in the later phases (Dawson 1980: 33). Other typical tools include stone biface blades, abraders, pottery decorating tools, and net sinkers, copper beads, awls, barbs, fragments, nuggets, pendants, projectile points, chisels, and bone awls, needles, knives which are usually manufactured from beaver incisors, pottery decorating tools, and beads (Wright 1967: 152, Dawson 1980:33, 1981: 34),

House plans for the Initial Woodland are rare, one having been very tentatively identified at the Heron Bay (DdIn-1) Site on the west bank of the near the mouth of the Pic River on the north shore of Lake Superior. The "house" plan consisted of a circular grouping of post-moulds approximately 3 metres in diametre, with no hearths or indications of other interior features (Wright 1967:8). Others have been identified in northwestern Ontario, and their plans formed by post-moulds and curved lines of stone approximately 7 metres long and 4 to 5 metres wide, and appear oval in plan view versus the circular form of the earlier Archaic period (Reid & Rajnovich 1982: 79, 103-4, 1983: 5-6). Hearths and pit features have been recovered from the interior of these house structures (Reid & Rajnovich 1982:103-4).

While not necessarily numerous, Initial Woodland Burials have been well-studied. This is because of their prominence in the landscape, often consisting of interments covered by earthen mounds of various sizes. These burial mounds are most common along the Rainy River, but other examples have been recorded south of Thunder Bay, and north to Red Lake (Kenyon 1986, Dawson 1981, Pelleck 1983). The mounds were constructed of relatively clean fill or sod over top of wooden cribbing or scaffold that contained the initial burials (Dawson 1981: 34, Wright 1986: 63-4). Remains of birch bark baskets have been recovered from the mound fill (Dawson 1981: 34, Wright 1986: 34). Subsequent burials, either primary inhumations or secondary burials, interred alone or in a mass burial have been recovered from the mound, and at its base (Wright 1986: 63). Some of the burials were coated with powdered red ochre, and grave goods included such items as lithic bifaces, ceramics, and exotic imports such as a monitor pipe, and an Ohio pipestone sucking tube (Dawson 1981:34, Wright 1986:64).

While the Laurel Tradition dominates the Initial Woodland period in northern Ontario, the Terminal Woodland fragmented into a number of different ceramic based Traditions or

Complexes: Blackduck, Selkirk Composite, and Sandy Lake/Psinomani Complex. The Rainy River Composite is a late Terminal Woodland complex found in the southwest of northwestern Ontario, northern Minnesota and southeastern Manitoba.

It has been hypothesised that these three different ceramic groups are the ancestors of today's Ojibwa (Blackduck), Cree (Selkirk), and Sioux (Sandy Lake).

The Sandy Lake ceramic tradition has been dated, with regional variations, between 1000 and 1750 AD. In northern Ontario, Sandy Lake ceramics likely date from 1200 AD (Gibbon & Anfinsons 2008). Sites with Sandy Lake ceramics are often associated with wild rice harvesting areas, and rice husking or 'jigging' pits have been recovered from Sandy Lake sites (Taylor-Hollings 1999: 1, 82, 100). The culture that utilised the Sandy Lake ceramics has been labelled "Psinomani", Dakota Sioux for wild rice gatherer (Taylor-Hollings 1992:6).

While Sandy Lake ware has been identified in Minnesota, North Dakota, southern Manitoba and eastern Saskatchewan, its distribution in Ontario is confined to the southern portion of the northwest part of the province, east from Lake Superior to the Lake St. Joseph region (Taylor-Hollings 1999:2). It is hypothesised that sites that contain small amounts of Sandy Lake ware versus other ware types may be indicative of trading, likely the wild rice that was contained inside rather than the pot itself (Taylor-Hollings 1999: 107).

Apart from wild-rice harvesting, the Psinomani utilised a variety of subsistence strategies: hunting of both land-based and aquatic mammals, local and migratory fowl, and fishing, as well as gathering wild 'crops' (Gibbon & Anfinsons 2008). It is possible that they also tapped maple trees for their sap (Taylor-Hollings 1999: 94-6). Bison bones have been identified from the Psinomani strata from the Long Sault site on the Rainy River, the furthest east that such remains have been recovered (Taylor-Hollings 1999: 96).

While no house plans have been recovered for Psinomani sites from Ontario, the faunal and botanical remains indicate that at least in some areas there was (semi-) permanent occupation of villages (Taylor- Hollings 1999: 108). Palisaded Psinomani villages have been excavated in Minnesota (Gibbon & Anfinsons 2008). Settlement type and locations indicate widely spaced settlement clusters, with a main village that housed up to 500 people in permanent base villages and small family rice harvesting, or foraging camps located close to the resource. Larger camps may have been formed for hunting larger game such as bison, elk, caribou or deer (Gibbon & Anfinsons 2008). No palisaded villages have been recovered from northwestern Ontario, however contemporary settlement patterning around Lake of the Woods may be similar to that encountered in Minnesota (Reid & Rajnovich 1980).

Sandy Lake pottery has a globular shape, and a slightly incurving and short vertical neck, with grit temper. Mussel shell has been identified in Sandy Lake ware from Minnesota, but is lacking

in its northern area of distribution. Decoration is rare, and confined to the neck and rim, consisting of incised lines, stamping, and exterior bosses / interior punctates (Wilford Laboratory of Archaeology 2010). Surface treatment or decoration has divided this ware group into three: that with vertical cord impressions is known as "Sandy Lake Corded", with a smoothed exterior has been labelled "Sandy Lake Smooth", and those vessels exhibiting a checked or stamped exterior is "Sandy Lake Stamped"(Taylor-Hollings 1999: 6).

Apart from an un-notched triangular projectile point, usually manufactured from quartz, the Sandy Lake / Psinomani tool kit did not differ greatly from the earlier Blackduck tool-kit (Taylor-Hollings 1999:82-3, 90-1, Gibbon & Anfinsons 2008).

The Selkirk Composite extends from north-central Saskatchewan, central Manitoba and northwest Ontario. It includes a variety of related regional complexes throughout these areas (McLean 1995: 78). Two Selkirk Complexes are present in Ontario, the Clearwater Lake Complex, and the Rainy River Composite, a late Selkirk manifestation in the southern part of Selkirk range around Rainy River and southeastern Manitoba (Mclean 1995: 79-81).

The Clearwater Lake Complex extends from northern Saskatchewan to at least the Albany River in northwestern Ontario, and was in existence between the 1300's and 1600's AD (McLean 1995: 80-85). It has been theorised that the northern Ontario Clearwater Lake Complex Selkirk may eventually form its own composite, as ceramics recovered have mixed Blackduck and Selkirk decorative motifs that are lacking from the other Clearwater Lake Complex sites (McLean 1995: 83). Laurel vessels with Selkirk decorative motifs have been recovered from Lake Nipigon (Dawson 1982:32).

Quartz formed the dominate tool-stone recovered from Clearwater Lake Complex sites (McLean 1995: 83). Triangular points have been recovered, however the majority were side-notched (McLean 1995: 83). End- and side scrapers, spokshaves, and bifacally flaked knives form the characteristic of the Clearwater Lake Complex lithic tool kit. Groundstone celts, adzes, net sinkers, abraders manufactured from slate, and hammerstones have also been recovered. Bone tools recovered include barbed harpoons, awls, scrapers, snow shoe needles, tubes, shaft straightners, beads, pendants, and moose jaw scrapers / snow knives, and antler flakers. Red Ochre has been recovered in raw form, as well as pigment decorating pottery (McLean 1995: 85).

Clearwater Lake Complex pottery is a thin (5-10mm thickness) grit-tempered ware, gobular in form, with a wide neck and vertical or outflaring rim (McLean 1995: 81-2). Decoration is limited to a row of punctates around the neck which formed interior bosses (McLean 1995: 81). Textile impressions are commonly found on the exterior of the vessels, even though most have gone through some degree of smoothing in the leather-hard stage (McLean 1995: 81).

Sandy Lake burials are divided into three types, intrusive burials dug into existing mounds,

primary mound burial where a flexed body would be placed into a pit with grave goods, and the site marked by a short conical stone mound, and interments without mounds (Taylor-Hollings 1999: 109).

Of the these Late Woodland ceramic complexes, Blackduck is the widest spread. It extends from Saskatchewan, through northern Ontario, east to Quebec, and south into the north half of Minnesota and Wisconsin. Evidence from excavations of campsites and burials indicates that the Blackduck tradition existed up to the period of European contact.

Blackduck ceramics are globular, and are more rounded than the other Late Woodland ceramics from northern Ontario, with a more constricted neck, and often have out-flaring rims. They are produced by the paddle and anvil technique, and tempered with grit. Decoration is usually limited to the interior and exterior of the rim, and the exterior neck. Decorative techniques include cord-wrapped stick stamping, "comb" stamping, punctuations of various kinds, and vertical brushing on the exterior rim surface. Distinctive of early Blackduck vessels is bossed decoration, a motif that appeared late in the Laurel sequence (Wilford Laboratory of Archaeology 2010, Wright 1967). Pottery of typical Blackduck manufacture but with Laurel design motifs have been recovered, and these have been dated to very early in the sequence, as early as 700 AD (Dawson 1982:32).

Non-ceramic artefacts considered typical of the Blackduck people include: clay pipes, stone oval and lunate chipped knives; side scrapers; trapezoidal, oval, and thumbnail end scrapers; tubular-shaped drills; steatite pipes; bone awls and needles; unilaterally barbed harpoon; spatulas antler flakers; beaver incisor knives; bear canine ornaments; and native copper fishhooks, gorges, and beads (Gibbon & Anfinson 2008).

An early Blackduck house was excavated in Kenora. Like the preceding Laurel houses, this was oval in plan measuring 9.5 x 5 metres, and contained a central hearths and three pits, but in this case was demarcated by postmoulds alone without any stone supports (Reid & Rajnovich 1983b: 5-10).

Blackduck burials continue the Initial Woodland tradition of mound burial (Kenyon 1986). When compared to the Laurel Tradition mounds from Long Sault and the Armstrong Mound, the Blackduck period mounds were lower, around 1to 1.5 metres high (Kenyon 1986). The initial burial phase often comprised of multiple secondary burials in a central pit, accompanied by grave goods. Unlike Initial Wooldand Mounds, which were constructed from clean sod and fill, Blackduck mounds were often constructed with refuse from hearths, or material from campsites (Wright 1986).

Evidence of scaffold exposure and de-fleshing of the remains has been identified (Kenyon 1986: 46-7). The bones were often wrapped in birchbark shrouds (Kenyon 1986: 44-72). Some of the

adult skulls showed evidence of having been covered with clay masks (Kenyon 1986: 56). Both adults and older sub-adults were found to have holes that had been incised in their occipital bones, likely to facilitate the removal of the deceaseds' brains (Kenyon 1986: 56). Powdered red ochre was distributed over burials. A 'roof' of logs was occasionally constructed over the pit, and a mound was constructed over top of this burial. If no wooden roof superstructure was installed, the burials were filled in with earth as the mound over top was constructed on top of them.

Hungry Hall Mound I when excavated, indicated it had bee reused after the initial interment, with two subsequent secondary mass secondary burials excavated into the mound. A final burial phase involved what has been hypothesised to be the construction of a funeral pyre, as cremated human remains, charred oak logs, ash and charcoal were recovered in the fill of the mound (Kenyon 1986: 44-6).

Grave goods included ceramic vessels, shell and bone beads, utensils and tools, sucking tubes made from exotic or imported stone, stone knives and scrapers. Later Blackduck burials have been found with copper kettles, bangles and awls, iron axes, knives and utensils, and glass beads that had been sewn onto bags or strung onto necklaces (Kenyon 1986: 67).

Northern Ontario was not completely isolated from the south. Late Woodland pottery originating in southern Ontario has been recovered from sites near Thunder Bay, Lake Nipigon, Sault Ste. Marie, Elliot Lake, and Lake Nipissing (Brooks 2013, Dawson 1983:53, Filteau 1978: 63, Noble 1979: 20-1, Robertson et al 1997: 17-23). Locally produced painted Middle Woodland pottery with parallels from southern Ontario has been recovered from Whitefish Island near Sault Ste. Marie (Adams 1979: 12-13). Locally produced Late Woodland pottery recovered from Sault Ste. Marie exhibits influence from southern Ontario in both form and decoration (ASI 2010: 9-10).

1.3.2 Post-Contact

The project area was part of the lands ceded to the Crown under the Robinson-Huron Treaty of 1850, which included the north shore of Lake Huron from Matchedash Bay to Batchewana Bay north to the height of land that separates the Great Lakes from the Arctic watersheds. The First Nations population of the entire treaty area was estimated at 1240 (Surtees 1986: 19). The First Nations around Sault Ste. Marie were given reserves at Batchewana Bay and Garden River. The size of the territory reserved for the two bands was decreased with the cessation of further lands in the Pennefather Treaty only nine years after Robinson-Huron (ASI 2010: 12).

First contact between Europeans and the local First Nations is believed to have taken place in 1607 when Etienne Brule travelled to the area. Information from the 1607 trip, as well as a later one in 1622 was used in Champlain's 1632 map of New France. The land was formally claimed for France in 1671, as part of their claim over all land west of Montreal.

A permanent Jesuit mission was established in 1669, and the area claimed as part of France's claim of dominion over all land west of Montreal. The site of the mission today is located on the Michigan side of the St. Mary River. It was at this time that the area was named Sault Ste. Marie, in honour of the Virgin Mary. Brule had named the area Sault du Gaston previously, in honour of King Louis' brother. The Jesuit mission was not successful. It was finally abandoned in 1689 under threat of Iroquois attack after numerous previous destruction and rebuilding episodes.

The fur trade, rather than religion was the impetus for the next European ventures into the area. In order to sever British trade with the First Nations, the French constructed a palisaded trading fort on the Michigan side of the river in 1750. This post was surrendered to the British in 1763 with the loss of their North American territory. Two independent traders took possession of the outpost ca. 1765.

The first European trade post to be constructed in Sault Ste. Marie Ontario was with the arrival of the Northwest Company in 1788. In 1797 the Northwest Company constructed a canal to by-pass the rapids and remove the need for a lengthy portage. The post and lock were destroyed by American invaders in 1814, however within a year the post had been repaired and was once again in operation. The canal was not similarly repaired.

The Northwest Company post was taken over by the Hudson's Bay Company (HBC) after the merger of the two firms in 1821. The importance of the post in the fur trade went into decline, as the HBC preferred to ship furs from Hudson's Bay. The post was operating at a loss by 1828, but remained in operation in order to maintain good relationships with the local First Nations, and prevent the incursion of rival traders. The focus of the post shifted to supplying local settlers and shipping of fish. The post was ultimately closed in 1869.

Sault Ste. Marie's population remained fluid for much of the early 19th Century, with the rise and fall of the timber and mining industries in the region. One of the deterrents to settlement was believed to be the inability to purchase land, as no treaty had been signed with the local First Nations. With the signing of the Robinson-Huron Treaties, land was opened for survey and settlement. Local government was established with the creation of the Judicial District of Algoma in 1858.

Settlement in the area increased dramatically after the establishment of the Free Grants Act in 1868, with Sault Ste. Marie serving as a hub for east-west travel and communication. The creation of a canal on the American side greatly facilitated transit, however in times of political strife, access to transit the canal was denied by the American government. A canal on the Canadian side was opened in 1895.

With the arrival of the Algoma Branch of the Canadian Pacific Railway in the 1887, Euro-Canadian settlement increased markedly, many of the people taking advantage of free land grants

with the promises of fertile soil for farming (Commissioner of Crown Lands 1884: 16, Algoma Land & Colonization Co. Ltd. 1892) . Fertile soil proved to be lacking, and many people turned to other industries for employment.

A major force in the development of Sault Ste. Marie was Francis H. Clergue. Between 1894 and 1903, Clergue and his companies operated the hydro-electric plant, with a contract to supply the town and all businesses located in it, the Ontario Pulp and Paper Company, the Tagona Water & Light Company including a contract to supply water to the town for two decades, a sulphite mill, which necessitated the purchase of a nickel mine, and the Algoma Steel Company created in 1901, beginning Sault Ste. Marie's association with steel production. Of course, Clergue owned a number of the newly discovered iron mines in the area. As with any good 19th Century industrialist, Clergue was also heavily involved in the development of railroads.

Clergue's companies were organised under the umbrella of the Consolidated Lake Superior Corporation by 1902. Financial difficulties forced Clergue to give up his companies in 1903, and after an unsuccessful attempt to regain control in 1904, he left Sault Ste. Marie in 1908, returning once in the 1920's and 1930's to attend public functions.

1.3.3 Study Area Specific History

St. Mary Township was surveyed in 1859, and divided into sections and Park Lots. In 1887 much of the township, up to Park Lots on Concession 3 was annexed to the town of Sault Ste. Marie. This includes the study areas. In 1902 the northern-most Park Lots on Concession 4 became part of Tarentorus Township when it formed its own municipality.

The area comprising the MacDonald project area was part of 50 acres on Lot 7 Concession 2 patented to John McNab (also spelled McNabb and MacNabb on the Patent Plans) on June 24th 1857. McNab, his wife Anna, and R. Dalton mortgaged the whole Lot to Stephen Richardson on May 10th 1862 for $1200 a month. The mortgage was discharged July 6th 1874. The Grantees for the mortgage's discharge are R. Dalton and Mrs. Anna McNab. John McNab died earlier the same year, his will being probated on July 15th 1874. Interestingly, Mrs. McNab and Dalton mortgaged the whole lot to Joseph Donaldson on June 8th 1874 for $8000 prior to Stephen Richardson's mortgage being discharged. Anna McNab issued Donaldson a bill of sale for the whole lot on the same day.

After the sale of Lot 7 Concession 2 to Donaldson, the land seems to have been rapidly subdivided, however there are no indications of the location of the severances. **Table 1** gives a list of the land transactions from the original patent to John McNab until 1932, after which point the transactions deal with the sale of a variety of house lots without description of their location.

No records for Lot 10 Concession 3 were able to be located.

Table 1: Lot 7 Concession 2 Township of St. Mary Land Transactions 1857-1932.

No. of Instrument	Instrument	Its Date	Date of Registry	Grantor	Grantee	Quantity of Land	Consideration or Amount of Mortgage	Remarks
	Patent	24th June 1857		Crown	John McNab			50 Acres
52	M	10th May 1862	17th May 1862	J. McNab & R. Dalton	Stephen Richards		$1,200	Whole Lot
241	D of M	6th July 1874	18th Sept 1874	Stephen Richards	R. Dalton and Mrs. A (Anna) McNab		Ditto	Ditto
242	M	8th June 1874	18th Sept 1874	Joseph Davidson	Ditto Ditto		$8.000	Ditto
243	B + S	8th June 1874	18th Sept 1874	Anna McNab	Joseph Davidson		$12,500	Ditto
9	Probate of Will	15th July 1871	20th Oct 1874	John McNab				
500	B + S	23 May 1881	4 June 1881	Joseph Davidson et ux	Helen Leys		$10,000.00	9/20ths undv'd 19 Lots
501	M	4 May 1881	4 June 1881	Helen & John Leys	Henry Taylor		$20,000.00	~
10	By Law	7 Feb 1882	15 Mch 1882	Mun. Sault Ste. Marie	Mun. Sault Ste. Marie			N 33 x 990 ft Road
Awenge 15	M	1 Oct ~	9 Nov ~	R. Laird et ux & W.H. Laird	John Laird		$10,000.00	7/32 interest 14 Lots

No. of Instrument	Instrument	Its Date	Date of Registry	Grantor	Grantee	Quantity of Land	Consideration or Amount of Mortgage	Remarks
28	D of M	11 Aug 1885	26 Sept 1885	John Laird	R. & W.H. Laird		~	~ no. 15
R.S. 692	B + S	5 June ~	~ ~ ~	Robt Laird et ux	Wm. H. Laird		$1.00	7/64 ~
T.A 29	M	23 July ~	~ ~ ~	Wm. H. Laird	John Laird		$5,000.00	~ ~
T.A. 30	~	~ ~ ~	~ ~ ~	Robt Laird et ux	~ ~		$5,000.00	~ ~
~ 51	A of M	Oct 1 /87	Oct 19 /87	Henry Tayler	Ont. Inv. Assoc		$200.00	9/20 No. 501
~ 91	Lib Pen	Nov 8 /87	Nov 14 /87	Thos. Robertson & Co et al	R.H. Laird et al			
111	~	Nov 19 /87	Nov 29 /87	~ ~ ~ ~	~ ~ ~ ~			
408	B + S	Oct 8 /87	My 5 /88	H.E. Leys et ux et al	Ont. & SS Marie	2 20/100	$5,000	Several
452	QC	Dec 6 /88	My 22 /88	Robt Laird et ux	W.H. Laird		$10,000	7/64 un int 14 Lts
64	Pt D of M	Aug 28 /88	Sep 17 /88	Ont Inv Assoc	Helen E. Leys	2 24/100		Pt. 501
66	~ of R	Sep 4 /88	~ ~ ~	Ont Inv Assoc	Cana Pac R co			9/20 int pt
73	~ of M	Oct 15 /87	~ ~ ~	John Laird	Robt Laird			7/64 in 2 20/100 Pt. T.A. 30

No. of Instrument	Instrument	Its Date	Date of Registry	Grantor	Grantee	Quantity of Land	Consideration or Amount of Mortgage	Remarks
illegible	~	~ ~ ~	~ ~	~ ~	W Laird			~ ~ ~ ~ 29
illegible	~	Mch 3 /87	~ ~ ~	R.G. Dalton & A. McNab	Jos. Davidson			~ ~ ~ no. 242
113	Tis Pens	Jan 19 /89	Jan 24 /89	Hugh McDonald	J. Laird & R.H. Laird- Davidson			
242	M	Dec 29 /89	Mar 9 /89	John Leys	Dominion Law Inv Loc		$50,000	und 9/20 int
382	B + S	Dec 8 /88	Ap 29 /89	Helen E. Leys	John Leys		$50,000	~ ~ ~ other lots
2026	D of Tis Pen	Feb 27 /90	Mch 1/90	Hugh MacDonald	J. Laird & H. Laird-Davidson			
2034	B + S	Sep 30 /89	Ap 14 /90	John Leys et ux et al	Cand Pc Rl Co		$3750	Pt Rt of W CPR
2119	Tis Pen	May 17 /90	May 21 /90	Joseph Lowrie	R.H. & W.H. Laird, Jos Davidson			(see order vacating Lic Pen ....) MLH July 3 /29
2124	B + S	Ap 1 /90	May 28 /90	W.H. Laird et ux	Cand Pac R Co	Pt.	$704	R of Way
2131	~	Jan 20 /90	June 3 /90	Jos. Davidson et ux	W.H. Laird		$1	9/64 int
2165	Pt D of M	~ 29 /90	~ 27 /90	John Laird	W.H. Laird			7/64 no 29

No. of Instrument	Instrument	Its Date	Date of Registry	Grantor	Grantee	Quantity of Land	Consideration or Amount of Mortgage	Remarks
2263	M	July 7 /90	Sep 18 /90	Robt Laird et ux	A.L. Laird		$1200	~ ~
2301	B + S	Dec 2 /90	Oct 25 /90	W.H. Laird et ux	Robt Laird		$10000	~ ~
2355	M	Nov 20 /90	Jany 39 /90	Robt Laird et ux	W.H. Laird		$3000	7/64 int
3206	Plan	May 1 /93	May 18 /93	Ley Sub				See 7^{7} for 119
3424	Cert of Ord	May 12 /94	May 25 /94	John Laird vs	Cand Pac R Co	Pt		
4839	B + S	Jany 11 /97	Mar 2 /97	Ont SS Marie RR Co	Chas. M Hays Trts			
3816	Pt D of L Pens	Nov 7 /93	Augst 19 /95	Thos. Robertson & A. Ass	Jos. Davidson			No 91 -
3817	~ ~	~ ~	~ ~	~ ~ ~	~ ~			No 111
4839	B + S	Jany 11 /93	Mar 2 /97	Ont SS Marie RR Co	C.M. Hays (Trust)	2 24/100 ac	$1	
6977	B + S	Jany 15 1901	Jany 31 1901	Chas. M. Hays (Trust)	Geo. B. Reeve Trustee	pt	$1	
7535	D of M	May 2 1901	May 29 1901	John Laird	H. Laird	7/64 int		no 29 -

No. of Instrument	Instrument	Its Date	Date of Registry	Grantor	Grantee	Quantity of Land	Consideration or Amount of Mortgage	Remarks
7544	QC	Apr 28 /888	May 30 /901	S.M. Thomson executrix A.C. Thompson	Wm. H. Laird		$1	
8439	B + S	Dec 25 -01	Dec 27 /01	Geo. B. Reeve Trustee	Chas. M Hays Trustee	Pt	$1.00	Same as 408
9012	D of M	Apr-24-01	May-5-02	Ontario Investment Co	F.B. Leys			no. 501-
22151	B + S	June 9/13	July 8/13	Clara G. Hays Ex of C.M. Hays	E.J. Chamberlin		$1 and Premises	Pt other Lots
27263	~	Feb 5/17	Apl 29/17	E.J. Chamberlain	Grand Trunk Ry Co		$1 previous	pt
36050	Certificate of Discharge of Lic Pendias	Mar 19 1926	Apr 3 1926	The Alpha Oil Gas & Mining Co of on (illegible) Thos Robertson who are as well on their own behalf as on behalf of all other directors of R.H. Laird	Robt. H. Laird and Joseph Davidson	other lots		

No. of Instrument	Instrument	Its Date	Date of Registry	Grantor	Grantee	Quantity of Land	Consideration or Amount of Mortgage	Remarks
38667	Grant	Oct 25 /29	Dec 28 / 29	Can National Ry Co	Can National Realties Ltd	~	$2.00	Pt being strip 100' wide see deed
40134	Lieu	Feby 16/32	Feby 16 /32	Jn E. Rewcastle Neil Tume (?) Can(illegible) of business under former name of Rewcastle France(?)	Augustus Selumnowski & Lenard PilKurdiftori(?) Can National Realties Ltd	~	$635.20	Pt ~ ~ ~ ~ see Lieu
40139	Lieu	Feby 19 /32	Feby 24 /32	Taylor Taylor Ltd (?)	Soo Winter Playground, A.F. Selumnowski, and Henson(?) Lumber Co. Ltd	~	$309.91	Pt 2 Lots see Lieu
40143	Lieu	Feby 25 /32	Feby 25 /32	Archibald G McDonald	Soo Winter(?) Playground, A.F S(?)owski & Hess(?) L Co Ltd		$176	Pt 2 Lots see Lieu

No. of Instrument	Instrument	Its Date	Date of Registry	Grantor	Grantee	Quantity of Land	Consideration or Amount of Mortgage	Remarks
40147	ceil.	Mar 3 /32	Mar 3 /32	Jn E Rewcastle O Neil Terr(?) ca(?) business under name of Rewcastle, Terrace, Rewcastle Fournier (?)	Augustus S(?)owski, Leonard Pilk..(?) Can Natn R Ltd	merlauds (?)	$610.23	Pt being strip 100' wide for (illegible)
4023	Ceil	Apr 29 /32	Apr 29 /32	Archibald G McDonald	Soo Winter (?) Playground & A.F. S(?)owski, Henson(?) L Co		$167.00	Pt 2 Lots see cert (?)

1.3.4 Maps

Champlain's map of 1632 depicts the Sault Ste. Marie Area, which shows the St. Mary's River with a group of First Nations cabins along it (Champlain 1632). A 1653 map of the area names the rapids "Sault St. Pierre" (Duval & Champlain 1653).

The two properties under assessment were originally part of St. Mary Township. The 1859 patent map of St. Mary and Tarentorus Townships show a Jonathan MacNab owning Lot 7 Concession 2, the McDonald project area and a Henry C.R. Becher on the McNabb project area on Lot 10 Concession 3. The same names appear on another undated map of St. Mary's Park Lots as well. On this second map, the watercourse that goes through the centre of the McNabb project area is depicted.

An 1855 map of Sault Ste Maire depicts the project areas, and again shows the McNabb project area's watercourse flowing through Pewabic Mountains to the southwest and into the St. Mary's River (Whitney & Colton 1855). Modern maps depict this water course as intermittent, and not flowing all the way to the river.

NTS Mapsheet 41K9 did not yield any further information on the project areas.

1.3.5 Summary of Historical Context

Situated on the St. Mary's River Sault Ste. Marie has seen continuous habitation for thousands of years as the First Nations harvested fish along the river and the rapids that gave the modern city its name. Early explorers mention the large number of First Nations who lived, traded and fished in the area.

The earliest European settlement came in form of a short-lived Jesuit mission. This was followed by fur-traders who used the St. Mary's River as part of the fur-highway connecting Montreal with the North American interior. A trading post was established by the French in the 18th Century, to be taken over by independent traders after 1763. This trading post was superceded by the Northwest Company's post, which was taken over in 1821 by the Hudson's Bay Company after the two companies merged.

Sault Ste. Marie struggled to maintain a steady population as the fur trade waned, partly because of the lack of land available for settlement. The Robinson-Huron Treaty opened up land for settlement, followed by the establishment of the District of Algoma. Free land grants enticed people to the region, however much of the land proved unsuitable to agriculture, and settlers migrated to the mining and lumber industries for employment. These industries proved unreliable as timber stands were depleted and mines opened and closed, causing Sault Ste. Marie's population to fluctuate markedly.

American industrialist Francis H. Clergue arrived in Sault Ste. Marie in the late 19th Century, and either resuscitated or founded a series of companies that put the city on a firm industrial footing. Cleurge lost control of his companies by 1904 after they suffered a series of cash flow problems.

The project areas were initially part of St. Mary's Township, which was relatively rapidly absorbed into the City of Sault Ste. Marie. Each project area was initially owned by people who owned multiple properties in the township, but records were only available for the MacDonald project area that was initially patented to John McNabb. The property was rapidly subdivided afterwards.

1.4 Archaeological Context

1.4.1 Current Conditions

The McNabb project area is located on Lot 7 Concession 2 St. Mary's Township, and runs roughly east-west between Pim Street and Gladstone Avenue, south of Bruce Street, and north of MacDonald Avenue. Immediately north of the project area is a public park, to the south an abandoned school and grounds, and the parking lot of the Our Lady of Good Counsel Roman Catholic church. The project area is a steeply sloped ravine with a narrow meandering water course at its bottom (**Figures 1-3**). The rim and upper slopes of the ravine are forested with various sized trees, the lower slopes covered in scrub brush and shrubs, and the ravine bottom with tall flowers and grasses. The winding nature of the water course has formed a narrow discontinuous flood plain in the valley bottom. The largest single portion of the floodplain was located near the project area's southwest border, and measured approximately 10 metres long, and 3 metres wide (**Figure 4**).

The MacDonald project area is located on Lot 10 Concession 3 of St. Mary's Township, south of MacDonald Avenue, and extends south to Ontario Avenue. Like McNabb, the MacDonald project area was composed of a ravine with a narrow water course at the bottom. At Ontario Avenue, the project area extended to the east to Pine Street. The ravine bottom sloped to the south towards Ontario Street, and the water course in places was not well defined (**Figures 5 & 6**). The slopes of the ravine were tree covered, and the bottom was covered in long grasses. The ravine narrowed to less than two metres at its northern edge (**Figure 7**). Along Ontario Street, the project area was covered in large bushes and long grasses (**Figure 8**).

1.4.2 Physiography

The bedrock of the project areas is a mixture of sandstone and undifferentiated limestone and shale (Ontario Department of Mines 1966). Both project areas' soil is composed of Tavistock Till (SSMRCA 2011). Both Project areas are located on the edge of the Korah Strandline. This ancient beach ridge was formed between 10,500 and 10,000 B.C. (ASI 2011: 58-60, Figure 57).

1.4.3 Previous Archaeological Assessments

No archaeological assessments have taken place within the bounds of the project area, nor adjacent to it.

Archaeological Services Inc has created an archaeological master plan for the City of Sault Ste. Marie (ASI 2011). This document examined a variety of factors including known archaeological sites, historical documents, palaeoenvironmental studies, geology, physiography, and hydrology to determine areas within Sault Ste. Marie that are considered as containing high archaeological potential. Both the McNabb and MacDonald project areas were classified as zones of high archaeological potential (ASI 2011: Figure 79).

1.4.4 Registered Archaeological Sites

A request of the MTCS data base yielded 2 archaeological sites within 1 kilometre of the study area (von Bitter 2014). The two sites are the Curran Site (CdIb-3), and the Mystery Hand Site (CdIb-4).

The Curran Site (CdIb-3) Site was an Archaic campsite located near a beach ridge, and artefacts comprised of a single stone axe found while a yard was being dug up for the installation of drainage tile in the 1920's. The Curran Site was located roughly between the two project areas.

The Mystery Hand Site (CdIb-4), now covered by a public utilities commission building was an early contact site that comprised of a hand created out of 'sponge', or impure iron, as well as a brass cross that is thought to be part of a portable altar. The site has been dated to 17th Century.

2.0 Field Methods

The project areas were located in high potential areas, with water courses running through them, and in close proximity to an archaeological site. Stage 2 Assessment took place on Tuesday, September 2nd 2014 under predominantly sunny skies. Temperatures ranged between a low of 13° and a high of 24° Celsius. Fieldwork was not affected by unfavourable conditions that would reduce ability to identify and document any part of the archaeological site, as laid out in Section 3.2 of the 2011 Standards and Guidelines for Consultant Archaeologists (MTCS 2011: 25). The maps and plans contained in this report represent the best available and reflect those which will be used in the proponent's application.

Owing to the narrow irregular flood plain on the McNabb project area, 5 m interval transects were not possible. Test-pits excavated were composed of wet grey soil, and filled with water during excavation (**Figure 9**). The MacDonald project area was wider and allowed test pitting at 5 m intervals throughout much of its extent, save at the north end where the ravine narrowed drastically. Along the ravine the test pits were composed of light brown wet soil, and water would seep from the test pit sides and bottom **(Figures 10 & 11**). In the south and eastern parts of this project area, test-pits were composed of gravel and sand fill, and were likely disturbed during road construction (**Figure 12-15**). No areas that were steeply sloped were subject to Stage 2 Test Pit Assessment.

Approximately 45% of the McNabb Project Area was found to be low-lying and wet, and the remaining 55% was comprised of steeply sloping topography (**Map 3**). The MacDonald Project Area was composed of 60% steep slope, 20% low-lying and wet, and 20% disturbed (**Map 4**).

3.0 Record of Finds

No artefacts nor subsurface features were identified.

4.0 Analysis and Conclusions

4.1 Conclusions

No archaeological sites were identified during Stage 2 Assessment.

5.0 Recommendations

It is therefore recommended that the McNabb and MacDonald Storm Water Management project area requires no further assessment.

6.0 Advice on Compliance with Legislation

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

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

Should previously unknown or deeply buried archaeological resources by uncovered during development, they may be a new archaeological site and therefore subject to Section 48 (1) of the Ontario Heritage Act. The Proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologists to carry out archaeological fieldwork, in compliance with Section 48 (1) of the Ontario Heritage Act.

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

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the Ontario Heritage Act and may not be altered, or have artifacts removed from them, except by a person holding an archaeological license.

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8.0 Images

Figure 1: McNabb Project Area from Northeast Corner. Facing West.

Figure 2: McNabb Project Area from Southwest Corner. Facing East.

Figure 3: McNabb Project Area, Watercourse. Facing Southeast.

Figure 4: McNabb Project Area Floodplain. Facing East.

Figure 5: MacDonald Project Area, Steep Slope. Facing South.

Figure 6: MacDonald Project Area. Facing North.

Figure 7: MacDonald Project Area, Northern Border. Facing South.

Figure 8: MacDonald Project Area, East Arm. Facing West.

Figure 9: McNabb Project Area Wet Test Pit. Facing East

Figure 10: MacDonald Project Area Test Pit. Facing West.

Figure 11: MacDonald Test Pit Profile. Facing West.

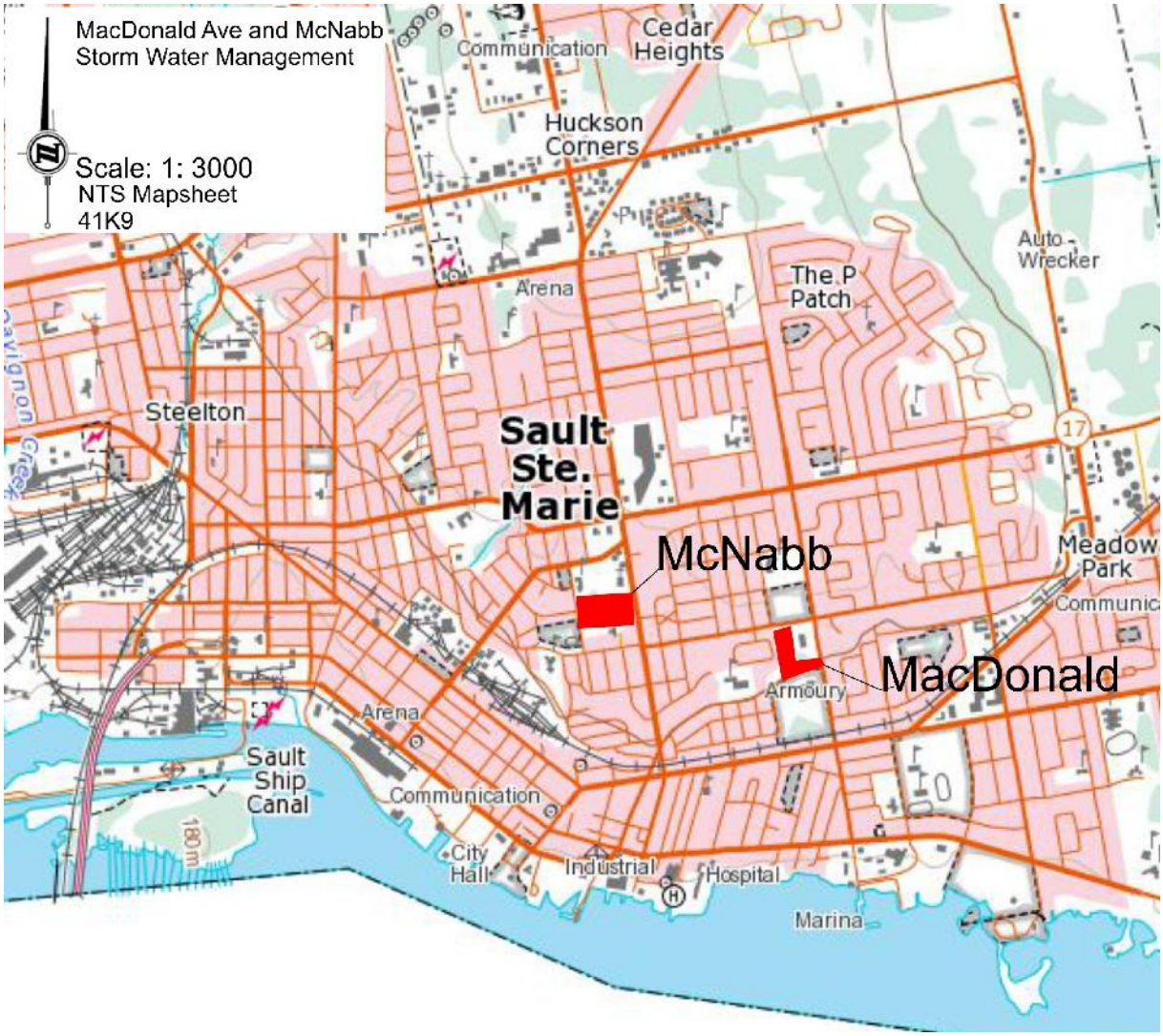
Figure 12: MacDonald Project Area Disturbed Test Pit Plan. Facing East.

Figure 13: MacDonald Project Area Disturbed Test Pit Profile. Facing West.

Figure 14: MacDonald Project Area Disturbed Test Pit. Facing West.

Figure 15: MacDonald Project Area Disturbed Test Pit Profile. Facing West.

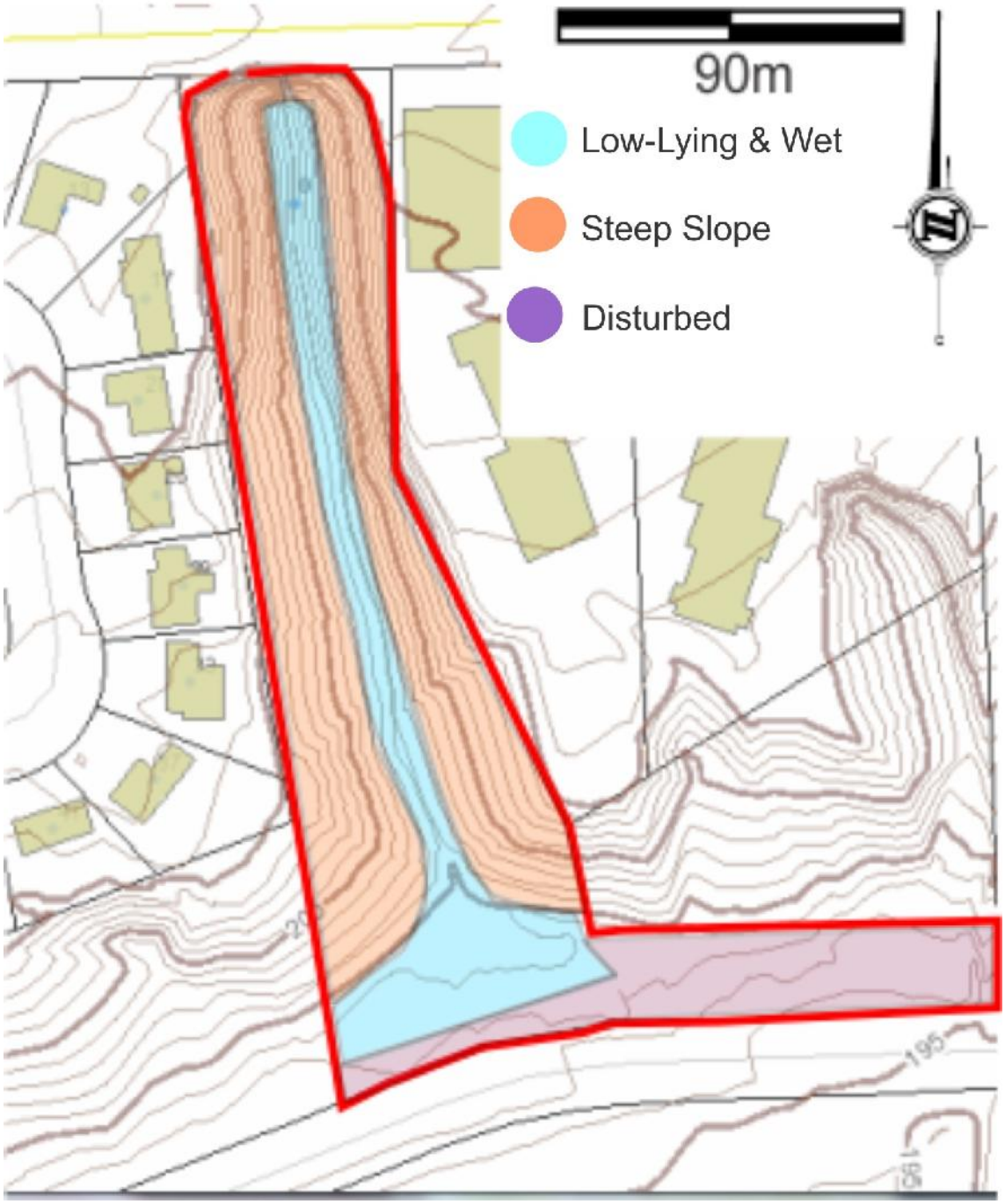
9.0 Maps



Map 1: Project Area Locations.

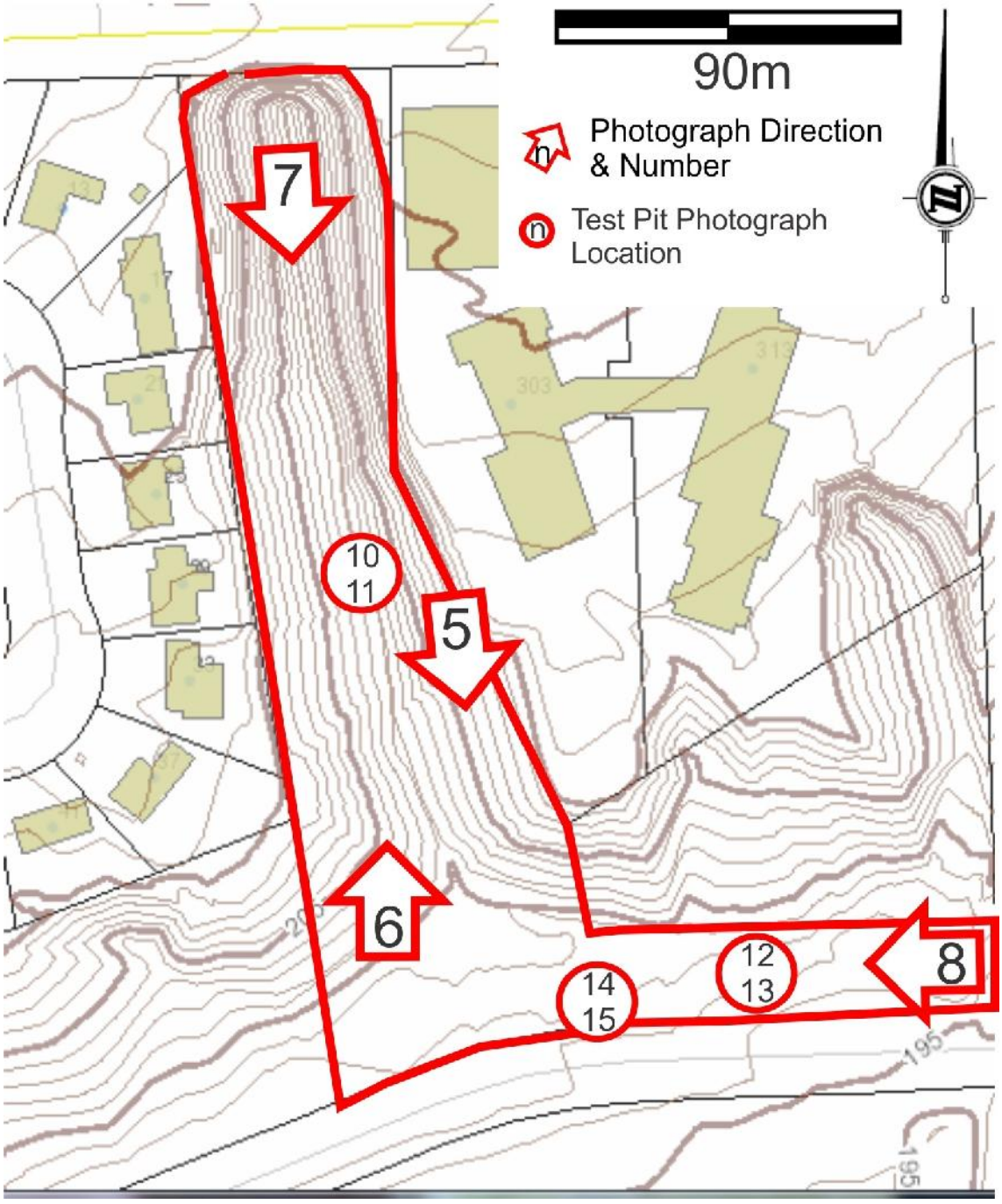
Map 2: Proponent Supplied Development Map.

Map 3: McNabb Project Area



Map 4: MacDonald Project Area

Map 5: McNabb Project Area with Figure Numbers and Direction Mentioned in Text



Map 6: MacDonald Project Area with Figure Numbers and Direction Mentioned in Text.

Appendix 1
Documentary Record Generated in the Field

The documentary record generated in the field during the MacDonald Avenue and McNabb Storm Water Management Project includes four pages of handwritten notes and sketch maps, GPS points and 44 digital photographs.

Exposure Number	Subject
DSCF0885	Photoboard
DSCF0886	McNabb Project Area
DSCF0887	McNabb Project Area
DSCF0888	McNabb Test Pit
DSCF0889	McNabb Test Pit
DSCF0890	McNabb Test Pit
DSCF0891	McNabb Test Pit
DSCF0892	McNabb Creek/Ravine Bottom
DSCF0893	McNabb Ravine Bottom
DSCF0894	McNabb Ravine Bottom
DSCF0895	McNabb Steep Slope
DSCF0896	McNabb Creek/Ravine Bottom
DSCF0897	McNabb Steep Slope
DSCF0898	McNabb Project Area
DSCF0899	McNabb Steep Slope
DSCF0900	McNabb Ravine Top
DSCF0902	McNabb Ravine Edge
DSCF0903	McNabb North Project Boundary
DSCF0904	McNabb North Project Boundary
DSCF0905	McNabb Ravine Bottom
DSCF0906	McNabb Ravine Looking to Bottom
DSCF0907	McNabb South Project Boundary
DSCF0908	MacDonald Project Area Photoboard
DSCF0909	MacDonald Project Area
DSCF0910	MacDonald Project Area

Exposure Number	Subject
DSCF0911	MacDonald Steep Slope
DSCF0912	MacDonald Steep Slope
DSCF0913	MacDonald Ravine Creek/Ravine Bottom
DSCF0914	MacDonald Steep Slope
DSCF0915	MacDonald Project Area
DSCF0916	MacDonald Steep Slope
DSCF0917	MacDonald Wet Test Pit Plan
DSCF0918	MacDonald Wet Test Pit Profile
DSCF0919	MacDonald Low-Lying and Wet Ground Surface
DSCF0920	MacDonald Ravine Bottom
DSCF0921	MacDonald Narrow Northern Part of Project Area
DSCF0922	MacDonald Narrow Northern Part of Project Area
DSCF0923	MacDonald Disturbed Southern Part of Project Area, Cement / Concrete Rubble
DSCF0924	MacDonald Disturbed Test Pit Plan
DSCF0925	MacDonald Disturbed Test Pit Profile
DSCF0926	MacDonald Disturbed Test Pit Plan
DSCF0927	MacDonald Disturbed Test Pit Profile
DSCF0928	MacDonald Southern Part of Project Area

APPENDIX 6

Public Open House #2 Information

Notice of Public Consultation Centre

Flooding in the McNabb Street and MacDonald Avenue Areas

The City of Sault Ste. Marie has initiated two Class Environmental Assessments (EA's) to review the storm water drainage system in the vicinity of McNabb Street east of Pim Street and on MacDonald Ave near Brien Avenue.

These projects are being planned as Schedule 'C' projects under the Municipal Class Environmental Assessment process.

Study Area #1 - McNabb St

The storm water drainage system in the vicinity of McNabb Street, Pim Street and Willow Avenue is being reviewed. The intent of the study is to determine the preferred method of reducing the frequency of local flooding in the lower Willow Avenue, McNabb Street and upper Pim Street areas. Alternative solutions were presented in a January 2014 Information Session, which have now been evaluated. The preferred solution involves storm sewer improvements between McNabb St and Pim St through Poplar Park and the parking lot of the Canadian Motor Hotel, in combination with temporary storage of excess storm water in the ravine running between Pim St and Gladstone Ave, south of 415 Pim St (Great Lakes Honda). The study area has been expanded to include properties bordering on the ravine.

Study Area #2 - MacDonald Ave

The intent of this study is to determine the preferred method of reducing the frequency of local flooding on MacDonald Avenue between Poplar Avenue and Alworth Place. Alternative solutions were presented in a January 2014 Information Session, which have now been evaluated. The preferred solution involves storm sewer improvements on MacDonald Ave to drain excess storm water into the ravine running between MacDonald Ave and Ontario Ave, where it will be stored temporarily in the ravine before discharge into the Pine St storm sewer system. The study area has been expanded to include properties bordering on the ravine.

A key component of the study is consultation with interested stakeholders (public and review agencies). A Public Consultation Centre will be held:

Thursday November 12, 2015
Plummer Room - Civic Centre
from 3:00 p.m. to 7:00 p.m.

Consultants and municipal staff will be available to discuss the drainage issues in the two study areas, and get input from interested parties on the preferred solutions.

The public is invited on a come and go basis between 3 p.m. and 7 p.m. to visit and provide input or have questions answered.

Subject to comments received as a result of this notice, the City plans to proceed with the completion of Class EA's for these projects and Environmental Study Reports will be prepared and placed on the public record for a minimum of 30 days.

PTO

For more information, please contact:

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Don Elliott, P. Eng.
City of Sault Ste. Marie
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Sault Ste. Marie, ON
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Phone (705) 759-5329
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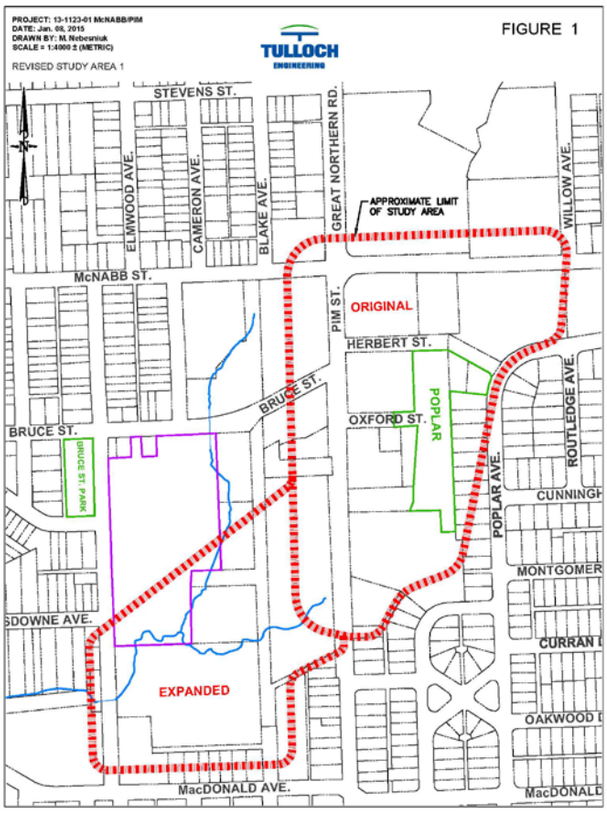
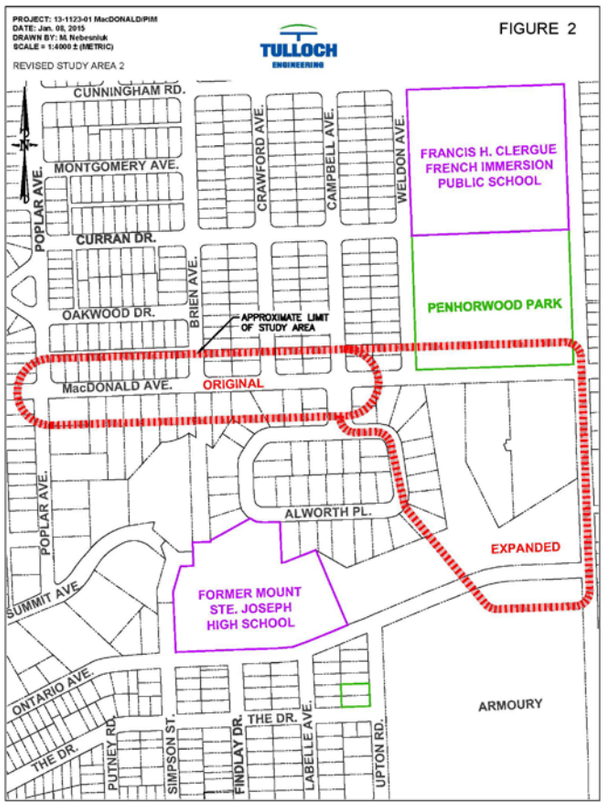
Information will be collected in accordance with the *Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

Study Area #1



Study Area #2



MacDonald Avenue Storm Water Drainage

Class Environmental Assessment

INFORMATION BULLETIN

November 2015

Introduction

Street flooding on MacDonald Avenue has occurred fairly regularly in the Brien Avenue area, as a result of the storm sewer system backing up during heavy rain falls. As a result homes on the south side have experienced basement and surface flooding, in driveways and on front lawns. A class environmental assessment is being undertaken by The City's Engineering and Planning Department to look for ways to reduce the frequency of flooding in the area. This is the second public open house being held in order to present the preferred option and to consult with the public and to request feedback.

Background

In 2011 City Council requested the Engineering Department review the storm drainage system and to recommend a solution to address the issue. In 2012 a Storm Sewer Capacity Analysis and Condition Assessment was completed by Tulloch Engineering for the storm drainage area. The report concluded the storm sewer is inadequate to convey flows from a 2-year storm without the presence of surface flooding on MacDonald Avenue in the vicinity of Brien Avenue. The City's design standard is for storm sewers to have capacity to carry 10 year storm events. The critical capacity restrictions occur on Pim Street from Borron Avenue to MacDonald Avenue, and along MacDonald Avenue from Pim Street to Brien Avenue.

Class Environmental Assessment

Infrastructure projects undertaken by municipalities must follow a Class Environmental Assessment process, which is a streamlined approach used for routine and predictable projects to fulfill the requirements of the Environmental Assessment Act. The Class EA process was developed to ensure that environmental concerns are addressed and public consultation is sought.

Alternative Solutions

The first public open house was held in January 2014 to present the problem/opportunity along with alternative solutions and to seek input. Alternative solutions included complete sewer replacement of all undersized sewers to the St Mary's River, underground storage, constructing relief sewers to other systems, and temporarily storing excess water in natural ravines.

Based on public input during the first open house, the study area limits were expanded to include temporary storage of water in the natural ravine south of MacDonald Avenue, between Alworth Place and Pine Street.

An additional open house is now being held to present the preferred solution along with various design concepts.

Preliminary Preferred Solution

After evaluating the alternatives the preferred solution is to redirect storm water flows from the top end of the MacDonald Ave storm water catchment area to the natural ravine east of Alworth Place, on the south side of MacDonald Avenue. This will reduce the potential for flooding on the street to the 10 year design storm average.

The drainage in the ravine flows to the Ontario Ave/Pine St storm sewer system. The addition of extra water into this system would exceed its capacity. So in addition to redirecting flows here from MacDonald Ave, the preferred solution also includes constructing a small dam and control structure near Ontario Ave, to temporarily store excess water during major rainfalls until the Ontario/Pine St storm system can handle the flows.

PTO

A) Preliminary Preferred Conveyance (in ground piping) Solution

Two new storm sewer installations were considered; one draining from the MacDonald Ave/Brien Ave intersection to the ravine, the second one draining from the Campbell Ave/MacDonald Ave intersection to the ravine. The former would result in a deep (4-5 m) sewer that would be expensive to construct due to its depth and its proximity to adjacent utilities. As well a sewer at this depth would interfere with the lateral house connections to the sanitary sewer main.

The latter is less costly and provides the required relief to the MacDonald Ave system. Thus the preferred conveyance solution is to redirect excess flow by constructing a storm sewer from Campbell Ave easterly to outlet into the ravine.

B) Preliminary Preferred Temporary Storage Solution

The volume of water stored in the ravine can be altered based on the height of the control structure. The options include meeting the 10 year design standard, or controlling all flow that could drain into the ravine, including overland flow, during a major event, up to a 100 year storm. Analysis indicates a maximum water level of 1.2 m would result after a 10 year storm, and it only needs to be increased 0.5 m to meet storage requirements for a 100 year event. Given the added protection this offers the properties south of Ontario Ave along Pine St, the preferred solution for storage is to create a dam and control structure in the ravine just north of Ontario Ave to retain a 100 year rainfall event. The maximum storage depth would be approximately 1.7 m. This would cover a relatively small area at the south end of the ravine. The stored water would drain out in about 5 hours after the end of the storm event.

The control structure's actual location and dimensions would be finalized once the project is approved and survey and design work is completed.

Your Involvement

Please review the documentation and ask questions of City staff and the consultant. Questions and comments can be also submitted on the form provided until **November 30, 2015**.

Next Steps

After all comments have been received the consultant will compile all information and then finalize the preferred solution. An environmental study report (ESR) will be produced documenting the process and a Notice of Completion will be advertised and issue to all those on the mailing list, including those in the study area and agencies. The public will have the opportunity to review the final project documentation over a period of 30 days.

If no significant concerns or objections to the undertaking are received during the 30 day review period the City may proceed with final design of the project and construction subject to receiving all technical approvals and the required capital budget funding.

If a concern cannot be resolved through discussions with City officials and the consultant a request can be brought to the Minister of the Environment to make an order for the project to comply with Part II of the Environmental Assessment Act. A Part II Order addresses individual environmental assessments. Requests for a Part II Order must clearly identify the rational for the objection and ultimately the Minister will decide based on the process and the rationale for the decisions reached.

Thank you for your interest.

For more information, please contact:

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McNabb St and MacDonald Ave Environmental Assessment Studies

Public Consultation Centre #2

Thursday November 12, 2015

Plummer Room Civic Centre 3:00 p.m. to 7:00 p.m.

Please Sign In:

NAME	ADDRESS	PHONE	EMAIL ADDRESS
Ryan Scott	235 McNabb	?	
Carmen Marrelli	410 Pim St		
Andrea Quarrelli	410 Pim St		
Joan Kelly	3 Gladstone		
STEVE TAYLOR	74 FAIRMOUNT DR		
JUSTIN CAMPBELL	105 ALGONQUIN R		
JOAN & TOBY CURRAN	11 Summit AVE		
Nancy Evans & Ryan Nadeau	205 McNabb (AFS)		
Steve McGuire	313 MacDonald		
Patrick McGuire	313 MacDonald Ave.		
TINA GACCIONE	219 MACDONALD AVE		
JEFF RANTAMAKI	219 MACDONALD AVE.		
MARIA FEBBRARO	29 Alumette		

Please Sign In:

NAME	ADDRESS	PHONE	EMAIL ADDRESS
SAM NICOLETTA	25 ALWORTH PL		
PEGGY WRIGHT	159 POPLAR		
MARK WRIGHT	159 POPLAR AVE		
GORD DION	3 WELDON AVE		
DAVE MURPHY	9 ALWORTH PLACE		
Anne Lee	33 Alworth		

TULLOCH ENGINEERING

Structural Civil & Municipal Contract Administration Environmental Geotechnical Mechanical & Electrical Inspection & Testing

Public Information/Consultation Centre #2

McNabb St and MacDonald Ave Environmental Assessments

November 12, 2015, 3:00 p.m. to 7:00 p.m.

Plummer Room - Civic Centre

Representatives in attendance:

City of Sault Ste Marie representatives: Carl Rumiel, 3:00 p.m. to 6:30 p.m.

Tulloch Engineering representatives: Pat McAuley, 2:30 p.m. to 7:00 p.m.

John McDonald, 2:30 p.m. to 7:00 p.m.

Public participation:

Public attendance: 21 people signed in on sign in sheet (attached)

4-5 people declined to sign in despite encouragement, but reviewed info/took handouts

Information material on walls and tables:

-Drawing of both study areas, showing original and expanded areas

-Various photos, including November 17th 2013 flooding in both areas, ravine photos, etc

-1958 compiled drawing of topographic information, showing ravine system before filling

-Copies of "Storm Sewer Capacity Analysis and Condition Assessment" reports for both study areas, completed in 2012, including all drawings

-Environmental Study Reports by Tulloch Environmental for both areas, dated December 1st, 2014.

-Copy of Stage 1 & 2 Archaeological Assessment by Horizon Archaeological Inc, for both areas

-Municipal Class E.A document for reference

-List of Alternatives with concepts/expected results

-Evaluation Criteria

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Fax: (705) 945.5092
saultstemarie@tulloch.ca

-Evaluation Results Chart

-Preferred Conveyance and Storage Alternative Drawings, overlaid on "Google satellite image" for both areas

-Plan and Profile drawing for MacDonald Ave, showing proposed sewer work on the road, from Alworth Street easterly

-Information Bulletins for both projects as handouts, giving a summary of the EA process

-Sign in sheets, comment sheets

Summary:

Discussion took place with most visitors in a "one on one" format reviewing the flooding problems and discussing the referred alternatives, and their perspectives with regard impact on their homes or businesses. The wall mounted photos and the satellite images with the preferred alternatives were very useful in the discussions. The other alternatives that were reviewed and the reasons why they were not pursued were discussed. Everyone was asked to take a comment/question sheet and either fill it out that night, or to take it with them and return it (mail or emailed comments) to either Don Elliott or Pat McAuley.

Questions and area of interests were split between the two study areas.

Various comments/ issues that were raised:

- The YMCA has done considerable work flood proofing their building after several major basement flooding events. They drain various amounts of water daily from the pool into the storm sewer system behind the building, but have now put a valve on the outlet pipe.

- Discussion took place with the owner of The Canadian Motor Hotel once again (separate meeting was held with him on Oct 15th at the Civic Centre) He discussed his flooding damage from past floods and offered to sell his building for storm water storage. He asked about staging of the work on his property and ways to minimize the impact on his business.

- The owners of 159 Poplar Ave came to discuss foundation cracking/settling of their house adjacent to a former ravine. They had called on November 5 to discuss the notice received in the mail, and were encouraged to attend the open house to see the 1958 topo map showing the original ravines. Discussion centered on the possibility that part of the house's foundation may be on fill which was slowly settling. They had obtained a rough estimate to underpin the

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house about 10 years ago. The need to replace the sewer south of thehouse was also discussed. In order to avoid any further settlement shoring or a trench box might be used, or the sewer may be relocated further south. An insurance inspection would be done before and after.

- The primary concern raised with the MacDonald Ave preferred solution was what effects the increased water would have on the ravine, including erosion potential, and loss of vegetation in the ravine

PMc

16/11/2015

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McNabb Street & MacDonald Avenue Environmental Assessments
Public Open House #2
Thursday November 12, 2015
Plummer Room Civic Centre

Thank you for attending today's open house concerning the flooding issues in the McNabb St and the MacDonald Ave areas.

Your comments or questions are appreciated and will be incorporated into the project file and final recommendations to the City of Sault Ste Marie. All questions will be responded to if contact information is provided (address and/or email).

Primary Area of Interest: McNabb St Study Area [ ]
MacDonald Ave Study Area [✓]

Comments/Questions?

Now understand the plan to improve drainage on MacDonald Ave, improve drainage & collection to ravine & course to lower Pine St. – Good plan.

Steve McGuire
Re: Pineview Condo

Contact Information (optional)

Name: _____

Address: _____

Email: _____

For more information, please contact:

Pat McAuley P. Eng.
Tulloch Engineering
71 Black Rd Unit 8
Sault Ste Marie ON.
P6B 0A3
Phone (705) 949 1457
pat.mcauley@tulloch.ca

Don Elliott, P. Eng.
City of Sault Ste. Marie
99 Foster Drive
Sault Ste. Marie, ON
P6A 5X6
Phone (705) 759-5329
d.elliott@cityssm.on.ca

To fulfill the requirements of the Environmental Assessment Act, we will keep all comments on file for use during the study, and include them in the project file. With the exception of personal information, all comments received will become part of the public record. Information will be collected in accordance with the *Freedom of Information and Protection of Privacy Act.*

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McNabb Street & MacDonald Avenue Environmental Assessments
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Primary Area of Interest: McNabb St Study Area [ ]
MacDonald Ave Study Area [ ]

Comments/Questions?

EXCELLENT SOLUTIONS TO 2 PROBLEMS THAT AREN'T GOING AWAY - THE SOONER THESE PROJECTS CAN BE STARTED THE BETTER.

MAY HAVE TO LOOK AT POSSIBLE FENCING AROUND CONTAINMENT AREAS TO PREVENT CHILDREN FROM ACCESSING DEEP WATERS DURING EVENTS.

THANKS,

STEVE TAYLOR

Contact Information (optional)

Name: _____

Address: _____

Email: _____

For more information, please contact:

Pat McAuley P. Eng.
Tulloch Engineering
71 Black Rd Unit 8
Sault Ste Marie ON.
P6B 0A3
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Pat McAuley

From: Dave Murp
Sent: Thursday, November 12, 2015 7:22 PM
To: pat.mcauley@tulloch.ca
Cc: d.elliot@cityssm.on.ca
Subject: Public Consultation Centre - Flooding In The MacDonald Avenue Area

Pat:

Further to the e-mails below, good to see you again at the Public Consultation Centre held on Thursday, November 12, 2015 at the Civic Centre.

A couple of thoughts as follows:

. Would like to thank Tulloch Engineering staff and City staff for responding positively to another alternative to resolve flooding in the MacDonald Avenue area raised as part of the consultative process for this project;
. Understandably, this project will have to be prioritized relative to other initiatives endeavouring to access the CIty's 5 year budget for these type of initiatives; and
. Hopefully, since this project is not cost prohibitive and relatively shovel ready that this initiative will be able to be implemented as soon as reasonably possible.

Thanks Again,
Dave Murphy
9 Aworth Place

Sent from my iPad

Begin forwarded message:

> **From:** Dave Murph
> **Date:** January 18, 2014 at 12:21:42 AM EST
> **To:** "pat.mcauley@tulloch.ca" <pat.mcauley@tulloch.ca>
> **Cc:** "d.elliott@cityssm.on.ca" <d.elliott@cityssm.on.ca>
> **Subject: Comments - Public Open House #1 (MacDonald Avenue Study Area)**
>
> Pat:
>
> Enjoyed our discussion on Wednesday, January 15, 2014 at the Public Open House regarding flooding in the MacDonald Avenue area. The following are some thoughts on the 7 alternatives proposed in Tulloch Engineering's Alternative Solutions document:
>
> . Extreme Weather Events - Some of these alternatives being proposed are expensive. Whether it is flooding in Alberta, a flood & an ice storm in Toronto, flooding events in the Sault, numerous other extreme weather events across Canada and the U.S., it is clear that extreme weather events are happening more frequently. Is Tulloch Engineering confident that the "10 year design" noted in the Alternative Solutions document will be adequate? Understandably, it would be unfortunate to spend significant dollars and not solve the problem.
>
> . Major Issues Using Penhorwood Park For Storm Water Storage - As you know, this is Alternative 3 in Tulloch Engineering's Alternative Solutions document. What are the planning

issues related to using Penhorwood Park for storm water storage? Also, Penhorwood Park is located immediately adjacent to a brand new multi-million dollar elementary school. Why would one want to take this beautiful piece of property where there has just been a multi-million dollar investment immediately adjacent and decide to designate this property for storm water storage?As the Alternatives Solutions document notes to "a degree" the two natural ravines in Penhorwood Park are already taking some of the excess flows. Penhorwood Park should not be required to take all the excess flows. This has the potential to impact the Park itself. Please see my e-mail below dated December 12, 2013 that raises additional concerns and impacts on the Park resulting from this alternative.

. Another Alternative - In addition to the 7 alternatives outlined by Tulloch Engineering in the Alternatives Solutions document there would appear to be another alternative worth consideration. Immediately across from Penhorwood Park between the Alworth Place subdivision and the Parkview/Pinewood buildings there is a much larger ravine than the 2 ravines in Penhorwood Park. The Alternative Solutions document on Page 2 states that "The stored water would drain out slowly, down to the Ontario Avenue / Pim Street storm water system as the storm event passes". This is exactly what would happen if the larger ravine (that based on the maps at the Open House appears to be owned by the City) is utilized and there would be no impact on Penhorwood Park.

Thank you for the opportunity for input.

Dave Murphy
9 Alworth Place

Sent from my iPad

On Dec 12, 2013, at 11:17 AM, "Dave Murphy" > wrote:

> Pat:
>
> Thank you for your quick response below. In all likelihood, I will not be in a position to attend the public meeting in January. Currently, I am awaiting the birth of my grandchild in Toronto. My wife & myself plan on spending a good deal of January in Toronto helping out.
>
> As a result, further to your e-mail below, I would like to share the following thoughts:
>
> . There are a number of ISSUES that will need to be addressed if one of the options "could be to store water temporarily in the two depressions in Penhorwood Park, letting it drain out slowly down to the storm sewer system on Ontario Avenue, as the rainfall event passes".
>
> . From a planning perspective, is it appropriate to use a long time City Park (such as Penhorwood Park) for flood control?
>
> . Penhorwood Park is located immediately adjacent to a brand new multi-million dollar elementary school. How deep will the water get in the two depressions in Penhorwood Park? Will there be any safety concerns with an elementary school located in close proximity?

. Will the area with the water in the two depressions in Penhorwood Park have to be fenced? Will this area be fenced year around? It is important to understand that for at least the past 25 years these depressions have been used by small youngsters in the neighbourhood for winter recreational use.

. How long will the water stay in the two depressions in Penhorwood Park? Will this result in an area for mosquito infestation?

. Etc.

Thanks for the opportunity for input.

Dave Murphy
9 Alworth Place

Sent from my iPad

From: "Pat McAuley" <pat.mcauley@tulloch.ca>
Date: December 12, 2013 at 9:11:12 AM EST
To: "'Dave Murphy [redacted]
Cc: <d.elliot@cityssm.on.ca>
Subject: RE: Please Advise

Hello Dave:

As a property owner abutting the study area, you are already included on the contact list, so we will ensure you get all mailings involved throughout the study. We plan on having 2 public information sessions, the first (to be scheduled in January) to get input, and the second to show possible solutions (after we do some hydraulic modeling, assessing impact and cost estimating etc.)

The purpose of the study is to take into consideration issues exactly like you have noted: the effects of street flooding on private property.

I am not sure what you mean by: "will not result in more water being redirected to areas immediately adjacent to this area". We would not recommend directing water to private property, but one of the options could be to store water temporarily in the two depressions in Penhorwood Park,

letting it drain out slowly down to the storm sewer system on Ontario
Avenue, as the rainfall event passes.

I suggest we have a good discussion at the first PIC.

Pat

Pat McAuley P.Eng. MBA
Senior Director

Tel: 705 949 1457
Fax: 705 949 9606

Tulloch Engineering Inc.
71 Black Rd Unit 8, Sault Ste. Marie, ON P6B 0A3
pat.mcauley@tulloch.ca | tulloch.ca | legal disclaimer

-----Original Message-----
From: Dave Murph[illegible]
Sent: Wednesday, December 11, 2013 7:09 PM
To: d.elliott@cityssm.on.ca; pat.mcauley@tulloch.ca
Subject: Please Advise

Don and Pat:

Thank you for providing a "Notice of Study Commencement" regarding flooding
in the McNabb Street and MacDonald Avenue areas. The Notice states that "To
get involved in the study you can contact us at any time to express your
interest and/or be added to the study contact list". Thru this e-mail, I
would like to both express my interest and be added to the study contact
list.

The Notice further states that "The City has also initiated a Class Environmental Assessment (EA) to review the storm water drainage system in
the MacDonald Avenue area, east of Pim Street. The intent of this study is
to determine the preferred method of reducing the frequency of local

flooding on MacDonald Avenue between Poplar Avenue and Alworth Place".

Given the intent of this study, please advise if this study will also take into consideration the following factors:

. Properties immediately adjacent to the area on MacDonald Avenue between Poplar Avenue and Alworth Place currently are also subjected to a significant amount of water drainage. For example, my home at 9 Alworth Place is immediately adjacent to this area and my property backs onto MacDonald Avenue. My property is significantly lower than MacDonald Avenue resulting in a great deal of water drainage to the back portion of my property during both Spring snow melt and large rainfalls like we have experienced in the past few months. Hopefully, this study will take into consideration immediate adjacent areas as well.

. Also, it will be important that "the preferred method of reducing the frequency of local flooding on MacDonald Avenue between Poplar Avenue and Alworth a Place" will not result in more water being redirected to areas immediately adjacent to this area.

Please advise regarding these matters.

Sincerely,

Dave Murphy
9 Alworth Place

Sent from my iPad=

APPENDIX 7

Preliminary Cost Estimate

Preferred Conveyance and Storage Alternative
MacDonald Avenue Flooding

Cost Estimate

Part A	**MacDonald Avenue from Alworth Place to Ravine**	
Item No.	**Description**	**Estimated Price**
1	450 mm$^{\phi}$ Storm Sewer	$51,000
2	600X600 Catch Basins	$18,000
3	1200 mm$^{\phi}$ Maintenance Holes	$18,500
4	Concrete Headwall including Energy Dissipator (OPSD 804.040)	$27,500
5	MacDonald Avenue Restoration	$179,000
	Sub Total Part A	**$294,000**
Part B	**Ravine**	
6	Channel Rip Rap Scour Protection	$46,000
7	Temporary Water Storage Rip Rap	$26,000
8	Control Structure and Berm	$198,000
9	Topsoil and Hydro seed	$6,600
10	Clearing and Grubbing	$6,600
	Sub Total Part B	**$283,200**
Part C	**Access Road to Control Structure off of Ontario Ave.**	
11	Clearing and Grubbing	$9,500
12	Access Road (No asphalt)	$55,400
13	Allowance for 18 m of CSP Culverts C/W Headwalls	$11,000
	Sub Total Part C	**$75,900**
Part D	**Ontario Avenue Storm Sewer**	
14	450 mm$^{\phi}$ Storm Sewer	$56,000
15	Sediment Control Structure STC 300	$37,000
16	1200 mm$^{\phi}$ Maintenance Holes	$19,000
17	Topsoil and Hydro seed	$10,200
18	Ontario Ave/Pine Street Intersection Restoration	$28,000
	Sub Total Part D	**$150,200**

Summary

Part A	$294,000
Part B	$283,200
Part C	$75,900
Part D	$150,200
Contingency	$100,000
Total Estimated Construction Cost	**$903,300**
PUC/Bell/Union Gas Allowance	$50,000
Engineering (Geotechnical, Design/Contract Administration)	$135,000
Estimated Total Project Cost	**$1,088,300**

FIGURE 1

Map of Initial and Expanded Study Area

PROJECT: 13-1123-01 MacDONALD/PIM
DATE: Jan. 08, 2015
DRAWN BY: M. Nebesniuk
SCALE = 1:4000 ± (METRIC)

REVISED STUDY AREA 2

TULLOCH ENGINEERING

FIGURE 1

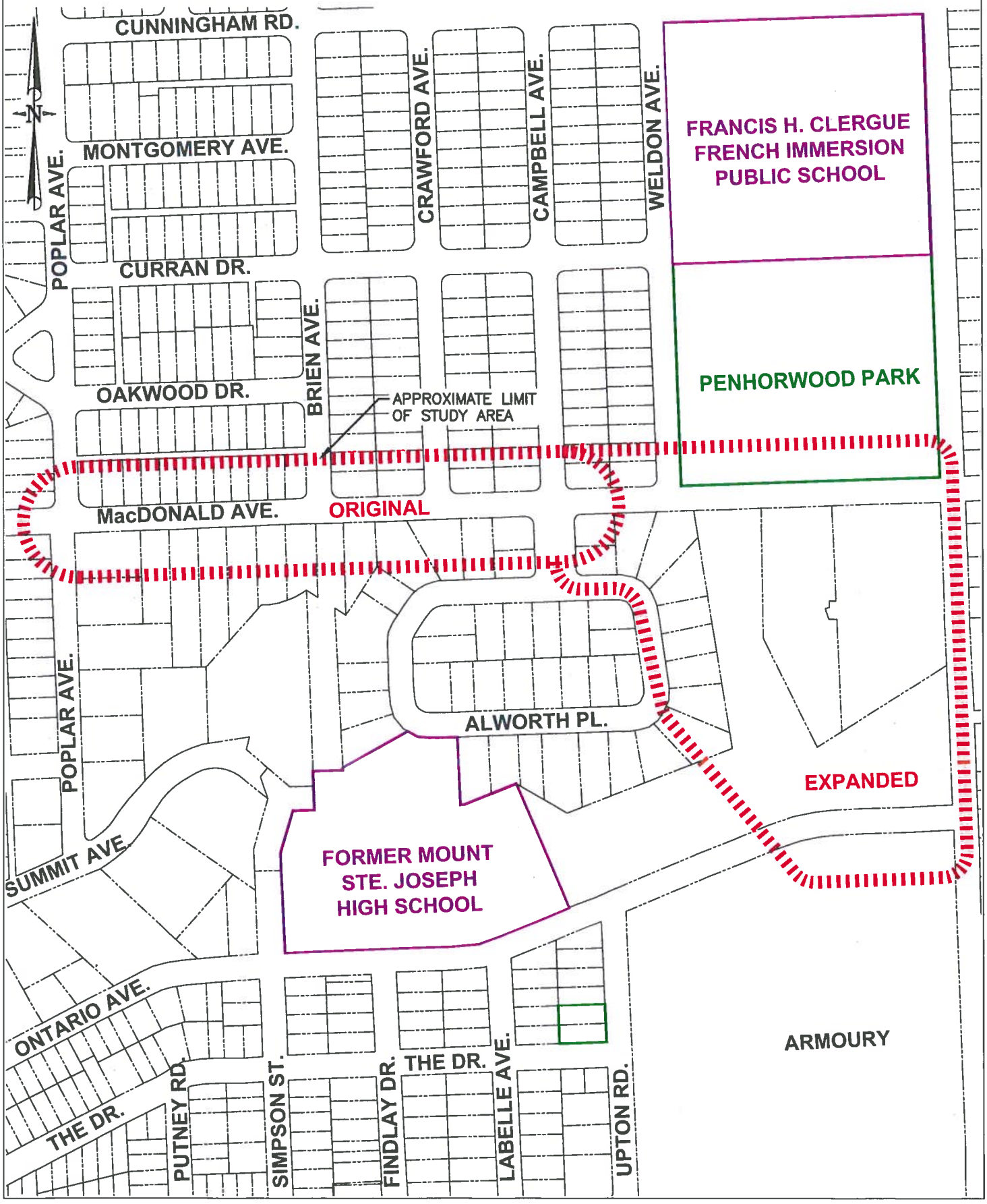


FIGURE 2

Drainage Area

SAULT STE. MARIE, ON

PIM STREET

OUTFALL TO RAVINE

MacDONALD AVENUE

MacDONALD AVENUE
WATERSHED AREA

INTERNATIONAL BORDER

CANADA

U.S.A.

KEYPLAN
SCALE 1:20,000 METRIC

TULLOCH ENGINEERING

REVISIONS

No	DATE	REMARKS
0	16.01.04	ISSUED FOR REPORT

LEGEND

- INDEX CONTOUR (1.0m INTERVAL)
- PROPERTY LINE
- BUILDING OUTLINE
- EXISTING STORM
- EXISTING STORM UNDER REVIEW
- MAINTENANCE HOLE # • 10
- STORM STUDY LIMITS McNABB ST. NETWORK

PROJECT TITLE
MacDONALD AVE. FLOODING E.A.

DRAWING TITLE
WATERSHED AREA MacDONALD AVE. STORM NETWORK

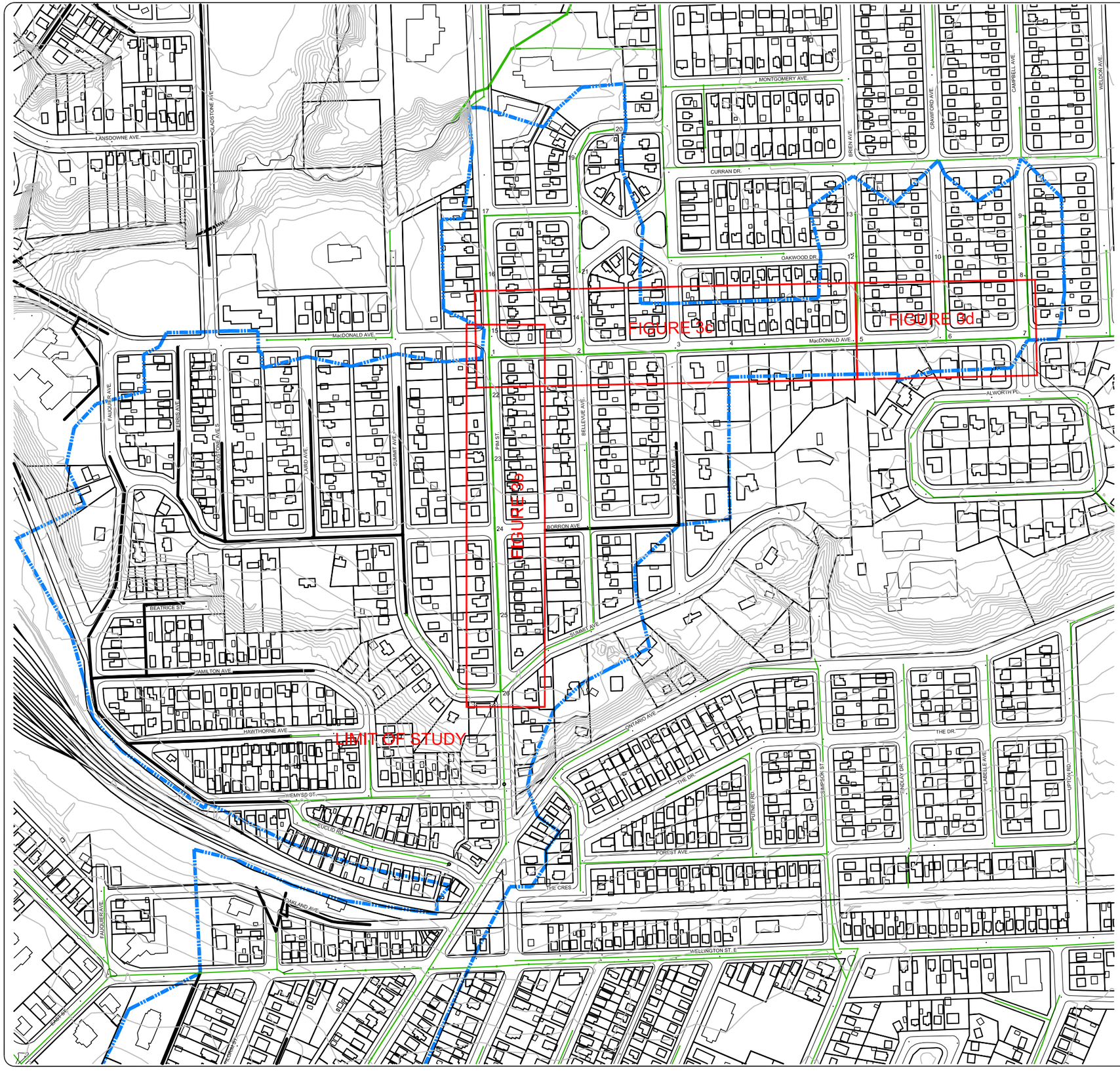
LOCATION
SAULT STE. MARIE, ONTARIO

DATE JANUARY 2016
DRAWN KTN
CHECKED JVM
SCALE AS SHOWN
ISSUED FOR TENDER ——
ISSUED FOR CONSTRUCTION ——

DWG. No.	PROJECT No.	REV. No.
2	13-1123	0

FIGURE 3

Storm Sewer Plan and Profile Sketches



TULLOCH ENGINEERING

REVISIONS

No	DATE	REMARKS
0	16.01.04	ISSUED FOR REPORT

LEGEND

- INDEX CONTOUR (1.0m INTERVAL)
- PROPERTY LINE
- BUILDING OUTLINE
- EXISTING STORM
- EXISTING STORM UNDER REVIEW
- MAINTENANCE HOLE • 10
- STORM STUDY LIMITS McNABB ST. NETWORK

PROJECT TITLE

MacDONALD AVE. FLOODING E.A.

DRAWING TITLE

SITE PLAN
MacDONALD AVE.
STORM NETWORK

LOCATION

SAULT STE. MARIE, ONTARIO

DATE JANUARY 2016

DRAWN KTN

CHECKED JVM

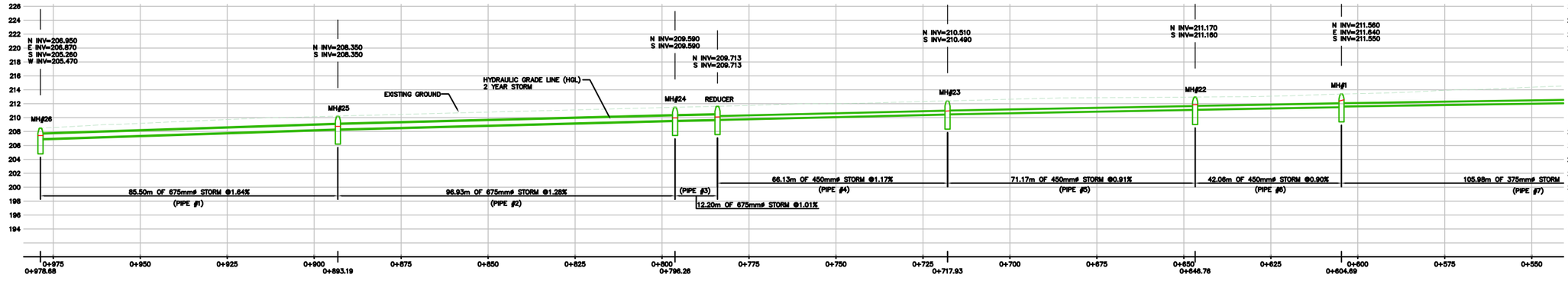
SCALE 1:2000

ISSUED FOR TENDER ———

ISSUED FOR CONSTRUCTION ———

DWG. No.	PROJECT No.	REV. No.
3a	13–1123	0

PLAN
SCALE 1:600



PROFILE
SCALE 1:600 HOR.
1:300 VER.

Horizontal & Vertical Datum:
Horizontal and vertical data was compiled from GIS data and engineering plans obtained from the City of Sault Ste. Marie.

TULLOCH ENGINEERING

REVISIONS

No	DATE	REMARKS
0	16.01.04	ISSUED FOR REPORT

LEGEND:
- INDEX CONTOUR (1.0m INTERVAL) — 210
- PROPERTY LINE
- BUILDING OUTLINE
- EXISTING STORM
- EXISTING STORM UNDER REVIEW
- CIVIC No. 195
- MAINTENANCE HOLE MH
- HYDRAULIC GRADE LINE (HGL) 2 YR. STORM
- EXISTING GROUND

GENERAL NOTES:
REDUCER IS NOT A MAINTENANCE HOLE STRUCTURE. IT IS A LOCATION WHERE THE STORM SEWER CHANGES PIPE SIZES.

(PIPE #) REFERS TO THE NUMBER ASSOCIATED IN THE AUTOCAD HYDRAFLOW MODELING REPORTS.

PROJECT TITLE
MacDONALD AVE. FLOODING E.A.

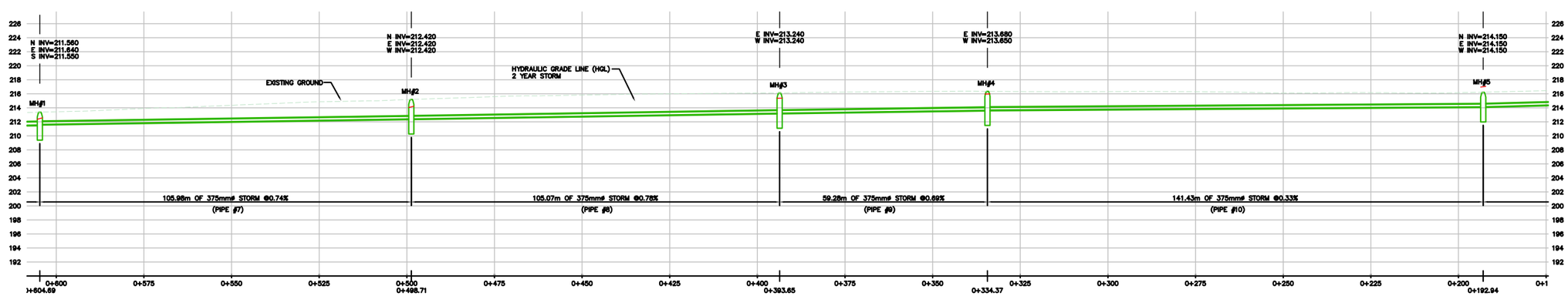
DRAWING TITLE
STORM SEWER PLAN & PROFILE

LOCATION
SAULT STE. MARIE, ONTARIO

DATE	JANUARY 2016
DRAWN	KTN
CHECKED	JVM
SCALE	1:1200 HOR. 1:600 VER.
ISSUED FOR TENDER	——
ISSUED FOR CONSTRUCTION	——

DWG. No.	PROJECT No.	REV. No.
3b	13-1123	0

PLAN
SCALE 1:600



PROFILE
SCALE 1:600 HOR.
1:300 VER.

Horizontal & Vertical Datum:
Horizontal and vertical data was compiled from GIS data and engineering plans obtained from the City of Sault Ste. Marie.

TULLOCH ENGINEERING

REVISIONS

No	DATE	REMARKS
0	16.01.04	ISSUED FOR REPORT

LEGEND:
- INDEX CONTOUR (1.0m INTERVAL) — 210
- PROPERTY LINE
- BUILDING OUTLINE
- EXISTING STORM
- EXISTING STORM UNDER REVIEW
- CIVIC No. 195
- MAINTENANCE HOLE ○ MH
- HYDRAULIC GRADE LINE (HGL) 2 YR. STORM
- EXISTING GROUND

GENERAL NOTES:
(PIPE #) REFERS TO THE NUMBER ASSOCIATED IN THE AUTOCAD HYDRAFLOW MODELING REPORTS.

PROJECT TITLE
MacDONALD AVE. FLOODING E.A.

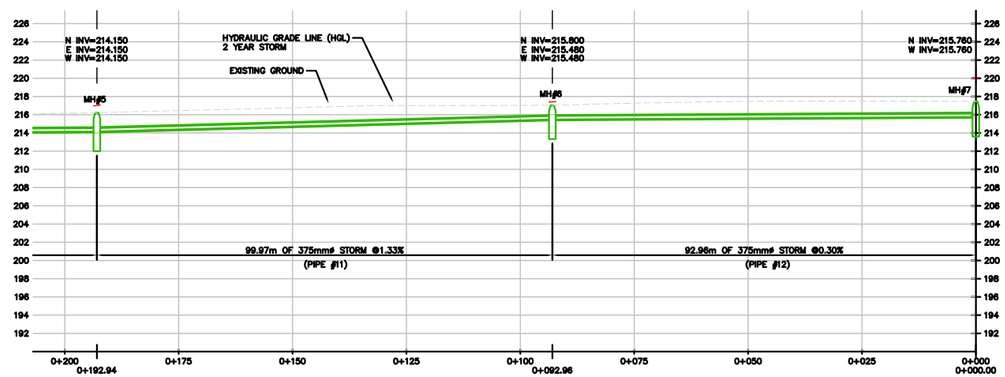
DRAWING TITLE
STORM SEWER PLAN & PROFILE

LOCATION
SAULT STE. MARIE, ONTARIO

DATE	JANUARY 2016
DRAWN	KTN
CHECKED	JVM
SCALE	1:1200 HOR. 1:600 VER.
ISSUED FOR TENDER	——
ISSUED FOR CONSTRUCTION	——

DWG. No.	PROJECT No.	REV. No.
3c	13-1123	0

PLAN
SCALE 1:1200



PROFILE
SCALE 1:1200 HOR.
1:600 VER.

Horizontal & Vertical Datum:
Horizontal and vertical data was compiled from GIS data and engineering plans obtained from the City of Sault Ste. Marie.

TULLOCH ENGINEERING

REVISIONS

No	DATE	REMARKS
0	16.01.04	ISSUED FOR REPORT

LEGEND:
- INDEX CONTOUR (1.0m INTERVAL) — 210
- PROPERTY LINE
- BUILDING OUTLINE
- EXISTING STORM
- EXISTING STORM UNDER REVIEW
- CIVIC No. 195
- MAINTENANCE HOLE — MH
- HYDRAULIC GRADE LINE (HGL) 2 YR. STORM
- EXISTING GROUND

GENERAL NOTES:
(PIPE #) REFERS TO THE NUMBER ASSOCIATED IN THE AUTOCAD HYDRAFLOW MODELING REPORTS.

PROJECT TITLE
MacDONALD AVE. FLOODING E.A.

DRAWING TITLE
STORM SEWER PLAN & PROFILE

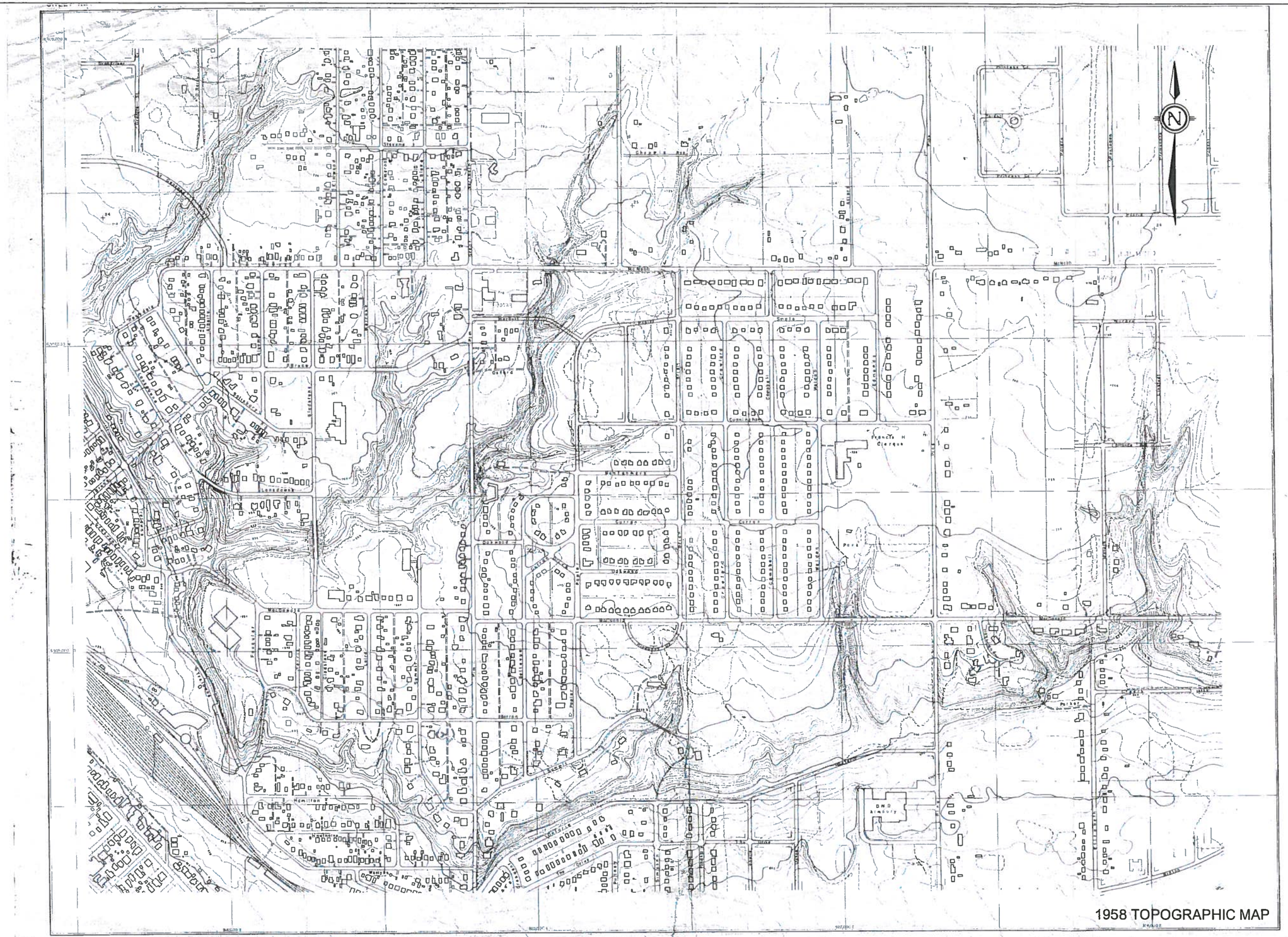
LOCATION
SAULT STE. MARIE, ONTARIO

DATE	JANUARY 2016
DRAWN	KTN
CHECKED	JVM
SCALE	1:1200 HOR. 1:600 VER.
ISSUED FOR TENDER	——
ISSUED FOR CONSTRUCTION	——

DWG. No.	PROJECT No.	REV. No.
3d	13-1123	0

FIGURE 4

1958 Topographic Map of Study Area



TULLOCH ENGINEERING

REVISIONS

No	DATE	REMARKS
0	16.01.04	ISSUED FOR REPORT

LEGEND

PROJECT TITLE
MacDONALD AVE. FLOODING E.A.

DRAWING TITLE
TOPOGRAPHIC MAP YEAR 1958

LOCATION
SAULT STE. MARIE, ONTARIO

DATE	JANUARY 2016
DRAWN	KTN
CHECKED	JVM
SCALE	N.T.S.
ISSUED FOR TENDER	——
ISSUED FOR CONSTRUCTION	——

DWG. No.	PROJECT No.	REV. No.
4	13-1123	0

FIGURE 5

Plan of Preferred Design Concepts for Conveyance and Temporary Storage

PREFERRED CONVEYANCE & STORAGE ALTERNATIVE
MacDONALD AVENUE FLOODING

NORTH

LEGEND:

PROPOSED STM. SEWER

EXISTING STM. SEWER

DATE	REV No.	REVISION	BY	APPD
2015.11.12	0	ISSUED FOR MEETING	KN	PM

ENGINEER'S SEAL:

CLIENT:

CITY OF SAULT STE. MARIE

CONSULTANT:

TULLOCH ENGINEERING

PROJECT: STORM WATER MANAGEMENT

DRAWING TITLE:

PREFERRED CONVEYANCE & STORAGE ALTERNATIVE

MacDonald Ave. Flooding

SCALE: N.T.S.

DATE: NOV. 12, 2015

DRAWN	CHECKED	DRAWING	REV
KN	PM	P1	0

PROJECT No: 13-1123

CAD DRAWING: 13-1123 MacDonald and McNabb Ponds.dwg