Peoples Road Area Overland and Basement Flooding Class EA

City of Sault Ste. Marie

60625445

April, 2024

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AECOM: 2015-04-13

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

The City of Sault Ste. Marie has initiated a Class Environmental Assessment (Class EA) to study overland and basement flooding within an area approximately bounded by Peoples Road and Farwell Terrace to the west, Old Goulais Bay Road and Fort Creek to the east, Fourth Line to the north and Second Line to the south (refer to Figure 1: Key Plan). Within the study area, there have been occurrences of overland and basement flooding during significant snow melt and precipitation events. The focus of this study is to identify potential causes and develop alternatives to mitigate significant impacts.

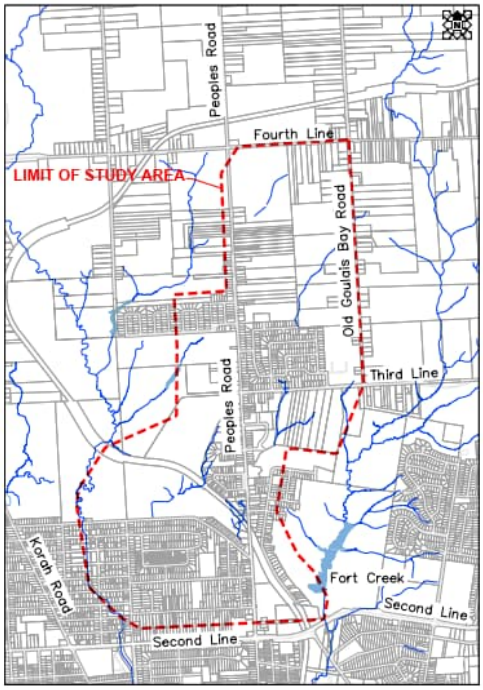


Figure 1: Key Plan

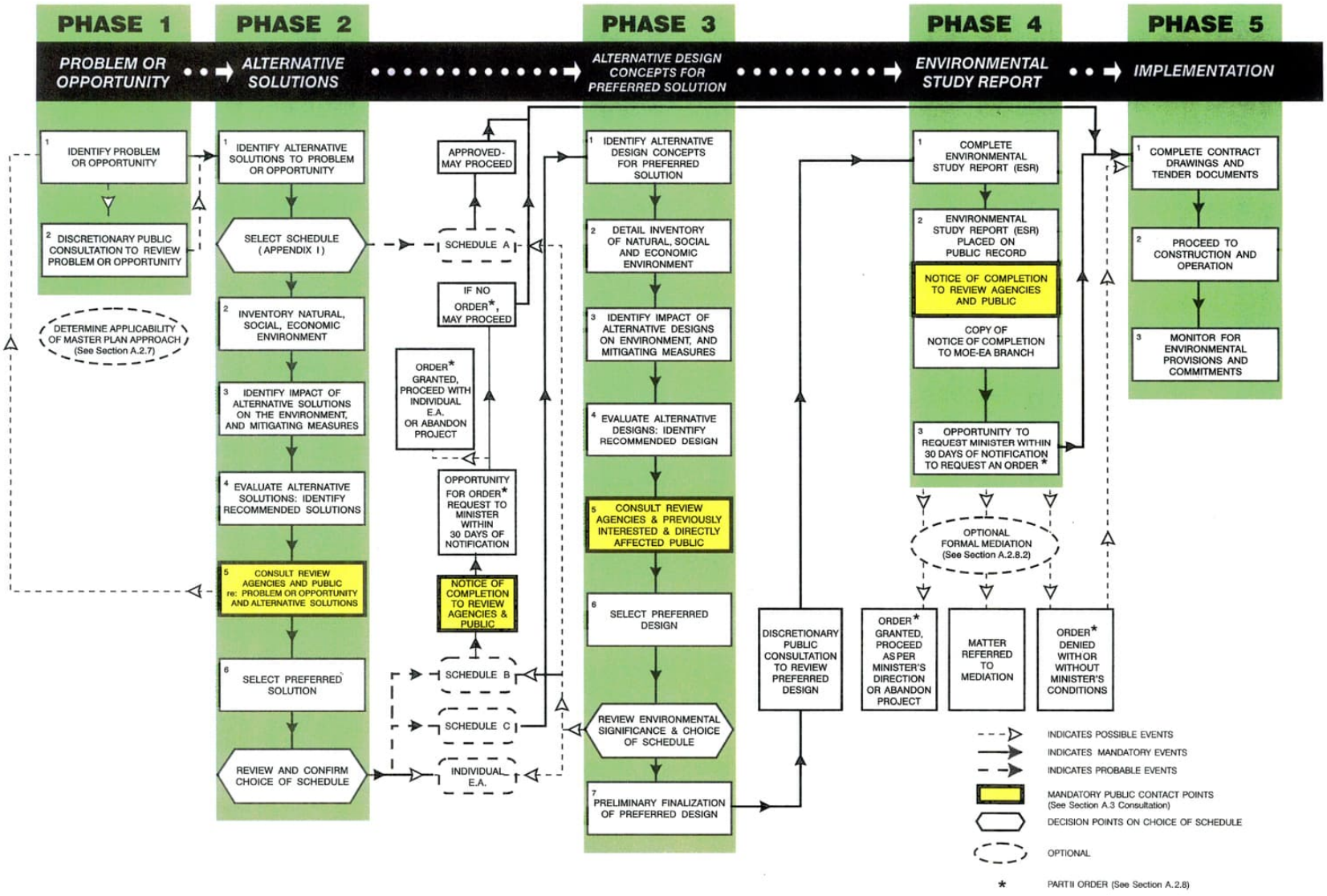
1.2 Class Environmental Assessment Process (Class EA)

This project is being undertaken in compliance with the Environmental Assessment Act ("EA Act"). The EA Act was enacted by the Province of Ontario to ensure that all reasonable alternatives and environmental impacts are identified and public input is solicited during the implementation of public undertakings.

Municipal infrastructure projects of this type are not subject to a full environmental assessment but are subject to a Class Environmental Assessment (Class EA). The Class EA process does not require formal ministerial approval provided the municipality complies with the activities and procedures set out in the pre-approved document entitled "Municipal Class Environmental Assessment – October 2000 as amended in 2007" prepared by the Municipal Engineers Association (MEA). That document provides a planning framework that must be followed to ensure that Public and Agency concerns are properly addressed throughout the development of the proposed solutions and designs.

The Class EA document stipulates that a five-phase process is to be followed, in whole or in part, and that careful consideration be given to the potential impacts of the project on the natural, social, cultural and economic environments. The phases to be completed are dictated by the project complexity and potential for environmental effects. Information and data relating to the existing environment has been gathered to assist in the evaluation of alternative solutions and design options. Relevant agencies, Indigenous Communities and the residents of Sault Ste. Marie were contacted and encouraged to participate in the process. The Class EA process is illustrated graphically in Figure 2.

Figure 2 – Class EA Process Flowchart



Briefly, the Class EA process for this project involved the following key study activities:

1. Research background data, gather additional data, and identify and document the problems/opportunities;
2. Notify area property owners, relevant agencies and Indigenous Communities of the study and solicit their input including the distribution of a questionnaire throughout the study area;
3. Identify alternative solutions to address the problems/opportunities;
4. Identify natural, social, cultural and economic environmental conditions within the study area;
5. Identify the impact of each alternative solution relative to the environmental conditions;
6. Evaluate each alternative solution relative to each other considering technical, environmental, cost and other relevant criteria and identify a preliminary preferred solution;
7. Solicit Public, Agency and Indigenous input on the alternative solutions and evaluation through correspondence and a public open house;
8. Incorporate the public input;
9. Finalize the preferred solution;
10. Document the process and findings in an Environmental Study Report (ESR) (Note: although not specifically required, given the high level of interest in the project an ESR was prepared to document the pre-design process); and
11. Proceed with detail design and construction subject to the receipt of Environmental Approval.

1.3 Project Organization

AECOM Canada Ltd. (AECOM), a consulting engineering firm, was selected to undertake the Class EA study tasks on behalf of the City of Sault Ste. Marie. Direction was provided throughout the study process by the municipality's Engineering Department. In addition, the City's Public Works staff were involved in providing relevant complaint and site investigation data to AECOM for use in undertaking the study tasks.

External agencies, Indigenous Communities and the general public were invited to participate at key points in the study process. Input was generally received throughout the study process by both the consulting engineer and the City of Sault Ste. Marie Engineering Department. All of the input received was incorporated into the overall study process by AECOM.

1.4 Public Involvement

Public involvement was an important element of the project. A public consultation plan was developed early in the study process to guide the proposed approach to soliciting public input and comments (refer to **Appendix A**). The public consultation plan included dissemination of information through a project webpage, broad distribution of a project questionnaire, periodic notices and a public open house. A description of the open house is summarized in Section 6 of this report.

Significant interest in this project originated primarily from property owners in the study area.

2. The Problem/Opportunity

This Class Environmental Assessment (Class EA) was initiated to study overland and basement flooding within an area approximately bounded by Peoples Road and Farwell Terrace to the west, Old Goulais Bay Road and Fort Creek to the east, Fourth Line to the north and Second Line to the south (refer to **Figure 1: Key Plan**). Based on the analyses documented in Section 3 of this report including historical complaint records, responses received through property owner questionnaires, field visits, property owner interviews, a review of pertinent historical documents including by-laws, reports, design guidelines and as-constructed records, analysis of precipitation records and storm and sanitary collection system modeling, the Problem/Opportunity statement is summarized as follows:

The study has been initiated to address relatively widespread basement flooding and overland flooding within an area approximately bounded by Peoples Road and Farwell Terrace to the west, Old Goulais Bay Road and Fort Creek to the east, Fourth Line to the north and Second Line to the south (refer to **Figure 1: Key Plan**). Throughout the study area, there have been occurrences of overland and basement flooding primarily reported during or following significant precipitation events. The focus of this study is to identify potential causes and develop alternatives to mitigate significant impacts particularly related to basement flooding. This study does not address localized yard flooding that may persist due to areas of high groundwater table and/or poor site grading and/or challenging soil conditions (eg. impervious soils such as clay).

Through the investigative and analytical work completed to date the principle contributing factors to the flooding occurrences likely consist of some or all the following:

- Potential bottlenecks or flow restrictions in the wastewater and/or stormwater collection systems which may be due to blockages (i.e. system maintenance) and/or conveyance pipe sizes;
- Limited system storage particularly in relation to stormwater management;
- Storm laterals directly connected by gravity to the storm sewer system with no backflow valve or a poorly maintained or failed backflow valve;

- Sanitary laterals connected to the sanitary sewer system with no backflow valve or a poorly maintained or failed backflow valve;
- Significant inflows and infiltration (i.e. extraneous flows) into the wastewater collection system particularly during more significant precipitation events. Sources of extraneous flows may include (refer also to **Figure 3: Typical Sources of Extraneous Flows**):
  - Groundwater infiltration into the collection system due to high groundwater and system leaks (i.e. broken or cracked pipes);
  - Inflows into low lying manholes or uncapped or leaky sanitary lateral cleanouts; and
  - Foundation and/or roof drains connected to the wastewater collection system.

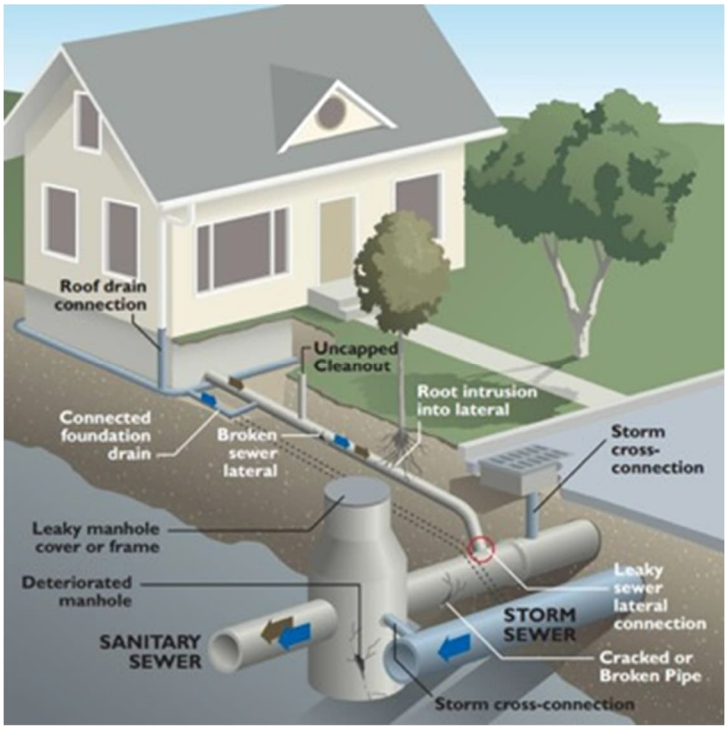


Figure 3: Typical Sources of Extraneous Flows
(Note: there are no known municipal storm cross connections to the sanitary sewer system)

3. Data Review and Analysis

3.1 Compliant Records and Questionnaires

Initially the City provided complaint records received from property owners within the study area. There were 96 complaints received throughout the 7 year period from 2013 to 2019. The distribution of calls received across this time period was as follows:

- majority of complaints were in 2013 with 46 calls;
- a modest number of calls in 2014;
- a limited number of calls from 2015 through 2017;
- 16 calls in 2018; and
- 23 calls in 2019.

In general, the variation in calls corresponds reasonably well with precipitation records. Calls were typically generated in conjunction with rainfall events of 50 mm or more and the number of calls increased significantly with higher intensity events (eg. greater than 70 mm). The years 2013, 2018 and 2019 saw

heavy rainfall events of more than 60 mm of rain which accounts for the majority of the 96 flooding complaint calls over the 7 year period.

Following a review of available complaint records provided by the City, it became evident that there were numerous data gaps that would impact the ability to identify and assess the problems being experienced in the study area. The project team subsequently developed and circulated, throughout the study area, a comprehensive property owner questionnaire to better understand where problems of basement and/or yard flooding occurred historically. The focus of the questionnaire was to identify potential areas/neighbourhoods where flooding is more prevalent, identify the number of flooding occurrences since 2013, and to characterize how the water may have entered basements.

There was a significant number of questionnaires returned (i.e. approximately 1170 questionnaires distributed and 226 returned) and the data was subsequently entered into a database for further analysis. In addition, mapping was developed to highlight the problem areas. Specifically, properties where basement flooding, yard flooding or both have occurred throughout the period from 2013 to 2019 were identified and mapped. The results highlight that the historical problems are generally widespread across the study area with no apparent focal neighbourhoods. Some of the key takeaways from the questionnaire responses are summarized below:

- 226 returned questionnaires;
- 84 identified a yard drainage issue;
- 110 identified a basement flooding issue;
- approximately 28% and 23% of the basement flooding incidents identified that there was a sewage odor and dirt/mud odour associated with the water entering the basement respectively and approximately 57% identified that it was dirty while 35% indicated it was clear;
- when analyzing where the water was entering the basement (note: not all respondents answered this question) 45 indicated it entered through floor drains, 15 indicated entry through walls, 6 indicated entry through a window, 6 indicated entry through a toilet and 24 indicated multiple entry points.
- 24 respondents identified one basement issue;
- 30 respondents identified 2 basement issues;
- 20 respondents identified 3 basement issues;
- 10 respondents identified 4 basement issues;
- 6 respondents identified 5 or more basement issues; and
- 119 respondents indicated they have sump pumps.

Furthermore, the questionnaire responses were also used to identify the more prevalent dates that flooding was problematic. Based on this review, the following dates were prevalent in the responses received (Note: we have also included some commentary related to precipitation events that likely contributed to the flooding events):

- **Spring (April) of many years** - likely linked to spring thaw as there were no significant rainfall events attributable to these periods;
- **September and November 2013** – 43mm event in September followed by consecutive days of rain and a large 71mm event with consecutive days of rain in November 2013.
- **June/July 2014** – One 31mm event in the latter part of June and a few consecutive days of rain at the end of June/beginning of July.
- **September and October 2014** – Two 30mm+ events in September, one of which included consecutive days of rain and two events in early/mid-October; one at 48mm and another at 59 mm and both included consecutive days of rain.

- **October-December 2015** – several events in the 25mm to 38mm range in late October and November with a larger (over 50mm) event in December 2015.
- **Fall 2016** - several events in the 20mm to 35mm range with one larger (40+mm) event in September 2016.
- **August 2017** – 47mm event together with consecutive days of rainfall.
- **October-November 2017** - a number of days in the range of 30mm from late October to early December with some consecutive days of rainfall.
- **June 2018** – event in the 30mm range.
- **October 2018** – larger events of 42mm and 87mm on October 3 and 10, 2018 respectively. Consecutive days of rainfall also contributed.
- **September-October 2019** – 103mm event at the end of September/October 1, 2019.

Note: The rainfall commentary was based on the City Public Works rain gauge data for the period from September 2015 to 2019 and where data was not available at this rain gauge (i.e. prior to September 2015) the commentary is based on the Sault Ste. Marie airport data. More information pertaining to the analysis of rainfall data is provided in the Section 3.6.

3.2 Field Visits/As-constructed Records and GIS Database

The information from the questionnaires was also supplemented by a few site visits to various locations in the study area including a few property owner interviews. Through those discussions it became evident that there are property owners that have gravity storm drain connections to the storm sewer system (i.e. groundwater collected in foundation drains flows by gravity through a pipe connected to the City's storm sewer system). Although these drains may have incorporated functioning back flow valves at one time, it is likely that over time failures of these valves have occurred and property owners may not fully understand the importance of these system components.

A review of as-constructed records for some of the study area also confirms that gravity storm laterals were likely installed in some areas where the storm sewer was constructed with adequate depth to accommodate them. Specifically, there are areas where it appears gravity storm drains may be present on one side of the street but not on the opposite side of the street.

In addition to the as-constructed records, the City's GIS system includes a field to differentiate properties that include a storm drain or service. These data records do not however differentiate between pumped versus gravity storm drain connections. It is also likely that the GIS and as-constructed records may not be 100% accurate or reliable.

3.3 By-Laws

The City's current and archived bylaws were also reviewed to better understand by-law requirements in relation to municipal and private sewer connections. Specifically, we reviewed By-law 4440 (circa 1969 and amended in 1977) and By-law 2009-50 which presumably replaced By-law 4440. These by-laws are included in the report Appendices.

It appears that the connection of surface runoff and groundwater drains, including roof downspouts and foundation drains were not permitted to be connected to the sanitary sewer system circa 1969. Prior to 1969 cross-connections (i.e. stormwater drains connected to the sanitary sewer system in some fashion)

were not specifically prohibited and are known to exist in the City. These cross connections result in much higher flows in the sanitary sewer system during and following significant precipitation events.

As noted above, By-law 4440 and future by-laws prohibited the connection of surface water and groundwater drains to the sanitary sewer system. The by-law offered an alternate approach to managing surface and groundwater on properties which consisted of pumping to a roadside ditch, storm sewer or to a splash pad located outside the building. It also allowed gravity discharge to an adjacent ravine with City approval. It did not at that time address gravity stormwater connections to the storm sewer system. Based on City staff input, the City subsequently permitted gravity storm drain connections to the storm sewer system with appropriate backflow valves sometime in the 1990's. The current Sewer Use By-law 2009-50 permits both pumped and gravity storm drain connections to the storm sewer system. Pumped connections must include piping that rises above the elevation of the centerline of the road and all gravity connections must include a backflow flap valve.

It is believed that a requirement for backflow valves on both sanitary and storm laterals was first introduced into the City By-laws via By-law 77-433 which amended By-law 4440 as follows: "Backwater valves shall be installed in storm and sanitary drains." The backflow valves are important components to prevent reverse flows from the City's collection systems back into private buildings when flows in the sewer system exceed the design capacity (refer to the discussion in Section 3.5).

The current and former By-laws also highlight that the "private sewer connections" (i.e. storm and sanitary pipes on private property connected to the municipal systems) must be maintained by the property owner. An important element is to ensure backflow valves are properly maintained and functional which would include replacement as necessary.

As a further protection to basement flooding for properties with gravity storm drains, the Schedules to the City's current Bylaw 2009-50 also show an optional stormwater sump pump installed in the foundation drain sump. The intent of the sump pump is to pump ground and/or surface water that accumulates in the sump when a gravity storm drain backs up (eg. failure of the backflow valve). As the sump fills with water, the pump operation would be triggered automatically by the rising water level and water would discharge to the ground surface outside the home. This contingency measure has been adopted by some property owners in the study area.

3.4 Historical Reports

Over time, a significant number of historical reports were provided by the City. The reports provided insight into various historical infrastructure projects that were procured to improve wastewater collection and conveyance. The specific reports that were referenced in the procurement of this study are listed below.

1. Flow Monitoring Analysis Report – Sanitary Sewer and Rainfall Monitoring – Cole Engineering, July 2018.
2. Greenfield Subdivision Phase 5 Design Brief – Genivar, August 2012.
3. Sanitary Sewer Investigative Study Class EA Phase 2 and Phase 3 Reports – Walker Engineering, May 1999 and January 2000 respectively.
4. White Oak Drive Sanitary Sewage Diversion Study – Stem Engineering, April 1997.
5. Harris Street Area Design Brief – Stem Engineering, September 1996.
6. Landfill Site Sanitary Sewer Design Brief – Stem Engineering, July 1996.

7. Sault Ste. Marie Infrastructure Program Project S5 Assessment of Priorities for Additional Sewers – Proctor and Redfern, February 1984.
8. Water Pollution Control Plant Pre-Design Report – Procter and Redfern, December 1982.
9. Sault Ste. Marie Infrastructure Program S4 North-South Trunk Sanitary Sewers Route Alignment Review – Knox Martin Kretch, September 1982.
10. Existing Sewer and Sewage Treatment Plant Capacity Study – Procter and Redfern, October 1981.

Information relevant to this study and included in the above referenced reports is summarized below:

- Many historical reports reference significant extraneous flows in the wastewater collection system which contribute to capacity constraints during or after higher precipitation events.
- It appears that in developing the design of some of the trunk sewers required to convey flows to the West End Water Pollution Control Plant (WEWPCP) in the 1980's consideration was given to accommodating, without surcharging, the estimated extraneous flows commensurate with a 1:10 year return period.
- Additional wastewater flows were conveyed through the study area in conjunction with the landfill leachate project completed in the 1990's. The design brief prepared for the new sanitary sewers north of Third Line noted "the receiving sewer system at Third Line near Beaumont Avenue is adequate to accept the initial design flows but future design flows will require several downstream upgrades which the City has already planned and will be carrying out within the next three years." Although there was no mention of the specific downstream upgrades to be undertaken, the design spreadsheet included with the design brief, shows most of the sanitary sewers along Third Line from Beaumont westerly to Peoples Road and along Peoples Road from Third Line southerly to Churchill Boulevard are undersized relative to the future design flows. The undersized Third Line sewers were subsequently upgraded from 300mm to 525mm diameter but it does not appear that the Peoples Road sewers have been addressed and hence remain a restriction in the system. System modeling completed in conjunction with this study shows flow restrictions along Peoples Road under some significant extraneous flow scenarios.
- The 1984 Sault Ste Marie Infrastructure Program Project S5 Assessment of Priorities for Additional Sewers Report references a proposed new trunk sewer spanning from the Third Line/Peoples Road intersection through Elliott Field and along Rossmore Road and Farwell Terrace to the Sussex Road trunk sanitary sewer. This sewer has not been constructed and may have been identified as an option to upgrading the Peoples Road sanitary sewer. It appears that the proposed trunk sewer was intended, in part, to support several proposed developments in the Peoples Road/Third Line area. The report suggests the proposed 1840 m, of 600mm and 750 mm diameter pipes would support approximately 1251 dwelling units. The report also notes "the Farwell Terrace/Peoples Road system will reduce peak flows in the existing system downstream of Third Line. However, in order to eliminate all the flooding under the 10 year storm condition, it will be necessary to install the elephant trunk sewer on Peoples Road." This reference to elephant trunk sewer relates to the offline system storage noted in the next bullet.
- Offline system storage along the east side of Peoples Road near Elliott Road was constructed in 1985 and subsequently decommissioned some time ago. It is speculated that this storage was decommissioned following the Churchill Boulevard sewer upgrades which were completed in approximately 1997. At the time the Peoples Road storage pipe was proposed the following was referenced in the relevant design report; "Localized surcharging of Churchill Avenue results from large extraneous flows from the upstream contributing area. This condition will persist even after backwater effects from the downstream areas have been eliminated with the installation of the new West End trunk sewers. The recommended relief measure for the upstream side of Churchill Avenue is the installation of in-line pipe storage to store peak flows during periods of high flows and

release them at a controlled rate to the sewer system when the conditions have subsided. An emergency overflow would be provided in case the storage pipe is filled to capacity during an infrequent storm (eg. 10 year or over)." The report goes on to note "The timing for the construction of the Stage II trunk sewer (referenced above in the previous bullet) which would intercept flows at Third Line and Peoples Road above the Churchill Avenue drainage area is uncertain, however, it is not expected to be less than 10 years and would likely be in excess of that. During this interim period, it is anticipated that some growth pressure will be dealt with in this drainage area. If any new developments are allowed prior to the Stage II relief sewers being constructed, then it follows that the additional flows induced will reduce the level of protection below the 10 year level. The storage facility will still be required after the Stage II trunk sewers because of growth in the lower reaches of the drainage area."

- There has been and continues to be additional development within the study area (eg. Greenfield Subdivision, Castle Heights, Ontario Aboriginal Housing, areas east of Peoples Road and south of Third Line and others) and also beyond the study area (eg. Crimson Ridge development) that contribute additional wastewater flows through the study area. It is not clear to what extent the downstream components of the collection system were considered in conjunction with these developments.
- Significant collection system changes have also been completed that have resulted in additional flows through the south end of the study area. Specifically, the White Oak Drive Sanitary Sewer Diversion Study completed in April 1997 considered the possibility of diverting sanitary sewage flows from an area approximately bounded by Great Northern Road to the east, Third Line to the north, Fort Creek to the west and Second Line to the south (approximately 208 Ha). Within that study the overall area was divided into two separate diversions labelled as Diversion 1 and Diversion 2. Diversion 1 referenced in the study was completed which diverted flows to Churchill Boulevard from the White Oak Drive, North Street and Sackville Road areas. However, it is our understanding that Diversion 2, which would divert flows from the area approximately bounded by Sackville Road to the west, Third Line to the north, Great Northern Road to the east and Second Line to the south has not been completed.

Although not specifically related to this study the City also procured a Sanitary Sewer and Rainfall Monitoring Report in 2017 which focussed on quantifying inflows and infiltration (I&I) in an east end catchment area. Again, although the study focussed on an east end catchment area, the results support the comments in other historical reports which conclude there are significant extraneous flows in the sanitary collection. Some of the relevant findings from that study are presented below:

- The study noted that the typical allowances for I&I incorporated into the design of sanitary sewer systems is in the range of 0.2 to 0.3 liters per second per hectare and the study was finding actual peak rates in the range of 0.4 to 1.76 liters per second per hectare. There were a total of seven sub areas that were looked at in the study and the peak I&I rate in those subdivided areas was primarily in the range of about 0.5 to 0.8 liters per second per hectare.
- The study noted that the dry weather flow for the study area was 33.4 liters per second and the average daily peak flow was 46.07 liters per second resulting in a peaking factor of 1.38.
- The constant groundwater infiltration rate was characterized as 0.1 liters per second per hectare or 22 l/s across the study area and it was noted that this represents approximately 2/3 of the average dry weather flow in the area.
- The study area saw a peak increase of 122 liters per second due to the most significant rainfall event which represents a 265% increase over the average daily peak dry weather flow.
- It was interesting to note that when the flow response following a wet weather event takes longer to return to dry weather conditions it is more of an indication of indirect I&I sources including pipe

integrity and foundation drains. Conversely, it also notes that when there is a very quick response to a high intensity event it is indicative of direct I&I sources.
- The study recommended the City investigate opportunities for a foundation drain disconnection program.

In the late 90's/early 2000's the City commissioned a study to address overflows to the River and basement flooding associated with the sanitary sewer system serving the east end sewage treatment plant (ie. "Sanitary Sewer Investigative Study Class EA Phase 2 and Phase 3" reports dated May 1999 and January 2000 respectively). Those reports note: "Studies carried out by the City over the last several years have concluded that the excessive wet weather flows that result in overflows and basement flooding are largely the result of foundation drains being connected to the sewer system and to a lesser extent roof downspouts also connected to the sewage system. Prior to 1968 it was common practice for a building's foundation drains to be connected to the sanitary sewage system. In 1968 a City bylaw was enacted prohibiting such connections but the city has experienced significant difficulty in enforcing this bylaw. Studies conducted by the City have shown that a significant number of homes constructed since 1968 have foundation drains interconnected to the sanitary sewer system."

The key conclusions drawn from the review of historical reports are as follows:

- Extraneous flows in the wastewater collection system have been identified in numerous historical reports and continue to be a problem in relation to the capacity of the wastewater collection system.
- Conveyance restrictions were identified in the wastewater collection system south of the Peoples Road/Third Line intersection and these restrictions were confirmed through the modeling completed in conjunction with this study. Consideration should be given to upgrading the Peoples Road sanitary sewer or alternatively constructing the "Stage II trunk sewer" spanning from the Third Line/Peoples Road intersection through Elliott Field and along Rossmore Road and Farwell Terrace to the Sussex Road trunk sanitary sewer
- Consideration should be given to re-establishing the Peoples Road offline storage adjacent to Elliott Road.
- Several reports recommend investigating opportunities to implement a foundation drain disconnection program.

3.5 Design Guidelines

The City updated their stormwater management guidelines in 2015. The Stormwater Management Guidelines (SWMG) include "guidelines, recommendations and design standards to promote uniformity of the design and construction of stormwater drainage systems within Sault Ste. Marie." The following components are pertinent to this study and were extracted from the document.

In general, for all new development, peak post-development flows should not exceed predevelopment flows for all storms up to the major drainage system design storm. This implies that that future development should not exacerbate existing stormwater management challenges in the study area.

No storm water drainage is to flow onto through or over private property other than by a natural watercourse, excavated ditch or swale, minor stormwater drainage system with an agreement as necessary. Natural drainage may flow onto a neighboring property if the cross property boundary discharge existed in the pre development condition. If the cross property discharge did not exist pre development directed drainage may not flow onto a neighboring property without permission from the

receiving property owners. Proposed drainage is not to adversely impact natural drainage or impact neighboring properties (i.e. natural drainage may not be cut off and the construction of hydraulic controls may not cause off property flooding). Runoff from a property may be directed to a natural watercourse or to a municipal stormwater drainage system with approval. The grading along the limits of a property shall be carefully controlled to avoid disturbance of adjacent properties or an increase in the discharge of stormwater to those properties.

Developments within the City of Sault Ste. Marie shall continue to be serviced by a dual drainage system consisting of a minor stormwater drainage system (eg. piped system) and a major stormwater drainage system (i.e. over land system). Design of stormwater drainage systems shall include consideration of drainage for both minor and major storms

The minor stormwater drainage system includes the underground pipe network, maintenance holes, outfalls, roof drains, lot drainage and drain tiles. The major stormwater drainage system conveys runoff that exceeds the conveyance capacity of the minor system components and typically includes overland flow pathways including drainage channels and floodwater diversion channels, streets, swales, stormwater detention and retention ponds outfalls and culverts.

The minor stormwater drainage system shall be designed to convey stormwater runoff from the 1:10 year return period without surcharging. The major storm water drainage system shall be designed to convey storm water runoff from the major storm event (i.e 1:100 year return period storm and the Timmins regional storm).

The capacity of minor storm water drainage system within the study area was generally checked to assess its capacity and ability to convey the 1:10 year storm event without surcharging. The check was completed through modeling using PCSWMM software. The results of the modeling suggest that, in general, the minor stormwater system appears to be appropriately sized to meet the City design standards albeit with some surcharging which is expected given that the intensity of the 1:10 year design storm has increased over time.

Despite these findings the minor system over time could be subject to physical changes such as changes to pipe grades due to settlement, or pipe failures and/or maintenance issues such as system blockages that could adversely impact the conveyance capacity of the system. Therefore, it is important, to have in place, operating and maintenance procedures which may include periodic CCTV inspections and regular catchbasin and maintenance hole cleanouts and system inspections inclusive of inlets and outlets.

Furthermore, it appears that over time various developments have intercepted or impacted some natural ravine drainage systems. In some cases, the major storm event may not have been fully assessed in the design of these developments.

The guidelines also prescribe that individual storm services are to be provided for all single residential lots and for each side of semi-detached lots. Storm sewer service connections shall be laid at a minimum grade of 2% and have a depth of 1.5 meters at the street right of way. It is noted that in some cases the depth of the storm sewer is inadequate to meet these requirements.

Foundation drainage will normally be pumped or gravity fed to the minor stormwater drainage system to minimize the likelihood of basement flooding or foundation damage. Foundation drains shall not be permitted to discharge to the ground surface in such a way as to direct stormwater runoff to the street

surface, curb, walkway, or adjacent private property as stipulated in the city streets by-law. Roof drains from single family or semi-detached homes shall not be connected to storm drains.

Surface storage areas or ponding areas on single detached and low-density residential lots is not allowed.

The City prefers dry ponds over wet ponds with the principle difference being that wet ponds have a permanent body of standing water and dry ponds only include water during and following a precipitation event. The purpose of a dry pond is to temporarily store stormwater runoff in order to restrict peak discharge and reduce the potential for downstream flooding and erosion.

The ratio of effective pond length to width should not exceed 3:1 and the inlet should be located as far away from the outlet as possible. The minimum bottom slope is 0.5% and the recommended bottom slope is 2%. The maximum depth shall be in accordance with MECP guidelines, maximum embankment slopes are 4:1 and minimum pond freeboard is 0.3 meters.

The City most recently updated the rainfall amounts for various design storms in 2015. At that time, the rainfall amount for each return period was increased to reflect historical records.

Based on the information presented above, it is evident that storm sewer systems are designed to surcharge periodically (i.e. overloading the sewer beyond its design capacity). During larger storm events when the minor storm water system is overwhelmed (flooded), storm water will then follow the “major” overland storm water system. This would typically include storm water being conveyed, amongst other things along streets and roads. This stormwater management approach is used as it would be extremely costly and impractical to covey major storm events entirely in a piped system.

Recognizing that storm sewer systems are designed to flood it is evident that gravity storm drains connected to homes must include functional backflow prevention valves. Furthermore, these valves, have a finite service life and require replacement over time and require regular maintenance/testing to ensure proper functionality.

Often storm sewers are installed at shallower depths in comparison to sanitary sewers as their depth may be constrained by a downstream outlet elevation or other constraints within public right-of-ways such as other services and utilities. Given these constraints, oftentimes storm sewers are not constructed at adequate depths to facilitate gravity storm drain connections from adjacent properties. In these cases, groundwater collected in foundation weepers could be pumped and discharged to the surface outside the home or to the storm sewer system.

Conversely, sanitary sewers are typically designed and constructed with adequate depth to allow sewage generated within residences and buildings including their basements to flow by gravity via a gravity sanitary service pipe which spans from the building or home to the City’s sanitary sewer. Historically sanitary sewers typically predated storm sewers and prior to 1967 when the City By-law 4440 was enacted there were “cross -connections” constructed to the sanitary sewer system. This meant that property owners connected their foundation drains and/or roof drains to the sanitary sewer system which results in storm water mixing with sewage in the sanitary sewer system. These stormwater flows typically increase substantially during and following precipitation events. In addition to these “cross-connections”, storm water also enters the sanitary system when groundwater enters the system through leaky pipes (either cracked/broken pipes or through pipe joints) and also through manhole lids. Collectively these

storm water flows that enter the sanitary sewer system are referred to as extraneous flows or inflows and infiltration.

Although sanitary sewer systems are typically designed to accommodate some extraneous flows (i.e. storm water) in addition to sewage, the extraneous flows may lead to system overloading/surcharging during significant precipitation events (refer also to the discussion in Section 3.4 regarding I&I).

Therefore, similar to the discussion provided above regarding backflow prevention valves on storm drains, equally important are backflow prevention valves on sanitary drains.

The key conclusions drawn from the review of design guidelines are as follows:

- Stormwater management consists of a dual drainage system; a minor stormwater drainage system (eg. piped system) and a major stormwater drainage system (i.e. over land system).
- It is important that functioning backflow prevention is in place for properties that have a gravity storm service connected to the storm sewer system to mitigate the potential for basement flooding.
- Dry stormwater ponds should be considered to reduce peak stormwater flows and the potential for flooding.
- Backflow prevention is also important on sanitary services as extraneous flows may overwhelm the wastewater collection system during and after high precipitation events or in conjunction with significant spring thaws.
- Ongoing collection system maintenance is important to ensure it functions as intended.

3.6 Rainfall Data

Initially precipitation data from the Sault Ste. Marie airport was downloaded from the Environment Canada website and charted to identify significant storm events that may have contributed to flooding occurrences. Specifically, total daily rainfall data was obtained and reviewed for the period from 2013 to 2019. This period was selected to coincide with data from the questionnaires and also because there were known occurrences of high precipitation events that resulted in property impacts. This historical rainfall data was obtained to assess the potential correlation between precipitation events and flooding complaints/occurrences.

The available data was plotted over time for each year to visually highlight when the higher precipitation events occurred throughout the analysis period. This information was subsequently cross-referenced with the data collected through the property owner questionnaires as noted in Section 3.1.

In reviewing the available data, it is evident that the flooding problems appear to be correlated to the high single day precipitation events and/or rainfall events that span more than one day. Over the seven-year analysis period there was at least one 50mm± event in six of the seven years and there were three years with a 70mm± event. These results support the conclusion that there is a significant contribution of storm water flows to the sanitary collection system likely through a combination of inflows and infiltration.

As the study progressed the City also provided additional rainfall data collected through various City owned and operated rain gauges distributed throughout the City. In relation to this study, gauge RG 04 – PWT (City Public works yard on Sackville Road) is the most relevant as it is located immediately east of the study area. The data provided by the City included hourly precipitation data throughout the period from approximately September 2015 to May 2021. This data was subsequently summarized to provide daily precipitation values for comparison to the data that had been plotted for the Sault Ste. Marie Airport.

In general, the data from the two sources showed reasonably good correlation over the period considered.

Based on a review of the City data the following was noted:

- Single day rainfall in excess of 50mm was similar to the airport data with individual occurrences exceeding 50mm on December 14 2015 (59mm), July 8, 2016 (61mm), October 10, 2018 (87mm), September 30, 2019 (103mm), June 23, 2020 (67mm) and August 26, 2020 (64mm).
- Single day occurrences of rainfall events exceeding 70 mm occurred in 2018 and 2019 which is similar to the airport data (Note: City data was not available prior to May 2015).

Based on the foregoing, the PWT rainfall gauge data was used for the period it was available and for periods where only airport data was available it was also considered suitable for use in the study.

3.7 Sanitary and Storm Sewer System Modeling

Individual models were developed for both the wastewater and stormwater collection systems. The intent of these models is to generally demonstrate system performance, particularly under higher flow events, identify potential bottlenecks or restrictions in the systems and assist in assessing the potential benefits of various alternative solutions.

The models were generally developed as summarized below.

<u>Common to both sanitary and storm collection and conveyance systems:</u>

- The City's GIS manhole and pipe data was imported to create the sanitary and storm pipe models. This information was assumed to be accurate with limited checks versus as-constructed records when information appeared to be inconsistent (eg. larger pipe draining into a smaller pipe at similar grade).
- Manning's coefficients for pipes consisted of; non corrugated = 0.013, corrugated = 0.022 in accordance with the City's SWMG.

<u>For the storm system modeling the following approach/assumptions were also applicable:</u>

- Topographic information was imported into the model using GIS contours.
- In some instances, the contour information was supplemented with ditch/ravine slopes.
- Ditches were created with an assumed 1.2m to 1.5m depth and the bottom width was established using best judgements and site knowledge. A manning's open channel roughness coefficient of 0.03 was used as suggested in the SWMM manual.
- Rainfall intensity curves consist of Sault Ste. Marie airport AES storm curve in accordance with the City's SWMG.
- Infiltration modeled using an average curve number of 80 for imperviousness.
- Implemented dynamic wave SWMM routing method.
- Storm pipe diameter and elevations through the EACOM property have been assumed.
- Storm pond in Elliott Field assumed to generally be offline in the existing conditions model (i.e. in its current configuration it has limited storage capacity).
- Field confirmed and incorporated CN rail crossing storm drains of 900mm x 900mm and 1200mm x 900mm.

For the sanitary system modeling the following approach/assumptions were also applicable:

- Used the GIS database to identify the number of dwellings in the Peoples Road subcatchment and applied an occupancy factor of 3.2 people per dwelling unit to establish the subcatchment population;
- Applied a per capita average daily sewage flow rate of 450l/cap/day;
- Applied standard design extraneous flow allowances of 0.28 l/s/Ha and standard design peaking factors to establish a "base" flow;

Design Flow Formulae

Peaking Factor -	M = 1 + 14 / (4 + SQRT (p))
Peak Population Flow -	Q(p) = p * q * M / 86.4 (L/s)
Peak Design Flow -	Q(d) = Q(p) + Q(i) (L/s)
Peak Extraneous Flow -	Q(i) = I*A (L/s)

- Distributed the base flows proportionally in the model based on the number of manholes in each subcatchment (eg. 10 MH's in a subcatchment than each MH receives 10% of the calculated base flow);
- It is well documented that the extraneous flows are much higher than the design allowances during significant precipitation events and hence additional peaking factors were applied incrementally to the base flows until flooding of the system occurred. System problems/flooding became evident when base flows were increased by about 2.5 times.
- Given the approach consisting of incrementally increasing the base flows to force system surcharging/flooding there were no specific allowances made for future development within the catchment area. At the time of preliminary/detail design the calibrated system model can be used in conjunction with anticipated future development flows to confirm pipe sizing and downstream system capacity.
- Flows from White Oak Drive combine with Peoples Road flows at Churchill Boulevard. The White Oak Drive flows included in the model were derived from Scenario 3 of the White Oak Drive Sanitary Sewage Diversion Study (April 30, 1997). This includes a peak flow of 168 L/s assuming both diversions are implemented and 111.5 L/s assuming only Diversion 1 is implemented (Note: presently only Diversion 1 has been implemented but the City may consider implementing Diversion 2 at a future date). These flows include a higher extraneous flow allowance relative to the typical 0.28 L/s/Ha noted above and hence the additional peaking factor noted in the previous bullet was not applied to these flows.
- The above conditions (i.e. Peoples Road catchment base flows x 2.5 + White Drive flows) were then used to model alternative solutions to assess flood mitigation effectiveness.
- Peoples Road elephant trunk sanitary storage pipe assumed to be offline in the existing conditions model.
- To check the base flows in the Peoples Road catchment area we compared AECOM flows to the flows included in the Sanitary Sewer design sheet that was developed for the Churchill Boulevard sanitary sewer upgrade which showed reasonably good correlation.

3.8 Summary

The principal conclusions drawn from the data analysis are as follows:

- Stormwater management consists of a dual drainage system; a minor stormwater drainage system (eg. piped system) and a major stormwater drainage system (i.e. over land system) and the minor system is designed to “flood” or surcharge when a storm event exceeds a 1:10 year return period.
- Extraneous flows in the wastewater collection system have been identified in numerous historical reports and continue to be a problem in relation to the capacity of the wastewater collection system.
- Foundation drain connections to the sanitary system continue to contribute significant extraneous flows in the wastewater collection system.
- Historical problems are generally widespread across the study area with no apparent focal neighbourhoods.
- Basement flooding problems are being experienced, to some extent, in the spring of each year which reflects the spring thaw period. Based on the rainfall data there were no obvious large rainfall events in the April to May period from 2013 to 2019 but problems have been reported by property owners.
- There is good correlation between the rainfall data and flooding complaints/problems reported in the summer and fall periods.
- The basement flooding that has occurred has been linked to both sanitary flows and stormwater flows - in some instances property owners reported the flood waters were clear with no odour and water was observed to be entering through walls or windows.
- Basement flooding is in part attributable to failed or malfunctioning backflow valves in sanitary and/or storm services. Property owners may not be aware of or understand the importance of maintaining, testing and replacing these valves.
- The sanitary system modeling identified a couple of locations where existing pipe sizes may be restricting flows and resulting in system surcharging during periods of higher extraneous flows.
- The “Stage II trunk sewer” spanning from the Third Line/Peoples Road intersection through Elliott Field and along Rossmore Road and Farwell Terrace to the Sussex Road trunk sanitary sewer has not been constructed.
- The Peoples Road “elephant trunk” offline storage adjacent to Elliott Road was taken offline.
- Blockages in either the sanitary or storm sewer systems likely contribute to system surcharging.

Through the investigative and analytical work completed to date the principle contributing factors to the flooding occurrences likely consist of some or all the following:

- Potential bottlenecks or flow restrictions in the wastewater and/or stormwater collection systems which may be due to blockages (i.e. system maintenance) and/or conveyance pipe sizes;
- Limited system storage particularly in relation to stormwater management;
- Storm drains directly connected by gravity to the storm sewer system with no backflow valve or a poorly maintained or failed backflow valve;
- Sanitary drains connected to the sanitary sewer system with no backflow valve or a poorly maintained or failed backflow valve;
- Significant inflows and infiltration (i.e. extraneous flows) into the wastewater collection system particularly during more significant precipitation events. Sources of extraneous flows may include (refer also to Figure 3):
    - Groundwater infiltration into the collection system due to high groundwater and system leaks (i.e. broken or cracked pipes),
    - Inflows into low lying manholes or uncapped or leaky sanitary lateral cleanouts; and
    - Foundation and/or roof drains connected to the wastewater collection system.

4. Inventory of Existing Conditions

In order to assess the potential environmental impacts associated with the implementation of the various alternative solutions presented in Chapter 5.0 it was first necessary to inventory the existing conditions within and adjacent to the study area.

The study area consists of an area of approximately 380 ha and as noted previously is generally bounded by Peoples Road and Farwell Terrace to the west, Old Goulais Bay Road and Fort Creek to the east, Fourth Line to the north and Second Line to the south.

4.1 Natural Environment

4.1.1 Physiography and Surface Geology

Geologic and Aggregate Resource base mapping produced by the Ministry of Natural Resources (“MNR”) was reviewed relative to Sault Ste. Marie and the study area. This mapping provides a general overview of the physiography and surficial geology of the study area.

The geologic formations in the Sault Ste. Marie area are largely the result of significant glacial activity from the Wisconsinan Stage of the Pleistocene Epoch which was marked by the repeated advance and retreat of extensive continental ice sheets.

The Sault Ste. Marie area is underlain by rocks of Precambrian and Cambrian age.

The Data Base Mapping from the Northern Ontario Engineering Geology Terrain Study suggests that the entire study area is located within a glaciolacustrine plain landform. Portions of the study area are dissected and/or bordered by gullies/ravines. The soils are generally characterized as sands and silts in the northern portion of the study area with the remainder classified as clays and silts. The latter soil types are indicative of relatively low permeability soils which lead to high runoff during precipitation events.

The Official Plan “Schedule A - Natural Resources and Environmental Constraints” mapping shows the northern portion of the study area forms part of the “significant groundwater recharge protection area” while “Schedule B – Hazards” mapping characterizes the soils from Greenfield subdivision southerly as lacustrine clay soils which is consistent with the Northern Ontario Engineering Geology Terrain Study. The latter mapping also identifies alluvial soils in the ravines and notes that portions of the ravines are regulated by the Sault Ste Marie Regional Conservation Area (SSMRCA).

Depending on the nature of any proposed improvements there may be a need to undertake a detailed geotechnical investigation to characterize subsurface conditions at specific project location(s).

4.1.2 Surface Water Resources and Aquatic Habitat

There are a number ravines within or adjacent to the study area. The Official Plan “Natural Resources and Environmental Constraints” mapping differentiates seasonal/intermittent versus more permanent watercourses in and adjacent to the study area. The more permanent waterways within or adjacent to the

study area include Fort Creek and East Davignon Creek/Flood channel each of which area described below.

The East Davignon Flood Control Channel was completed in 1978 and is 1.08 km in length. This channel was designed to protect areas of Korah Road and Douglas Street from severe flooding. It extends from Rossmore Road to Farwell Terrace where the creek enters an underground aqueduct.

The Fort Creek Dam and Reservoir was completed in 1971 and is located north of Second Line and immediately east of the study area. The drainage area for the dam is approximately 7.7 square kilometres, while the reservoir surface area is 3.24 hectares.

The dam is an earthen structure with a low permeability clay core confined by shells of granular material. The dam is 12 metres high and 117 meters long. The outlet consists of a 0.9 metre wide gate and a 91.4 metre long chute spillway passing through the base of the dam.

Downstream from the dam, the Fort Creek channel crosses Second Line and John Street. Further downstream, Fort Creek is enclosed in a concrete aqueduct from Hudson Street near Wellington Street to Queen Street near John Street. The lower portion of Fort Creek is an open channel south of Queen Street to the St. Mary's River.

Prior to construction of the Fort Creek Dam, major flooding occurred in Sault Ste. Marie as Fort Creek overflowed it banks. The flooding occurred in populated areas where existing aqueducts did not have sufficient drainage capacity to convey peak runoff. Consequently, the primary objective of the Fort Creek Dam was to provide flood control. The dam functions by retaining run-off from a rain event and subsequently releasing it when downstream flows have subsided.

AECOM Ecologists conducted a desktop review and preliminary field assessment of the lands within and surrounding each of the storm water management pond alternatives to characterize the current conditions and identify potential natural heritage sensitivities that may be impacted by the proposed project. Specifically, the focus of the review was to characterize the natural environment in support of this study and to identify potential field surveys, environmental constraints, and regulatory review or permitting recommended in conjunction with preliminary/detailed design.

The results of the review found fish habitat and suitable conditions at several sites. Specific permits and necessary regulatory reviews are to be confirmed at the next stage of the project once preliminary designs are developed and construction work plans are identified. The requirements may include a fish and fish habitat assessment to support relevant submissions and approvals.

Construction activities contemplated through a review of alternative solutions may require sediment control measures to mitigate the transport of sediment to downstream receivers. There may also be additional mitigating measures that will be dependent upon the specific design details and may include timing restrictions for in-water work.

A portion of the study area is located within the Sault Ste. Marie Region Conservation Authority ("SSMRCA") regulated area (ie. O.Reg.176/06 - Development, Interference with Wetlands and Alterations to Shoreline and Watercourses). Any construction that falls within the regulated area will require a permit from the SSMRCA prior to initiating construction.

Consideration of the potential impacts to surface water resources and aquatic habitat will be included in the evaluation of the various alternatives and mitigation measures will be identified to minimize impacts.

4.1.3 Vegetation and Terrestrial Habitat

There are undeveloped forested and/or grassed lands within and adjacent to the study area. These undeveloped areas, provide habitat for a variety of wildlife that are indigenous to the area.

AECOM Ecologists conducted a desktop review and preliminary assessment of the lands within and surrounding each of the storm water management pond alternatives to characterize the current conditions and identify potential natural heritage sensitivities that may be impacted by the proposed project. Specifically, the focus of the review was to characterize the natural environment in support of this study and to identify potential field surveys, environmental constraints, and regulatory review or permitting recommended in conjunction with preliminary/detailed design.

The results of the review found records of SAR or SAR habitat in or near the Study Area. Potentially-suitable SAR habitat was observed at several sites. Applicable permits and regulatory review are to be confirmed following a review of the preliminary design and construction work plan.

Detailed field studies are recommended at the preliminary/detail design phase to confirm potential features such as SAR or SAR habitat and to gather data to inform agency submissions. The following are recommended:

- Ecological Land Classification – to confirm suitability of SAR habitat paired with botanical inventory (including inventory of black ash trees);
- Breeding bird surveys – to inform presence/absence of SAR or other protected species; and
- Cavity tree detailed assessment.

Consideration of the potential impacts to vegetation and terrestrial habitat will be included in the evaluation of the various alternatives developed through the study process and specific mitigation to address the potential impacts will be developed through consultation with MNRF once the design details are advanced further. As an example, mitigation may include exclusion fencing to keep species outside of the areas that will be disturbed by construction.

4.1.4 Cultural/Heritage Resources

There are significant areas within the study area that have been identified as having archaeological potential as shown on the official plan Schedule E which is included in **Appendix B**.

Depending on the nature and location of the proposed improvements developed through this study there may be a need to undertake further investigations to assess potential cultural impacts (eg. Stage 1 and/or 2 Archaeological Assessment).

Regardless of the need for and specific requirements identified through supplementary investigations/studies, as a standard mitigation measure all construction contracts will include special provisions to suspend construction operations if heritage resources are uncovered.

4.1.5 Ground Water Resources

A small proportion of the Steelton well wellhead protection area “C” (5 year travel time) is included within the study area (i.e. within Elliott Sports Complex).

Consideration of the potential impacts to the capture zones and relevant source water protection documentation will be considered in the evaluation of the various alternatives as appropriate.

4.1.6 Topography

The topography within the study area generally slopes from north to south with a topographic high (approximate elevation = 244m) at Fourth Line east of Peoples Rd and a topographic low (approximate elevation = 190m) near Peoples Road and Churchill Avenue. The average slope from north to south considering the topographic high and low is in the range of 1.5 to 2.0%. The study area also includes several ravines that are important outlets for storm water flows.

4.2 Social Environment

4.2.1 Municipal Services

The entire study area is serviced by a potable water distribution system, sanitary sewers and electrical distribution infrastructure. Storm drainage is accommodated through a combination of storm sewers, roadside ditches/culverts, natural ravines and flood control channels.

The municipal water distribution and electrical distribution plant are owned and operated by the Public Utilities Commission ("PUC"). The sewage and stormwater collection and conveyance systems are owned and operated by the City of Sault Ste. Marie.

More detail related to the sewer systems are provided in the following subsections.

4.2.2 Sanitary Sewer System

The sanitary sewer system within the study area consists of approximately 18.4 km of sanitary sewer pipes ranging in size from 150 mm to 2100 mm. The distribution of install dates and pipe sizes are shown in Figures 4 and 5. A significant proportion of the sewers were constructed in the mid 60's, mid 70's and late 90's and a significant proportion of the pipes are 250mm in diameter.

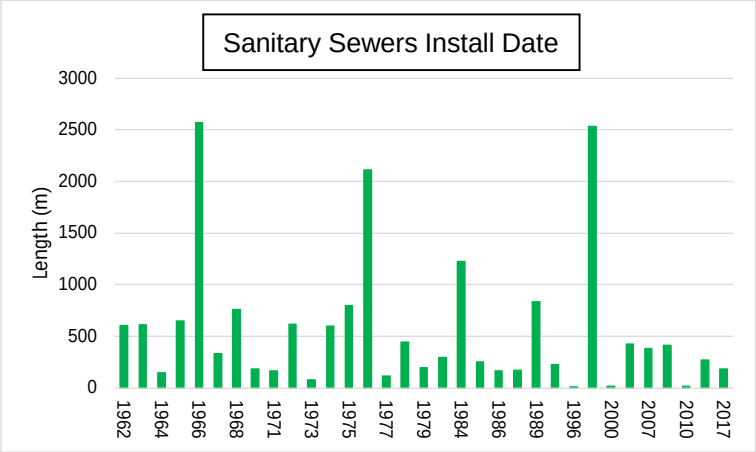


Figure 4: Sanitary Sewer Installation Dates

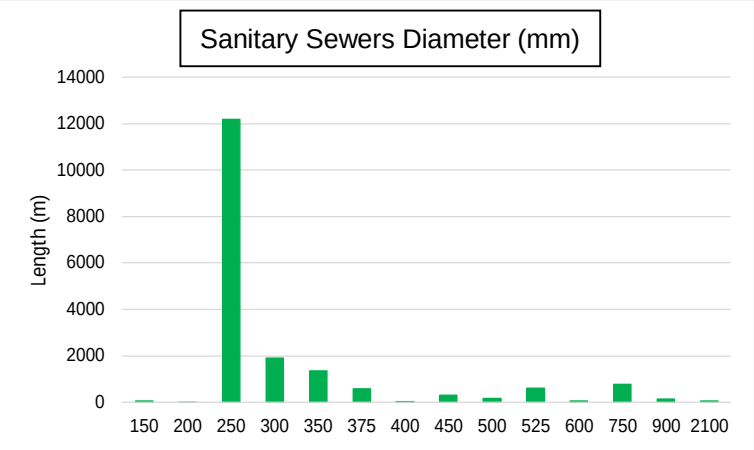
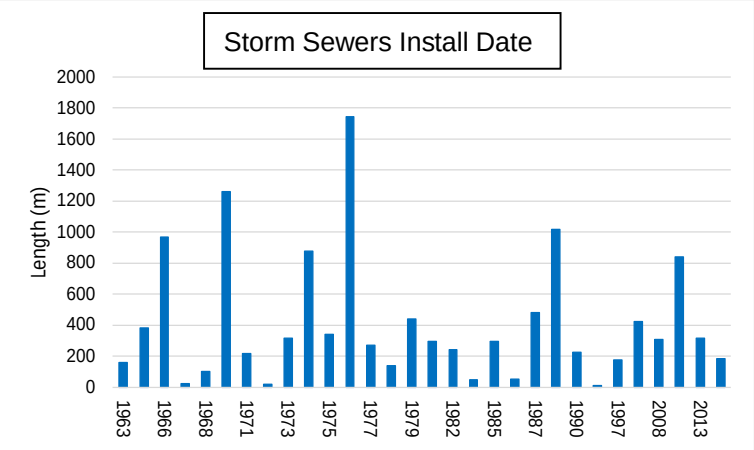


Figure 5: Sanitary Sewer Diameters

4.2.3 Storm Sewer System



The storm sewer system within the study area consists of approximately 12.2 km of storm sewer pipes ranging in size from 250 mm to 2100 mm. The distribution of install dates and pipe sizes are shown in Figures 6 and 7.

Figure 6: Storm Sewer Installation Dates

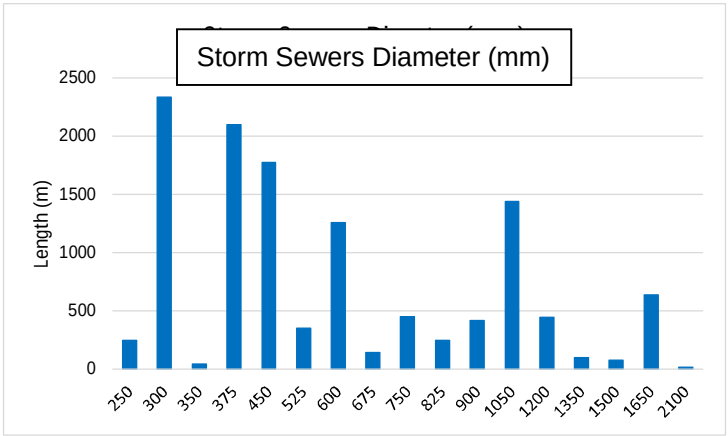


Figure 7: Storm Sewer Diameters

4.2.4 Utilities

The following utility authorities are known to have plant within the study area:

- PUC
- Enbridge Gas;
- Bell Canada; and
- Rogers Cable.

Consideration of the utility conflicts will be considered during the evaluation of the various alternatives developed through the study process.

4.2.5 Land Use

The study area includes a mix of land uses with the predominant land use being residential.

Official Plan designations include Rural Area north of Greenfield subdivision and a mix of Residential, Industrial and Parks and Recreation from the north limit of Greenfield subdivision to the south limit of the study area.

The study area includes a mix of zoning designations including various Residential zones (this is the most prominent zoning designation and is found throughout the study area), Rural Area (primarily in the north), Institutional (primarily the cemeteries but includes a couple of other properties), Medium and Heavy Industrial (west of Peoples near Third Line and east of Peoples near the south end of the study area), Parks and Recreation (primarily Fort Creek Conservation Area and Elliott Sports Complex), Environmental Management (in the ravines) and Commercial along Second Line at the south limit of the study area.

4.2.6 Transportation

Within the study area, Peoples Road from Third Line southerly and Third Line are classified as arterial urban roadways, Peoples Road north of Third Line and Fourth Line are classified as rural collectors, Rossmore Road and Farwell Terrace are classified as urban collectors and all other roads are classified as local roads.

4.2.7 Recreation

Within and adjacent to the study area there are two principle recreational opportunities at Fort Creek Conservation area and Elliott Sports Complex.

Consideration of the existing and proposed recreational facilities will be incorporated into the development and evaluation of various alternatives.

5. Alternative Solutions

The Municipal Class Environmental Assessment (MCEA) process recognizes that there are different ways of solving a particular problem and requires that various alternative solutions be considered. The following describes the approach to identifying and evaluating alternative solutions to potentially mitigate future flooding in the study area.

5.1 Development and Screening of Alternative Remedial Measures

To minimize or mitigate basement flooding occurrences and control wet weather flows, several remedial measures were identified and evaluated. The alternative solutions include “Do Nothing” and a series of measures divided into three categories; local measures (property owner), wastewater collection system remedial measures and stormwater management remedial measures. Each of these are broadly described below:

- **Do Nothing** – The Municipal Engineers Association (MEA) manual directs proponents to consider the ‘Do Nothing’ alternative in which no improvements would be undertaken to address the problem or opportunity. The ‘Do Nothing’ alternative represents what would likely occur if none of the alternative solutions are implemented and provides a benchmark for the alternatives evaluation. While the Do Nothing alternative is not typically the preferred solution in a MCEA study, it can be recommended when the costs of all other alternatives, both financial and environmental, outweigh the benefits.
- **Local measures (Property Owner)** - These measures, would be undertaken by individual property owners and if properly implemented, provide the highest level of protection for individual properties and are highly recommended. Given that these measures would be undertaken by individual property owners on private property they are excluded from the formal assessment and the costing of alternatives but may be recommended for implementation in all alternatives.
- **Wastewater collection system remedial measures** - These measures are based on reducing storm water flows entering the sanitary system or controlling/managing the flow within the system. All measures will be subject to a screening level evaluation and may be carried forward for a more detailed evaluation.
- **Stormwater management system remedial measures** - These measures are based on better managing or controlling the flow within the stormwater management system. All measures will be subject to a screening level evaluation and may be carried forward for a more detailed evaluation.

Tables 5.1 to 5.3 list the alternative remedial measures and describe the advantages, disadvantages, where it may apply and whether it has been carried forward for a more detailed evaluation. These tables are used as a screening method from which a short list of remedial measures is subjected to quantitative assessment of potential environmental effects and their effectiveness.

5.2 Property Owner Remedial Measure Alternatives

The following control measures are recommended for consideration for implementation by individual property owners within the study area. Each property owner should assess the merits of each item and implement as appropriate.

Table 5.1: Local Measures (Property Owner)

Control Type	Control Measures	Advantage	Disadvantage	Applicability	Comments
Local Remedial Measures	Backflow prevention in sanitary and storm drains.	Effective solution for individual properties to mitigate basement flooding due to sewer surcharge.	Required installation or upgrade in basement and periodic testing, maintenance and replacement by homeowner.	May be applied to all sanitary drains and all gravity storm drains.	Highly encouraged as a general solution, especially in residences with previous flooding. Not identified as part of alternatives to be modeled and evaluated.
	Sump pump backup for gravity storm sewer drains.	Effective contingency solution for individual properties to mitigate basement flooding due to storm sewer surcharge when backflow valve fails.	Required installation in basement and periodic testing, maintenance and replacement by homeowner.	May be applied to locations that have gravity storm drains.	Encouraged as a general solution, especially in residences with previous flooding. Not identified as part of alternatives to be modeled and evaluated.
	Sump pump for foundation drains.	Disconnection of foundation drains from gravity sanitary sewer and convert to a pumped storm discharge. Reduces inflow and infiltration in sanitary sewer.	Required installation in basement and periodic testing, maintenance and replacement by homeowner. Requires reliable power as grid power could be offline during a storm.	May be applied where foundation drains to sanitary sewer system.	Encouraged as a general solution, to reduce the level of extraneous flows in the sanitary sewer system which will mitigate future system surcharging and basement flooding.
	Lot regrading (Note: cross property discharge not permitted unless it existed pre-development or neighboring property permission received).	Effective in reducing local flooding and high inflow and infiltration to foundation drains.	Potential increase in overland flow and potential flooding to adjacent properties.	Applicable in areas where localized yard flooding is occurring and/or basement flooding is occurring from storm water and overland flow can be routed/drained without impacting neighbouring properties. To be assessed on an individual property basis.	Encouraged as a general solution, especially in residences with previous flooding. Not identified as part of alternatives to be modeled and evaluated.

Control Type	Control Measures	Advantage	Disadvantage	Applicability	Comments
	Rain barrel or similar local storage.	Reduces storm runoff by promoting re-use of roof runoff, which also reduces municipal water consumption.	Requires co-operation/action of homeowner.	Where space for barrel exists. May be used even where basement flooding has not occurred.	Encouraged as a form of source control and general solution. Not identified as part of alternatives to be modeled and evaluated.
	Downspout Disconnection	Divert roof runoff from storm and sanitary sewers thereby increasing time to reach storm system and reducing the peak flows.	May temporarily limit property use (i.e., ponding in yards). Potential increase in overland flow. May require grade change.	Applicable in areas where overland flow does not cause a problem. To be assessed on an individual property basis.	Encouraged as a form of source control and general solution. Not identified as part of alternatives to be modeled and evaluated.

5.3 Wastewater Collection System Remedial Measure Alternatives

The following municipal wastewater management alternative solutions have been developed for consideration and evaluation within the framework of this Class EA. In some cases, the alternative has been identified as a recommended maintenance measure for source control or flow management and screened from further consideration (i.e. exempt from Class EA) and in other cases the alternative has been carried forward for consideration in a detailed evaluation.

Table 5.2: Wastewater Collection System Remedial Measures

Control Type	Control Measures	Advantage	Disadvantage	Applicability	Considered in Alternative
Sanitary System Remedial Measures	Sealing selective sanitary sewer manhole covers.	Low cost maintenance measure effectively reducing I/I in sanitary sewers.	Reduces self-ventilation of sewer system. Must be avoided at high points of system.	Primarily at low points of system or where frequent road flooding occurs.	Encouraged as a form of source control and is considered system maintenance. Not identified as part of alternatives to be modeled and evaluated.
	Sealing selective manholes and pipes to address system leakage.	Maintenance measure reducing I/I into sanitary sewer though system repairs inclusive of pipe lining and grouting. Less disruptive relative to system replacements.	May be costly and no opportunity for pipe upgrades.	Priorities should be focused where high inflow and infiltration is evident based on CCTV inspections.	Encouraged as a form of source control and is considered system maintenance. Not identified as part of alternatives to be modeled and evaluated.
	In-line / off-line pipe storage.	Allows some flexibility regarding location. Less O&M requirements relative to underground storage tank. Does not require open space for implementation.	Requires favorable conditions of existing sewer for optimal operation and minimal maintenance.	Locations where other underground infrastructure does not impose constraints and hydraulic conditions allow implementation.	Considered as an alternative.
	Pipe Upgrades	Provides reduction/ elimination of sewer surcharge and provides capacity for future growth.	Disruptive during construction and may transfer surcharging to downstream sewers.	Locations where clear flow restrictions exist and adequate capacity is available downstream of the proposed upgrades.	Considered as an alternative.

Control Type	Control Measures	Advantage	Disadvantage	Applicability	Considered in Alternative
	Underground storage tank	Area of construction typically more compact and thus potentially less disruptive during construction than other storage alternatives.	Requires open space for construction at a hydraulically effective location. May impact land use during and after construction. Adds to system O&M costs.	Applicable where and if open space (parkland, school yard, etc.) is available.	Considered as an alternative.
	Operations and Maintenance including CCTV inspections.	Mitigate potential bottlenecks from debris/grease/ sediment build-up.	Requires City resource availability.	Everywhere, particularly where basement flooding has occurred.	Considered system maintenance and not identified as part of alternatives to be modeled and evaluated.

As noted in Table 5.2 several alternatives (potential capital improvements) have been carried forward for further consideration and evaluation. Each of these alternatives are more fully described in the following paragraphs.

Wastewater System Online/Offline pipe storage. Based on the historical records review reference is made to the Peoples Road elephant trunk offline pipe storage along Peoples Road adjacent to Elliott Road. This system component was identified as an important element to mitigate impacts associated with extraneous flows. It is speculated that this storage was decommissioned following the Churchill Boulevard sewer upgrades which were completed in approximately 1997. The City was unable to source any records or documentation that addresses the rationale for taking this system component offline. This alternative consists of bringing the existing offline pipe storage back online. However, prior to reactivating this component, steps should be taken to better understand why it was taken offline and secondly a CCTV inspection of all components should be undertaken to confirm the adequacy of the existing condition.

Increase the capacity of Sanitary Sewer pipes - Available design briefs and historical reports pertaining to the sanitary sewer system within the study area were accessed where available and reviewed and the wastewater collection system was also modeled to identify potential system bottlenecks or restrictions. The modeling was completed with various extraneous flow allowances. Through system modeling it became evident that as the level of extraneous flows in the system increased surcharging was prevalent in some areas. Furthermore, the historical records review identified significant extraneous flows in the system and also identified potential system upgrades to address extraneous flows and future development. This alternative considered the impacts of pipe size increases and/or new sewers where system restrictions were identified through historical records review and/or system modeling. The specific areas where pipe upgrades were considered are summarized as follows:

1. **Peoples Road from Third Line to Churchill Boulevard**. Under this alternative consideration was given to replacing the Peoples Road sanitary sewer within the limits noted above.
2. **Johnson Avenue from Diane Street to Farwell Terrace**. Under this alternative consideration was given to replacing the Johnson Street sanitary sewer within the limits noted above.

High level system modeling was undertaken to evaluate the effectiveness of the potential pipe upgrades identified above. The modeling was undertaken using estimated theoretical design/base flows and

extraneous flows were systematically increased to force system flooding. There was no flow monitoring or calibration of the sanitary collection system modeling. For the alternatives that include proposed sanitary sewer pipe size increases it will be important to confirm downstream sewer capacities. The City is currently undertaking a City Wastewater Master Plan project which includes a system-wide sanitary sewer model which also includes model calibration though flow monitoring and correlation to precipitation events. Prior to moving forward with sewer pipe replacements recommended in this report downstream sewers capacities need to be confirmed through system modeling.

SSO Tank – the City has installed combined sewage (sewage combined with stormwater) storage tanks adjacent to the Pim Street Pump Station and also within Bellevue Park. These tanks were constructed to collect and temporarily store sewage mixed with stormwater during more significant precipitation events. These tanks are designed to store flows in excess of downstream component capacities until such time that the precipitation/snow melt event subsides and the stored sewage can be returned to the system at a controlled rate. For the purposes of this study, tanks were considered at two separate locations as follows:

- Immediately east of Peoples Road opposite Churchill Avenue in the City snow dump.
- Within the former school property at 74 Johnson Avenue.

Conceptual drawings illustrating the various wastewater collection system alternatives and the potential impacts of their implementation are included in **Appendix C**.

5.4 Stormwater Collection System Remedial Measure Alternatives

The following municipal stormwater management alternative solutions have been developed for consideration and evaluation within the framework of this Class EA. In some cases, the alternative was screened from further consideration because it was either not well suited or considered a flow management maintenance measure (i.e. exempt from Class EA) and in other cases the alternative has been carried forward for consideration in a detailed evaluation.

Table 5.3: Stormwater Management System Remedial Measures

Control Type	Control Measures	Advantage	Disadvantage	Applicability	Considered in Alternative
Storm System Remedial Measures	Increase inlet capacity by adding catchbasins.	Effective in rapidly conveying runoff from ground into storm sewer system where adequate pipe capacity exists.	Cost can vary depending on site conditions and potential construction constraints.	Applied where the sewer system has adequate capacity and overland flow causes flooding.	Not considered appropriate or relevant as the flooding incidents are typically occurring when the storm sewer capacity is exceeded.
	Inlet control devices.	Effective in controlling the stormwater entering the storm system where sewer capacity does not exist.	Water ponding will occur in open areas.	Applied in situations where sewer surcharge causes basement flooding and overland flow is not a problem as the major system has adequate outlet capacity and there are no sags in the street.	Not considered appropriate as there are widespread problems of basement and surface water flooding problems during higher intensity events.

Control Type	Control Measures	Advantage	Disadvantage	Applicability	Considered in Alternative
	In-line / off-line pipe storage.	Effective in regulating/moderating peak flows at locations where the capacity of a sewer is exceeded.	Costs can vary significantly depending on sewer depth and the presence of other underground infrastructure and subsurface conditions (eg. groundwater, rock, etc). More costly than storage in storm ponds.	Applied in situations where head and space in the street are available. Most effective if the downstream sewer system does not have adequate capacity to convey the peak flow.	Not considered as an alternative as system storage in ponds is preferred in terms of capacity and costs.
	Storm sewer upgrades.	Effective in mitigating surcharge of existing storm sewer system.	Costs can vary significantly depending on site conditions. Costs are relatively higher than other remedial measures.	Applied in situations where storm sewer is undersized and suitable downstream capacity is present.	Considered as an alternative solution and incorporated in the modeling at a high level.
	Stormwater management pond (dry)	Effective in controlling stormwater peak flows by temporarily storing runoff and releasing at a controlled rate.	The footprints of SWM facilities occupy a significant amount of space.	Applied where open space is available.	Considered as an alternative solution and incorporated in the modeling at a high level.
	Construction of overflow outlets or new outlets to ravines	Effective in diverting storm sewer system flows to ravines when the system capacity is exceeded.	May be difficult and costly to implement in an urban area.	Applied in situations where overland flow routes or natural channels are available and in relatively close proximity to a storm sewer system and flooding occurrences.	Opportunities to incorporate a storm sewer overflow were not identified.
	Operations and Maintenance including CCTV inspections of storm sewers	Mitigate potential bottlenecks from debris/sediment build-up in storm sewers and ditches.	Requires City resource availability.	Everywhere, particularly where basement and/or yard flooding has occurred.	Encouraged as a general solution. Not identified as part of alternatives to be modeled and evaluated.

As noted in Table 5.3 several alternatives have been carried forward for further consideration and evaluation. Each of these alternatives are more fully described in the following paragraphs.

Stormwater Management (Dry) Pond – there are a number of locations that may be suitable for the construction of a stormwater detention pond with the objective of reducing peak downstream runoff/flows and erosion. The objective of this alternative was to identify locations where open space is available on City owned lands and the construction of a pond may have a meaningful impact as determined through

stormwater modeling. Conceptual pond designs (design are conceptual in nature based on limited available data and will have to be confirmed and refined through the preliminary and detail design phases) were developed at four locations within the study area as follows:

1. **Immediately south of the cemetery within an existing wooded area that is owned by the City**. The site is easily accessible through the cemetery to facilitate future access by City staff for maintenance and operations. For the purposes of this alternative, we have modeled a rectangular storm pond having approximate dimensions of 28m x 47m x 2.2m depth. These dimensions provide storage for approximately 4,500m^3 of stormwater.
2. **Within the Elliott Sport Complex.** The City has reported that there was a stormwater detention pond located within the park that has not been functioning as intended for some time. This alternative consists of taking advantage of the available storage within the former pond area through the construction of a dyke/berm and flow control structure at the southwest end of the existing pond. The site is easily accessible through the park to facilitate future access by City staff for maintenance and operations. For the purposes of this alternative, we have modeled an irregular (i.e. generally accommodated within existing topography) storm pond having approximate dimensions of 53m x 170m x 0.6 to 2.5m depth. These dimensions provide storage for approximately 7,000m^3 of stormwater.
3. **Within the Elliott Sport Complex.** There is also an existing low-lying area immediately adjacent to Elliott Road and east of the pickleball courts and baseball diamond. There may also be an opportunity to provide enhanced storage at this location by constructing a berm along the south and west sides (i.e. adjacent to the Elliott Road and Ball field fencing). This alternative should also include the construction of a defined ditch along the southern limits of Elliott Field and upstream of the Elliott Road residences to collect and convey flows to the pond (refer to **"**Enhance the capacity or capabilities of the stormwater conveyance system" alternative discussed below). The site is easily accessible through the park to facilitate future access by City staff for maintenance and operations. For the purposes of this alternative, we have modeled an irregular storm pond having approximate dimensions of 22m x 43m x 0.6m depth. These dimensions provide storage for approximately 300m^3 of stormwater.
4. **Immediately west of the Peoples Road/Penno Road intersection and north of the railroad tracks on City owned property**. This location is immediately upstream of an area that has been flooded and experienced significant erosion in the past. The site is accessible from Peoples Road to facilitate future access by City staff for maintenance and operations. For the purposes of this alternative, we have modeled an irregular storm pond having approximate dimensions of 40m x 47m x 1.8m depth. These dimensions provide storage for approximately 3,400m^3 of stormwater.

In addition to the foregoing there may also be an opportunity for the City to collaborate and partner with developers that are currently in the planning and design stages of their subdivisions north of Greenfield Drive and east of Konkin Avenue. Although these alternatives have not been modeled any upsizing of the stormwater ponds beyond the needs of the subdivision developments will have a positive impact by reducing downstream peak flows. The City is encouraged to explore this option further.

Enhance the capacity or capabilities of the stormwater conveyance system. The existing stormwater pipe network was modeled to identify potential bottlenecks or flow restrictions for 1:5 year and 1:10 year design storm events. Based on the City's stormwater management guidelines the storm sewer system should be capable of conveying the 1:10 year event without significant surcharging. The system modeling as described above demonstrated that the system generally operates with limited to no surcharging during a 1:5 year event but shows more significant surcharging /flooding during a 1:10 year event. Some surcharging is expected given that the current design guidelines are modestly more onerous than the guidelines that existed when this system was originally designed as rainfall intensity has

increased over time. The implementation of pipe upgrades within the study area must be carefully considered as an increase in pipe size in one area could potentially lead to new or increased downstream problems. Two specific areas within the study area were considered for stormwater conveyance system improvements which included low lying areas along Hillside Drive and Pozzebon Crescent. Both roadways include “sags” in their vertical road profiles that result in stormwater accumulation and ponding within the right-of-way during significant storm events. There may be an opportunity to mitigate or reduce impacts in these areas through conveyance system enhancements provided there are no significant downstream impacts. Furthermore, the City typically assesses potential improvements in conjunction with their capital reconstruction program (i.e. if a road is being considered for reconstruction the road profile and stormwater conveyance system capacity would be assessed and addressed as appropriate).

In addition to the potential storm sewer system upgrades identified in the forgoing paragraph, an opportunity was identified to mitigate potential erosion impacts to several Elliott Road properties immediately south of the Elliott sports complex. Through a field review coupled with input from property owners and City staff, improved stormwater collection and conveyance can likely be achieved with the addition of a perimeter ditch along the southeast limit of the Elliott Park fields. Stormwater generated within the southeast potion of the park generally flows south through a number of Elliott Road residential properties. There is an opportunity to collect and channel some of this stormwater to an existing low-lying area in the park immediately east of the pickleball courts. From this location the rate at which the stormwater enters the stormwater collection system can be better controlled. The proposed ditching is considered a maintenance activity. It is recommended but it has not been included in the detailed evaluation.

Conceptual drawings illustrating the various stormwater management alternatives and the potential impacts of their implementation are included in **Appendix D**.

5.5 Evaluation of Alternatives

To evaluate the different alternatives, comparative criteria were established and applied. The criteria are based on four categories: natural environment, social environment, technical considerations and cost. The measure for evaluating each criterion has been established, as shown in **Table 5.4**.

Scoring for the evaluation was conducted as follows:

- Neutral or positive impact or relatively low cost – Score 3.
- Near neutral impact or relatively medium cost – Score 2.
- Negative impact or relatively high cost – Score 1.

Table 5.4: Evaluation Categories, Criteria and Scoring

Category	Comparative Criteria	Criteria Description	Measures for Evaluating
Natural Environment	Terrestrial Systems	Potential to impact terrestrial habitats or systems, including SAR and SAR habitat, terrestrial features / functions unique vegetation species, mature trees, existing park / open spaces linkages or wildlife	• Alternative does not adversely impact terrestrial system (eg. all within existing disturbed ROW) - Score 3 • Alternative has comparatively small impact on terrestrial system – Score 2 • Alternative has comparatively large impact on terrestrial system – Score 1

Category	Comparative Criteria	Criteria Description	Measures for Evaluating
	Aquatic Systems	Potential to impact aquatic habitats or systems, including possible impacts on aquatic life, features / functions.	• Alternative does not adversely impact aquatic systems - Score 3 • Alternative has comparatively small impact on aquatic systems – Score 2 • Alternative has comparatively large impact on aquatic systems – Score 1
	Soil, Ground Water and Surface Water	Potential to impact soils, groundwater and surface water from the construction of the facility. Alternatives that require more than 1.0 m of excavation may require some dewatering during construction.	• Alternative does not impact soils, groundwater and surface water – Score 3 • Alternative has comparatively small impact on soils, groundwater and surface water – Score 2 • Alternative has comparatively large impact on soils, groundwater and surface water – Score 1
Socio-Cultural Environment	Community Impact	Potential to impact the community in terms of use and enjoyment of property, visibility, recreational opportunities, noise / odour / light, potential risk in terms of proximity to open water which may provide breeding grounds for mosquitoes, short-term construction impact, etc.	• Alternative does not adversely impact community – Score 3 • Alternative has comparatively small impact on community – Score 2 • Alternative has comparatively large impact on community – Score 1
	Land Use Compatibility	The extent to which the control measure requires a change in current land use and how it blends in with the existing land uses in the area.	• No or little change in current land use and Alternative demonstrates good compatibility in blending in with existing area land uses – Score 3 • Change in land use required to accommodate control measure and Alternative demonstrates fair compatibility in blending in with existing land uses – Score 2 • Change in land use required to accommodate control measure and Alternative demonstrates poor compatibility in blending in with existing land uses – Score 1
	Archaeology/Natural Heritage	The potential of the solution to impact any archaeological sites and/or significant / natural heritage areas (Note: at this stage of the assessment this is a tabletop screening level assessment. The prefrerred solution may require more detailed evaluation prior to implementation).	• Alternative not expected to adversely impact archaeological and/or natural heritage sites – Score 3 • Alternative likely has comparatively small impact on archaeological and/or natural heritage sites – Score 2 • Alternative likely has comparatively large impact on archaeological and/or natural heritage sites – Score 1
Technical Considerations	Water Quantity Effectiveness of Control Measure	Effectiveness of the alternative in mitigating basement and or yard flooding.	• Alternative is comparatively more effective in achieving stated requirements – Score 3 • Alternative is comparatively less effective in achieving stated requirements – Score 2 • Alternative has minimal or no effectiveness in achieving stated requirements – Score 1

Category	Comparative Criteria	Criteria Description	Measures for Evaluating
	Stormwater Runoff Quality Effectiveness of Control Measure	Effectiveness of the alternative in improving the quality of the stormwater runoff.	• Alternative is comparatively more effective in achieving stated requirements – Score 3 • Alternative is comparatively less effective in achieving stated requirements – Score 2 • Alternative has minimal or no effectiveness in achieving stated requirements – Score 1
	Feasibility and constructability of Control Measure	The extent to which the alternative is challenging to implement and construct in terms of availability of space, accessibility, utility conflicts, other infrastructure conflicts,easement requirements, construction techniques and requirements.	• Alternative is feasible/constructable in terms of stated considerations – Score 3 • Alternative is feasible/constructable but there are likely some challenges to overcome in terms of stated considerations – Score 2 • Alternative is not likely feasible/constructible or has significant challenges in terms of stated considerations – Score 1
	Downstream Impacts Trunk Sewers/ Treatment Facilities/ Receiving Water/ Erosion	The impacts of the alternative in potentially increasing downstream and surrounding area flows/flooding or impacts to erosion potential	• Alternative does not have an adverse impact in increasing flooding downstream and surrounding areas or does not increase potential for erosion – Score 3 • Alternative has comparatively minor impact in increasing flooding downstream and surrounding areas or does not increase potential erosion – Score 2 • Alternative has significant impact in increasing flooding downstream and surrounding areas or does not increase potential erosion – Score 1
Economic Considerations	Capital Cost	The high level estimated capital cost associated with the construction of the alternative including labour, material and equipment and possibly property acquisition.	• Capital cost of Alternative is low compared to other alternatives – Score 3 • Capital cost of alternative is medium compared to other alternatives – Score 2 • Capital cost of alternative is high compared to other alternatives – Score 1
	Operation & Maintenance (O&M) Cost	Post-construction operation and maintenance activities including inspection, grass cutting / weed control, performance monitoring, sediment removal, energy requirements and other operational requirements.	• O & M cost of alternative is low compared to other alternatives – Score 3 • O & M cost of alternative is medium compared to other alternatives – Score 2 • O & M cost of alternative is high compared to other alternatives – Score 1

Table 5.5: Detailed Evaluation of Alternatives

Evaluation Criteria	Do Nothing	Dry Stormwater Ponds	Offline Wastewater Storage Pipe or Tank	Wastewater Pipe System Upgrades	Stormwater Conveyance System Upgrades
Natural Environment					
Terrestrial Systems	No direct impact to terrestrial systems. Neutral impact =2	Somewhat location dependant but all ponds require disturbance of terrestrial features. Negative impact = 1.	Potential tanks or pipes located in previously disturbed corridors or lands and no substantial impact to terrestrial features expected. Neutral impact =2	Locations of pipe upgrades are within previously disturbed rights-of-ways. Neutral Impact = 2	The proposed storm sewer upgrades are located in previously disturbed City owned rights-of-way. Neutral Impact = 2
Aquatic Systems	No direct impact to aquatic systems but there is potential for adverse impacts associated with erosion and combined storm and wastewater overflows impacting aquatic systems. Negative impact =1	No direct impact to aquatic systems. Potential for enhanced downstream water quality resulting in modest improvement for downstream aquatic systems. Positive impact = 3	No direct impact to aquatic systems. Potential for enhanced surface water quality due to reduced wastewater overflows. Modest improvement for downstream aquatic systems. Positive impact = 3	No direct impact to aquatic systems. Increased peak flow to downstream conveyance and treatment which could result in modest increase in system overflows. Negative Impact = 1	No direct impact to aquatic systems. Proposed upgrades will increase downstream flows which may increase erosion but will also reduce surcharging and pressure in the system which may reduce transport of sediment in the system. Neutral impact = 2
Soil, Ground Water and Surface Water	Currently erosion and combined storm/wastewater overflows are creating negative impacts during significant precipitation events. Negative impact = 1	Most require significant excavation and grading activities which could also result in adverse impacts to ground and surface water systems. Negative impact = 1	New tank(s) require significant excavation and grading activities which could also result in adverse impacts to ground and surface water systems. Negative impact = 1 (Note: no significant impact anticipated to bring “elephant trunk” back online – Neutral Impact = 2)	Requires significant excavation and grading activities which could result in adverse impacts to ground and surface water systems. Negative impact = 1	Requires significant excavation and grading activities which could result in adverse impacts to ground and surface water systems. Negative impact = 1
Natural Environment	**4**	**5**	**6 7(elephant trunk)**	**4**	**5**
Socio-Cultural Environment					
Community Impact	The flooding occurrences are impacting the use and enjoyment of some properties. Negative impact = 1	Ponds are located in areas which will not significantly impact community features or recreational opportunities during or after construction. The ponds will	Storage tank(s) or pipes are located in areas which will not significantly impact community features or recreational opportunities during or after construction. Modeling shows only	Pipes to be upgraded are located within existing road allowances. There will be adverse impacts to transportation and community	The construction of the proposed storm sewer upgrades will have modest short term adverse impacts during construction. The proposed pipe upsizing will reduce

Evaluation Criteria	Do Nothing	Dry Stormwater Ponds	Offline Wastewater Storage Pipe or Tank	Wastewater Pipe System Upgrades	Stormwater Conveyance System Upgrades
		mitigate downstream flooding. Positive impact = 3	modest improvement to flooding. Neutral impact = 2	convenience during construction. The system modeling shows that the upgrades will provide meaningful basement flooding mitigation. Positive impact = 3 (Note: rating assumes no negative downstream impacts from increased flows)	the level of flooding in the Hillside and Pozzebon ROW's. Positive impact = 3 (Note: rating assumes no negative downstream impacts from increased flows)
Land Use Compatibility	No direct impact. Neutral impact = 2	No significant land use compatibility issues with any of the proposed ponds. Neutral impact = 2	No significant land use compatibility issues anticipated with storage tank(s) or pipes. Neutral impact = 2	No land use compatibility issues in replacing existing pipes with larger diameter pipes. Neutral impact = 2	No significant land use compatibility issues anticipated with the proposed storm sewer upgrades. The Hillside Drive storm sewer outlet is located within a City owned ROW immediately adjacent to two residential properties. Some surficial landscaping features will be impacted during construction but will be fully restored. Neutral impact = 2
Archaeology/Natural Heritage	No direct impact. Neutral impact = 2	The proposed ponds are generally located within areas designated as having archaeological potential based on the City's Official Plan Schedule E. Further investigations will be required prior to implementation. Negative impact = 1	Two possible locations were investigated for a possible storage tank and both are located within areas designated as having archaeological potential based on the City's Official Plan Schedule E. Further investigations will be required prior to implementation. Negative impact = 1 (Note: No impact anticipated with previously constructed offline	No impact as the proposed pipes would be replacing existing pipes within existing disturbed road rights-of-ways. Neutral impact = 2	No impact as the proposed pipes would be replacing existing pipes within existing disturbed corridors or road rights-of-ways. Neutral impact = 2

Evaluation Criteria	Do Nothing	Dry Stormwater Ponds	Offline Wastewater Storage Pipe or Tank	Wastewater Pipe System Upgrades	Stormwater Conveyance System Upgrades
			storage pipe - Neutral impact = 2)		
Socio-Cultural Environment	**5**	**6**	**5 6(elephant trunk)**	**7**	**7**
Technical Considerations					
Water Quantity Effectiveness of Control Measure	Poor flow control/management is resulting in basement and surface flooding for some properties. Negative impact = 1	Proposed ponds are effective in mitigating downstream flooding to some degree based on the system modeling and those with larger capacity will be more effective in mitigating impacts. Positive impact = 3	A storage tank or pipe can be effective in mitigating potential basement flooding. The system modeling showed that the two tank and single pipe options considered provide only modest mitigation of basement flooding. Neutral impact = 2	Based on the system modeling and historical records review there were a couple of areas that appeared to have flow restrictions. Modeling with increased pipe sizes in these locations showed improved system hydraulics and mitigation of basement flooding. Positive impact = 3 (Note: rating assumes no negative downstream impacts from increased flows)	Based on the system modeling and historical records review there were a couple of areas where flooding of the roadway was prevalent during major precipitation events. Modeling with increased pipe sizes in these locations showed improved system hydraulics and mitigation of flooding in the ROW. Positive impact = 3 (Note: rating assumes no negative downstream impacts from increased flows)
Surface water Quality Effectiveness of Control Measure	There have been historical precipitation events with significant erosion impacts and basement flooding which have adversely impacted surface water quality. Negative impact = 1	Although the ponds will be designed primarily for quantity control they will also provide some level of quality control. Positive impact = 3	The implementation of system storage in the wastewater collection system can reduce the volume and frequency of system overflows which will enhance surface water quality. Positive impact = 3	The proposed pipe upgrades show mitigation of basement flooding which will reduce cross contamination and provide greater control and treatment of wastewater flows. Positive impact = 3	The proposed pipe upgrades will result in reduced overland flow and may reduce some erosion but are not expected to have a significant impact on stormwater quality. Neutral impact = 2
Feasibility and constructability of Control Measure	No direct impact. Positive impact = 3	Based on the conceptual level design completed to date (i.e. based on existing available contour information with no local site surveys) the proposed ponds can	Based on the conceptual level design completed to date (i.e. based on existing available contour information with no local site surveys) the offline storage tanks are	The reconstruction/ upgrading of sewers within road rights-of-ways is undertaken regularly and is constructable and feasible but are comparatively more challenging	The reconstruction/ upgrading of sewers within road rights-of-ways is undertaken regularly and is constructable and feasible but are comparatively more challenging

Evaluation Criteria	Do Nothing	Dry Stormwater Ponds	Offline Wastewater Storage Pipe or Tank	Wastewater Pipe System Upgrades	Stormwater Conveyance System Upgrades
		be constructed with suitable outlets but are comparatively more challenging compared to alternatives rated at 3. Neutral impact = 2	comparatively challenging to construct. Specifically, the excavation depths are significant and it is challenging to incorporate meaningful storage volume in the two sites. Negative impact = 1 (Note: The offline "elephant trunk" exists but was taken offline some years ago. For the purposes of this evaluation, we have assumed that there were no significant design or operational challenges that required it to be taken offline. If City staff find evidence to the contrary the evaluation and feasibility of this alternative should be reconsidered - Positive impact = 3)	compared to alternatives rated at 3. Neutral impact = 2	compared to alternatives rated at 3. Neutral impact = 2
Downstream Impacts Trunk Sewers/ Treatment Facilities/ Receiving Water	Current system restrictions are reducing downstream flows. Positive impact = 3	The construction of storage ponds will have a positive impact on the downstream conveyance system as the ponds may reduce peak flows and provide controlled release of the storm water. Positive impact = 3	The construction of a storage tank(s) or pipes will have a positive impact on the downstream conveyance system as the storage may reduce peak flows and provide controlled release of the wastewater. Positive impact = 3	The upgrading of pipes in the wastewater conveyance system will increase peak flows in the system and may result in capacity concerns at downstream locations. The City has initiated a City-wide wastewater master plan which will include an all pipes model of the wastewater conveyance system inclusive of flow monitoring and model calibration. It also includes a review of treatment plant capacities and	The upgrading of pipes in the stormwater conveyance system will increase peak flows in the system and may result in capacity concerns at downstream locations. This can be mitigated through the implementation of storm ponds in conjunction with the proposed pipe upgrades. Neutral impact = 2 assuming completed in conjunction with storm pond (Note: rating assumes no negative downstream impacts

Evaluation Criteria	Do Nothing	Dry Stormwater Ponds	Offline Wastewater Storage Pipe or Tank	Wastewater Pipe System Upgrades	Stormwater Conveyance System Upgrades
				available reserve capacity. Downstream conveyance system capacity and WEWPCP capacity should be confirmed prior to implementing the pipe upgrades identified in this report. Negative impact = 1	from increased flows)
Technical Considerations	**8**	**11**	**9 11(elephant trunk)**	**9**	**9**
Economic Considerations					
Capital Cost	High capital costs related to basement flooding events. Negative impact = 1	Relatively high capital cost in most instances and adding to the City's infrastructure inventory in most instances = 2 (Note: Elliott ponds are lower cost as it is an upgrade of a former pond or depressed area).	High capital cost and new infrastructure adding to the City's inventory = 1 (Note: the capital cost to bring the "elephant trunk" back online is low - Low cost = 3)	High capital cost but many of the targeted sewers are Asbestos Cement pipe and approaching 60 years of age. (ie. approaching the end of the typical service life = 2 (Note: although high costs it has been scored 2 because of sewer age)	High capital cost and many of the targeted sewers are not near the end of their typical service life = 3 Negative Impact
O&M Cost	The impacts from high precipitation evets are leading to increased O&M needs and costs = 2	Moderate cost = 2	Moderate cost = 2 (Note: the O&M cost for the "elephant trunk" is low - Low cost = 3)	Moderate cost = 2	Moderate cost = 2
Economic Considerations	**3**	**4**	**3 6(elephant trunk)**	**4**	**5**
TOTAL SCORE	**20**	**26**	**23 30(elephant trunk)**	**24**	**26**

The offline wastewater storage alternative included consideration of tanks and/or the reactivation of the existing offline storage pipe referred to as the "elephant trunk". Although these alternatives were evaluated together, separate scoring was established for the "elephant trunk" as it is already constructed. The reactivation of the "elephant trunk" offline storage pipe scored the highest which reflects the fact that it is already constructed and is expected to have primarily positive impacts if reactivated. The offline wastewater storage tank scored the lowest as it has a high cost and the system modeling demonstrated limited effectiveness in mitigating basement flooding. The remaining alternatives scored very similarly in the range of 24 to 26, are feasible and offer measurable benefits based on the modeling completed.

6. Public Input/Open House

Early in the project, a Public Consultation Plan was developed which identified and encouraged opportunities for public and agency input. A project webpage was developed to disseminate project information and input was encouraged through project Notices, a project questionnaire and a Public Information Centre (PIC). A copy of the Public Consultation Plan is included in **Appendix A** and the PIC is summarized in the following paragraphs.

A public open house was conducted on May 16, 2023 at Superior Heights Collegiate and Vocational School Cafeteria, 750 North Street. The session provided a forum for interested individuals, Community leaders, agency representatives and property owners to review and discuss the alternatives considered and the preliminary preferred solution to mitigate significant basement and yard flooding impacts within an area bounded by Peoples Road and Farwell Terrace to the west, Old Goulais Bay Road and Fort Creek to the east, Fourth Line to the north and Second Line to the south.

Representatives of AECOM, and the City of Sault Ste. Marie were in attendance throughout the session to provide information, address questions, and facilitate discussions. The information session was open from 4:00 p.m. to 7:00 p.m. and was very well attended with a total of 74 individuals recording their names on the sign-in sheet.

Details related to the PIC including how it was advertised, the handout that was made available to visitors, the displays that were posted at the PIC and the comments and questions that were received during and following the PIC are included in **Appendix E**. The principal comments and input received through the PIC were generally focussed on individual yard and basement flooding occurrences at various locations throughout the study area. The Appendix includes the comments/questions together with the project team's responses.

7. Recommended Surface and Basement Flooding Remedial Measures

Section 7.1 summarizes the recommended local remedial measures (i.e. property owner responsibilities) to address basement and/or yard flooding. The benefits of these measures were not evaluated or modelled but are recognized as effective in reduction of flood risks and consistent with City-wide programs. **Section 7.2** provides a summary of the recommended modelled and/or evaluated sanitary and storm system improvements (i.e. potential City capital projects).

7.1 Recommended Local Remedial Measures

In all cases, the following local remedial measures form part of the preferred solution:

- Downspouts from roofs that are currently directly connected to either the storm or sanitary sewer, should be disconnected at the ground and directed to an appropriate surface discharge point.

- Backflow prevention should be implemented on all gravity storm and sanitary private drain connections (PDC. This includes installation of new backflow devices where they do not currently exist and condition assessment and testing of existing backflow devices and replacement where necessary. Property owners should be educated regarding the function and importance of these devices and the importance of testing, maintaining and replacing them regularly.
- Sump pumps should be encouraged to be installed for foundation drains where foundation drains are currently draining to the sanitary system. In addition, sump pumps should also be considered as a contingency for property owners with gravity storm drains. In the latter case the sump pump would provide a backup in the event that the backflow device in the gravity storm drain fails.
- Lot regrading should be considered if local grading is causing water to pond or flow towards on-site buildings. Careful attention must be given to any proposed lot regrading to ensure discharge is not directed to a neighbouring property unless it existed pre-development or a neighboring property owner's permission has been received.
- On-site storage such as the implementation of a rain barrel can be effective in reducing peak flows to the storm sewer system while simultaneously providing a source of water for local lawn watering or gardens.

There were numerous comments received from property owners voicing concerns with localized yard grading and drainage issues (eg. neighbouring property draining onto adjacent property, property does not shed water well and the ground is often saturated). This Class EA was not intended to directly address localized yard drainage issues and although some of the recommended municipal remedial measures, noted in the following subsection, may provide some relief or mitigation through better control of peak flows, these local challenges, in many cases, will require property owner interventions such as improved site grading or installation of on-site supplementary drains and/or storage.

7.2 Recommended Municipal Remedial Measures

In addition to the recommended remedial measures noted below, it is also important that future road reconstruction projects, within the study area, include consideration of the capacity of the stormwater management elements including ditches and culverts. Careful attention should be given to the appropriate design storm event as some stormwater elements may be considered minor and major system components (eg. uncontrolled discharge from a ravine into a municipal storm drain).

Based on the evaluation of the alternatives completed in Section 5.5 the following municipal remedial measures form part of the preferred solution.

- Construction of dry stormwater management ponds at the following locations:
  - Immediately downstream of the cemetery (south of Fourth Line and east of Peoples Road);
  - Elliott Field at the location of the former stormwater management pond;
  - Elliott Field immediately adjacent to Elliot Road and east of the pickleball courts; and
  - Immediately west of Peoples Road and south of the Hillside Drive properties.
- Bringing the previously constructed "elephant trunk" offline pipe storage back online. This alternative is contingent upon further input from the City regarding the rational for taking it offline and confirmation of any challenges in bringing it back online including its current condition. The reactivation of this element can be confirmed at the time of the preliminary/detail design for the Peoples Road sanitary sewer upgrade.

- Upgrading the existing sanitary sewers at the following locations (Note: this alternative is contingent on the available reserve capacity in the downstream conveyance system which will be evaluated in detail through the ongoing Wastewater Master Planning project):
  - Peoples Road from Third Line to Churchill Boulevard; and
  - Johnson Avenue from Diane Street to Farwell Terrace
- Construction of a new storm sewer along Diane Street.
- Upgrading of the existing storm sewers at the following locations:
  - Hillside Drive outlet sewer; and
  - Farwell Terrace from Johnson Avenue to the outlet in East Davignon Creek.
- Construction of a perimeter ditch on the south side of the eastern Elliott sports fields.
- Construction/upgrading of roadside ditching on Hillside Drive. This can be completed in concert with an road upgrading/reconstruction project or completed as routine maintenance.
- Construction of a redundant inlet to the 1200mm pipe crossing of Peoples Road north of Elliott Road.

Although each of the individual remedial measures will contribute to mitigation and improvements in the study area it is also recognized that the City has budget constraints and not all of the municipal remedial measures may be necessary. Therefore, the improvements noted above have prioritized in Section 10 of this report. As remedial measures are completed over time the City should monitor the impact of the improvements and confirm whether additional improvements should be implemented.

8. Confirmation of Municipal Class EA Project Planning Schedules

The preferred alternatives identified in Section 7.2 were reviewed to confirm the applicable MCEA Project Planning Schedules (i.e. A, A+, B or C) in accordance with the MEA MCEA manual (as amended in 2015 – based on the status of the project at the time of the release of the 2023 MEA MCEA updates a decision was made to continue this project under the 2015 version which is permitted in accordance with Section 1.4.2 of the 2023 document). The review considered whether the proposed works are in an existing road allowance, or in an existing utility corridor[1].

The proposed sanitary sewer and storm sewer upgrades are located within existing City-owned road allowances or utility corridors and are therefore considered Schedule A+ projects based on the following extract from the MEA MCEA manual:

Schedule A+ project: Establish, extend, or enlarge a sewage collection system and all necessary works to connect the system to an existing sewage or natural drainage outlet, provided all such facilities are in

[1] *Means land or rights to land utilized for locating utilities, including sewage, stormwater management and/or water services and/or appurtenances thereto, railways, street-cars, light rapid rail systems and transit ways. In the MEA MCEA manual, "existing utility corridor" means a developed utility corridor.*

either an existing road allowance or an existing utility corridor, including the use of Trenchless Technology for water crossings.

The proposed potential dry storm water ponds are located within City-owned lands. The relevant project descriptions within the MEA MCEA Manual that guide the Class EA planning requirements are as follows:

Schedule A project: Establish new or replace or expand existing stormwater detention/retention ponds or tanks and appurtenances including outfall to receiving water body provided all such facilities are in either an existing utility corridor or an existing road allowance where no additional property is required.

Schedule B project: Establish new stormwater retention/detention ponds and appurtenances or infiltration systems including outfall to receiving water body where additional property is required.

Although the proposed dry storm ponds are not located within existing road allowances or utility corridors they are all located on City-owned lands. As noted above, under the Schedule A and B project descriptions, it appears the intent is that the more rigorous Schedule B categorization would apply to projects where “additional property is required”. It appears reasonable to assume the proposed stormwater ponds are appropriately categorized as Schedule A undertakings as none of them require property acquisition.

Schedule A/A+ projects are pre-approved under the MCEA planning process and Schedule A+ projects require public notification prior to construction. Typically, these projects do not specifically include public consultation.

Despite the Schedule A and A+ categorizations noted above this project has generally incorporated planning activities (eg. Public Open House, detailed report) that are typically reserved for Schedule B and/or C projects. The City proactively took this approach based on the high level of interest from the public. Although a formal Notice of Completion and 30 day review period are not required, this report will be posted on the City’s website and all individuals and agencies that expressed an interest in the project will be notified that it is available for their review.

9. Impact on Downstream Sewer System

The approach used in developing the models is detailed in Section 3.7. There were numerous assumptions made in developing the models and there was no flow monitoring and related calibrations of the models. The general intent of the modeling within the context of this project was to provide a before and after comparison to assess the potential effectiveness of the alternative solutions. In the paragraphs below we highlight important downstream pipe capacity considerations which should be addressed before proceeding with the identified pipe upgrades.

9.1 Storm Sewer System

The storm sewer system within the study area discharges to various natural ravines/creeks including Fort Creek and the east Davignon Creek/flood control channel. Storm system modeling of 1:10 year and

1:100 year design storm events was completed using PCSWMM software. The 1:10 year event was modeled to assess the capacity of the minor storm system while the 1:100 year event was modeled to identify potentially vulnerable areas during more significant events and to assist in comparing the alternative remedial measures (i.e. before and after comparison of the remedial measures). Although only modest stormwater collection system upgrades are proposed, it was recognized that pipe upgrades may increase downstream peak flows. To address the potential for increased downstream peak flows a stormwater detention pond is proposed immediately downstream of the Hillside Drive storm water outlet upgrade and the proposed new/upgraded pipes along Diane Street, Farwell Terrace and Johnson Avenue are immediately upstream of the East Davignon Flood Channel outlet. No further assessment of downstream capacities is required beyond what is typically undertaken in the preliminary and detail design phases.

9.2 Sanitary Sewer System

The sanitary sewers within the study area discharge to a trunk sewer running westerly along Sussex Road. The modeling completed within the scope of this study included the first run of the Sussex Road trunk sanitary sewer. The modeling was completed using PCSWMM and the approach generally consisted of developing and systematically increasing a base flow to the point where significant system surcharging and basement flooding became evident. This assisted in identifying the most vulnerable areas in the collection system and provided a basis for comparing the alternative remedial measures (i.e. before and after comparison of the remedial measures).

As noted previously there were gaps in the data and information related to downstream sewer capacities. The best means of assessing and confirming downstream sewers capacities is to create an all-pipes system wide wastewater collection system model that is calibrated through flow monitoring and correlated to precipitation events. Prior to implementing the sanitary collection system enhancements recommended herein, the City should confirm downstream capacities through system wide modeling. The City is proceeding with this work through a wastewater master plan which is ongoing at the time of writing this report.

10. Preliminary Cost estimate and Prioritization of Improvements

Through this Class EA, a number of potential capital improvements have been identified for possible implementation. Each improvement will provide some level of improvement/mitigation and although it is possible to model the cumulative impacts there are limitations to the model and its accuracy particularly given the numerous assumptions and design parameters and the lack of calibration. Therefore, a prioritized list of capital improvements has been developed which considers the anticipated level of improvement/mitigation, the environmental impacts and costs. The prioritized list is presented in Table 10.1 together with a summary of the rationale for the priority rating assigned. The cost breakdowns for the identified improvements is included in **Appendix F**.

Table 10.1: Prioritized List of Improvements and Budget Costs

Priority	Proposed Improvement	Rationale	Budget Cost
1	Elliott Field Ditching	Easily implemented and low cost and will mitigate erosion impacts to properties along Elliott Road during more significant precipitation events.	$75,000
2	Elliott Field Stormwater Management Ponds	These ponds are relatively easy and cost efficient to construct and there are some synergies if implemented in conjunction with the Elliott Field ditching noted above.	$400,000 + $135,000 = $535,000
3	Peoples Road Sanitary Sewer Upgrade	Although this upgrade is costly the modeling identified potential mitigation of basement flooding along Peoples Road south of Third Line and along the adjacent side streets during higher precipitation events. As noted previously the implementation of this alternative is contingent upon satisfactory results through the sanitary system wide modeling.	$10,630,610 (includes restoration of full road and sidewalks)
4	Elephant Trunk	Although this alternative may be reasonably easy and cost efficient to implement, it is recommended that it be implemented in conjunction with the Peoples Road sanitary sewer upgrades to allow further analysis and assessments through the preliminary and detail design phases. This alternative is also contingent on the condition of the existing infrastructure and assumes there are no over arching reasons that it was taken offline previously.	No cost estimate prepared
5	Peoples Road Stormwater Pond	The modeling highlighted downstream improvements through the mitigation of downstream peak flows. This pond should be constructed in advance of or in conjunction with the Hillside Drive storm outlet upgrade to mitigate impacts of increased downstream peak flows.	$960,000
6	Hillside Drive Storm Outlet and Ditching Improvements	These improvements could be included in an overall capital project with the Peoples Road stormwater management pond noted above.	$178,000
7	Construction of a redundant inlet to the 1200mm pipe crossing of Peoples Road north of Elliott Road	This element reduces the risk of stormwater impacts to downstream Elliott Road properties and could be incorporated into an overall capital construction project with Items 5 and 6 noted above or could be completed as a stand-alone project.	Included in the $960,000 for the Peoples Road Storm pond
8	Upgrading the Johnson Avenue Sanitary Sewer from Diane Street to Farwell Terrace	The sanitary system modeling indicates the upgrading of this sanitary sewer will, during wet weather events, reduce the hydraulic grade line along Johnson Avenue, Diane Street and Pozzebon Crescent. This improvement is expected to mitigate basement flooding during wet weather events.	$769,000 (includes trench restoration only)
9	Cemetery Stormwater Management Pond	The proposed pond is located near the upstream end of the study area. Although the contributing stormwater area is relatively small, this pond will provide some mitigation of downstream peak stormwater flows.	$875,000
10	Upgrading Farwell Terrace and Johnson Avenue storm sewers to the outlet in East Davignon Creek	Although the proposed improvement is expected to mitigate flooding along Pozzebon, there will continue to be flooding during more significant precipitation events as the minor system will always have its limitations. This improvement is low on the list as the existing pipes are not very old and assumed to be in good condition and there will only be an incremental improvement.	$3,294,000 (includes trench restoration only)

11. Proposed Mitigation Measures

Although there are potential impacts associated with the implementation of the proposed project the anticipated impacts are typical of what would be expected for this class of project and the impacts can be effectively mitigated.

There was a significant level of interest in this project particularly from property owners within the study area. In keeping with the spirit of the Class EA process, efforts were focused on working with individuals to resolve issues and concerns as they were raised.

Table 11.1 summarizes the potential impacts and the proposed mitigation measures. In addition, a comprehensive summary of all issues and concerns raised throughout the project together with the team's responses are documented in **Appendix E**.

Climate change is now being integrated into infrastructure planning and design as a way of building more resilient and robust systems. Incorporating sustainability and resiliency early on in the decision-making process provides a level of flexibility to allow for potential changes related to future weather and climate uncertainty.

Climate change trends across Ontario show that temperatures are increasing across all seasons, precipitation patterns are changing, and extreme weather events are becoming more intense and frequent. Planning and design of the preferred alternatives will need to take into account changes in historical averages, as well as shorter-term more extreme events.

During construction, the preferred alternatives should be as climate ready as possible. Potential impacts to consider include the greenhouse gas (GHG) emissions associated with the construction period, including the physical machinery and equipment, travel distance and time for construction workers to get to and from the site, and the sourcing of materials.

To help reduce contributions to a changing climate while also allowing the sanitary and storm systems to respond to a changing climate, the recommended conveyance and storage improvements have been conceptually developed to better manage flows in response to current design standards and increased severe weather events.

Table 11.1: Summary of Potential Impacts and proposed Mitigating Measures

Potential Effects	Proposed Mitigation
Erosion / sedimentation and downstream water quality including aquatic habitat – there is the potential for erosion and sedimentation to occur with the excavation	The project will include an erosion and sedimentation control plan which will be developed during the detail design and construction phases. Plans will be reviewed as necessary with relevant Agency staff. Temporary sediment control features will have to remain active until vegetation has been re-established.

Potential Effects	Proposed Mitigation
disturbances which could adversely impact downstream water quality	The construction contract will include provisions to ensure that only designated areas are disturbed by construction activity. The contract will also include provisions to ensure all areas disturbed by the construction are stabilized to mitigate erosion. The contractor will be responsible for re-establishing vegetation in disturbed areas as soon as practical and within the same construction season. In-water work, if any, shall be undertaken within prescribed work windows as dictated by MNRF**.** **Equipment refuelling and maintenance will have to be conducted at locations suitable removed form the sensitive features such as surface water sources.** Where necessary work shall be scheduled during drier periods and flows shall be diverted to permit construction of components in dry conditions. In addition, the work will be planned to span the shortest timeframe possible. Details will be reviewed with MNRF staff during design/construction.
Archaeological and/or heritage impacts	There are areas within the study area that have been identified as having archaeological potential as shown on the official plan Schedule E which is included in **Appendix B**. The proposed sewer upgrades are all located in previously disturbed corridors and will not adversely impact cultural or heritage values However, some of the proposed improvements require excavation activities and are located in areas having archaeological potential. Specifically, the Cemetery, Peoples Road and possibly the Elliott Park stormwater ponds will require further investigations to assess potential cultural impacts (eg. Stage 1 and/or 2 Archaeological Assessment). **These supplementary investigations should be conducted in conjunction with the preliminary design phase for each project.** In addition to any supplementary investigations/studies all construction contracts will include special provisions to suspend construction operations if heritage resources are uncovered.
Environmental effects from climate change	Climate change has been considered **at a high level in this Class EA a**nd will continue to be considered through **preliminary and** detail design when the level of field information is adequate for these elements. The most significant climate change impacts for this project relate to storm water management. The City has recently completed a storm water investigative study which included consideration of climate change. The proposed project will comply with the requirements of the new storm water management guidelines which were issued by the City in September 2015. The guidelines include increased storm intensity for the design of the minor system. **In general, the drainage improvements identified through this Class EA include a combination of conveyance system upgrades and enhanced system storage. The proposed stormwater management ponds address the impacts of climate change through better control and management of peak flows.**
Natural environment project level impacts	During the conduct of the Class EA a screening level Natural Heritage review was completed in relation to the proposed stormwater ponds. AECOM Ecologists conducted a desktop review and preliminary assessment of the lands within and surrounding each of the SWP alternatives to characterize the current conditions and identify potential natural heritage sensitivities that may be impacted by the proposed project. The focus was to identify potential field surveys, environmental constraints, and regulatory review or permitting to be considered at the preliminary and detail design stage.

Potential Effects	Proposed Mitigation
	The results of the review found records of SAR or SAR habitat in or near three of the four proposed ponds and potentially-suitable SAR habitat within 120 m of all ponds. Fish habitat was identified, and suitable conditions were confirmed at three of the proposed pond sites. These findings will require additional field studies and reporting and may require review, approval, or registration under applicable legislation, namely: the ESA and Fisheries Act, as well as other potential approvals under the Lakes and Rivers Improvement Act, Conservation Authorities Act, and Fish and Wildlife Conservation Act. Applicable permits and regulatory review are to be confirmed during the preliminary and detail design phase.
Human environment project level impacts	The project team has been responsive and has commented on all concerns raised by area property owners (refer to Summary of Comments and Suggestion in **Appendix E**). In terms of the human environment there has been widespread support to undertake capital improvements to mitigate flooding impacts in the study area. Issues and concerns that have been conveyed throughout the study have been focussed on basement and yard flooding. The proposed solutions will in many case**s** mitigate the issues and concerns raised but it is important that property owners clearly understand that it is a shared responsibility and in many cases property owners need to take actions to assist in mitigating or resolving localized issues through improved grading, installation of private yard drains and installation/replacement and maintenance of protection measures (eg. backflow valves). **There will also be adverse impacts/inconveniences during the construction phase particularly within existing road corridors. There may be transportation disruptions and/or delays and access to neighbouring properties may be restricted or temporarily blocked for short periods of time. The contract terms and conditions will include specific constraints to maintain acceptable traffic flow/property access and limit these impacts.**
Contribution to greenhouse gas emissions from construction and loss of natural settings	We understand there will be greenhouse gas emission related to the construction activity and the loss of **some** natural vegetation **in conjunction with the proposed stormwater management ponds**. **The proposed ponds will include appropriate slope stabilization and site landscaping to blend in with the surrounding landscapes and t**he adverse impacts will be offset **with the enhanced sanitary sewer and storm sewer collection system performance and reduction in system surcharging and flooding**. The adverse greenhouse gas emissions will also be offset by the positive economic impacts stemming from the construction activity.
Construction noise and dust	**The contract terms and conditions will include restrictions on the timing for the work to limit construction noise to acceptable weekday hours and equipment will have to be properly muffled. In addition, the contract will include provisions to mitigate and control dust nuisance though the use of water and if necessary, dust suppressants.**

12. Conclusions and Recommendations

12.1 Conclusions

This MCEA covers the processes required to ensure that the proposed study and associated proposed work meets the requirements of the *Ontario Environmental Assessment Act (R.S.O. 1990, c. E.18).*

The recommended alternatives, as described in **Section 7.2,** mitigate the problems identified in this report and can be implemented with primarily minor and predictable impacts, which are addressed by the recommended mitigation measures presented in **Section 11.**

The following conclusions can be drawn from the completion of this study:

- Stormwater management consists of a dual drainage system; a minor stormwater drainage system (eg. piped system) and a major stormwater drainage system (i.e. over land system) and the minor system is designed to “flood” or surcharge when a storm event exceeds a 1:10 year return period.
- Extraneous flows in the wastewater collection system have been identified in numerous historical reports and continue to be a problem in relation to the capacity of the wastewater collection system.
- Foundation drain connections to the sanitary system continue to contribute significant extraneous flows in the wastewater collection system.
- Historical problems are generally widespread across the study area with no apparent focal neighbourhoods.
- Basement flooding problems are being experienced, to some extent, in the spring of each year which reflects the spring thaw period. Based on the rainfall data there were no obvious large rainfall events in the April to May period from 2013 to 2019 but problems have been reported by property owners.
- There is good correlation between the rainfall data and flooding complaints/problems reported in the summer and fall periods.
- The basement flooding that has occurred has been linked to both sanitary flows and stormwater flows - in some instances property owners reported the flood waters were clear with no odour and water was observed to be entering through walls or windows whereas in other cases the flood water were odorous and dirty.
- Basement flooding is in part attributable to failed or malfunctioning backflow valves in sanitary and/or storm services. Property owners may not be aware of or understand the importance of maintaining, testing and replacing these valves.
- The sanitary system modeling identified a couple of locations where existing pipe sizes may be restricting flows and resulting in system surcharging during periods of higher extraneous flows.
- The “Stage II trunk sewer” spanning from the Third Line/Peoples Road intersection through Elliott Field and along Rossmore Road and Farwell Terrace to the Sussex Road trunk sanitary sewer has not been constructed.
- The Peoples Road “elephant trunk” offline storage adjacent to Elliott Road was taken offline.
- Blockages in either the sanitary or storm sewer systems likely contribute to system surcharging.

Through the investigative and analytical work completed to date the principle contributing factors to the flooding occurrences likely consist of some or all the following:

- Potential bottlenecks or flow restrictions in the wastewater and/or stormwater collection systems which may be due to blockages (i.e. system maintenance) and/or conveyance pipe sizes;
- Limited system storage particularly in relation to stormwater management;
- Storm drains directly connected by gravity to the storm sewer system with no backflow valve or a poorly maintained or failed backflow valve;
- Sanitary drains connected to the sanitary sewer system with no backflow valve or a poorly maintained or failed backflow valve;
- Significant inflows and infiltration (i.e. extraneous flows) into the wastewater collection system particularly during more significant precipitation events. Sources of extraneous flows may include:
- Groundwater infiltration into the collection system due to high groundwater and system leaks (i.e. broken or cracked pipes),
- Inflows into low lying manholes or uncapped or leaky sanitary lateral cleanouts; and
- Foundation and/or roof drains connected to the wastewater collection system.

Future flooding can be mitigating through municipal capital improvements but cannot be prevented and property owners must also take action to protect their properties. The problems identified through this study can be mitigated through the following homeowner and municipal remedial measures:

Property Owner Remedial Measures

- Downspouts from roofs that are currently directly connected to either the storm or sanitary sewer, should be disconnected at the ground and directed to an appropriate surface discharge point.
- Backflow prevention should be implemented on all gravity storm and sanitary private drain connections (PDC. This includes installation of new backflow devices where they do not currently exist and condition assessment and testing of existing backflow devices and replacement where necessary. Property owners should be educated regarding the function and importance of these devices and the importance of testing, maintaining and replacing them regularly.
- Sump pumps should be encouraged to be installed for foundation drains where foundation drains are currently draining to the sanitary system. In addition, sump pumps should also be considered as a contingency for property owners with gravity storm drains. In the latter case the sump pump would provide a backup in the event that the backflow device in the gravity storm drain fails.
- Lot regrading should be considered if local grading is causing water to pond or flow towards on-site buildings. Careful attention must be given to any proposed lot regrading to ensure discharge is not directed to a neighbouring property unless it existed pre-development or a neighboring property owner's permission has been received.
- On-site storage such as the implementation of a rain barrel can be effective in reducing peak flows to the storm sewer system while simultaneously providing a source of water for local lawn watering or gardens.

Municipal Remedial Measures

- Construction of dry stormwater management ponds at the following locations:
  - Immediately downstream of the cemetery (south of Fourth Line and east of Peoples Road);
  - Elliott Field at the location of the former stormwater management pond;
  - Elliott Field immediately adjacent to Elliot Road and east of the pickleball courts; and
  - Immediately west of Peoples Road and south of the Hillside Drive properties.
- Bringing the previously constructed "elephant trunk" offline pipe storage back online. This alternative is contingent upon further input from the City regarding the rational for taking it offline

and confirmation of any challenges in bringing it back online including its current condition. The reactivation of this element can be confirmed at the time of the preliminary/detail design for the Peoples Road sanitary sewer upgrade.

- Upgrading the existing sanitary sewers at the following locations (Note: this alternative is contingent on the available reserve capacity in the downstream conveyance system which will be evaluated in detail through the ongoing Wastewater Master Planning project):
  - Peoples Road from Third Line to Churchill Boulevard; and
  - Johnson Avenue from Diane Street to Farwell Terrace
- Construction of a new storm sewer along Diane Street.
- Upgrading of the existing storm sewers at the following locations:
  - Hillside Drive outlet sewer; and
  - Farwell Terrace from Johnson Avenue to the outlet in East Davignon Creek.
- Construction of a perimeter ditch on the south side of the eastern Elliott sports fields.
- Construction/upgrading of roadside ditching on Hillside Drive. This can be completed in concert with an road upgrading/reconstruction project or completed as routine maintenance.
- Construction of a redundant inlet to the 1200mm pipe crossing of Peoples Road north of Elliott Road.

The MCEA process has been fulfilled through this study which included an appropriate level of public consultation.

12.2 Recommendations

Considering the above, it is recommended that the City systematically and incrementally initiate improvements to mitigate impacts of basement and yard flooding in the Study Area as follows:

- The City proceeds with short-term O&M measures including sealing of perforated sanitary maintenance hole covers in low lying areas and completing a detailed inspection and maintenance of the wastewater and stormwater collection systems in the study area to identify and address flow restrictions due to debris, sediment build-up or partial pipe failures. This should also include competing CCTV inspections of both systems and confirming the condition of all outlets.
- The City should continue to educate and promote local (i.e. property owner) actions to reduce peak flows in the systems and mitigate the potential to be flooded. This would include promoting roof downspout disconnections from sewer systems, promoting and possibly subsidizing disconnection of foundation drains from the wastewater collection system, promoting contingency measures such as sump pumps for gravity storm drains, promoting on-site storage (eg. rain barrels) and promoting regular inspections and testing of backflow devises on gravity wastewater and storm drains.
- The City should commence implementation of the proposed municipal capital improvements on a prioritized basis as capital budgets permit. It is suggested that the City proceed with this work systematically and monitor the effectiveness over time. Some of the proposed improvements can be implemented relatively quickly and with relatively low capital cost.

Appendix A

Public Consultation

City of Sault Ste. Marie

Peoples Road Area Overland and Basement Flooding Class EA
Public Consultation Plan

Prepared by:

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Project Number:

Date:
June 2020

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Revision #	Revised By	Date	Issue / Revision Description
1	R.Talvitie	June 10, 2020	Assumes Schedule B Project

AECOM Signatures

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Table of Contents

1. Introduction

The City of Sault Ste. Marie has retained AECOM to complete the **Peoples Road Area Overland and Basement Flooding Class Environmental Assessment (Class EA) Study** to identify potential flooding causes and develop alternatives to mitigate significant impacts.

The preferred solution will be determined based on technical requirements, environmental considerations, cost, public input and information gathered during the study.

The study is being conducted in accordance with the Municipal Class Environmental Assessment Process (Class EA process). The Class EA process includes an assessment of the problem and opportunities, evaluation of alternative solutions, public and review agency consultation, an assessment of potential effects on the environment and identification of reasonable measures to mitigate any adverse effects.

2. Proposed Consultation Activities

Public and external agency consultation is a key component of this study. The Proponent is tasked with determining the most suitable and effective means of involving the public and stakeholders. This public consultation program has been developed to incorporate and address input received from a broad cross-section of people and interests. The principle objective of the public consultation process is to solicit meaningful input from the public, stakeholders and review agencies throughout the process. The solicitation of public input will:

- Enhance the quality of the decision making process by capturing ideas and experiences of a broad cross-section of people;
- Ensure transparency in the decision making process;
- Enhance public understanding of the process, and rationale for the decisions reached; and
- Meet legislative requirements.

The City is taking a proactive approach and proposing to use a variety of media, tools and methodologies to reach as many individuals as possible. A description of each element of the public consultation program is included in the following subsections.

2.1 Website

A webpage is proposed on the City's website. The page will include important and relevant planning documentation and will be updated periodically as the study progresses. The site will also include contact information for the Consultant Project Manager and the City's Project Manager.

2.2 Notices

Notices will be used to solicit input and disseminate important information and project updates. We anticipate that the following Notices will be issued:

- Initial Notice advising of the project start, problem/opportunity being addressed and inviting comments and requesting completion of a Questionnaire.
- Phase 2 notification advising of the alternative solutions and preliminary preferred solution and inviting interested individuals to an open house; and

- Notice of Completion.

2.3 Questionnaires

Through discussions with City staff early in the project, it became apparent that there would be merit in soliciting direct input from property owners regarding their specific historical experiences with overland and basement flooding on their properties. Therefore, a Questionnaire will be prepared and distributed to all property owners in the study area. Property owners will have an option of completing and returning a hardcopy or scanned image or completing the questionnaire online.

2.4 Public Open Houses

A public open house is planned to present the alternative solutions and the preliminary preferred solution. The open house will include presentation boards mounted throughout the room and the Project Team will lead individuals or groups of individuals through the project displays. The Team will explain the Class EA process, the alternatives considered, the evaluation completed and the preliminary preferred solution. Participants will be encouraged to provide input and feedback regarding the alternative solutions, evaluation criteria and scoring. Comment and input will be recorded and participants will be encouraged to complete a public comment form. The intent of the open house will be to garner input and factor it into the decision-making process. The input received is expected to either support the preliminary preferred solution or provide additional insight to the project teem that will alter the evaluation and the preferred solution. Consideration will be given to a virtual open house if restrictions related to COVID-19 preclude a standard format open house.

2.5 Outreach

A broad range of media will be used to reach as many people as possible with Notices and advertising. Advertisements and Notices will be placed in the local newspapers (Sault This Week), mailed or emailed to all individuals on the project mailing list and posted on the City website. Other forms of media may also be used.

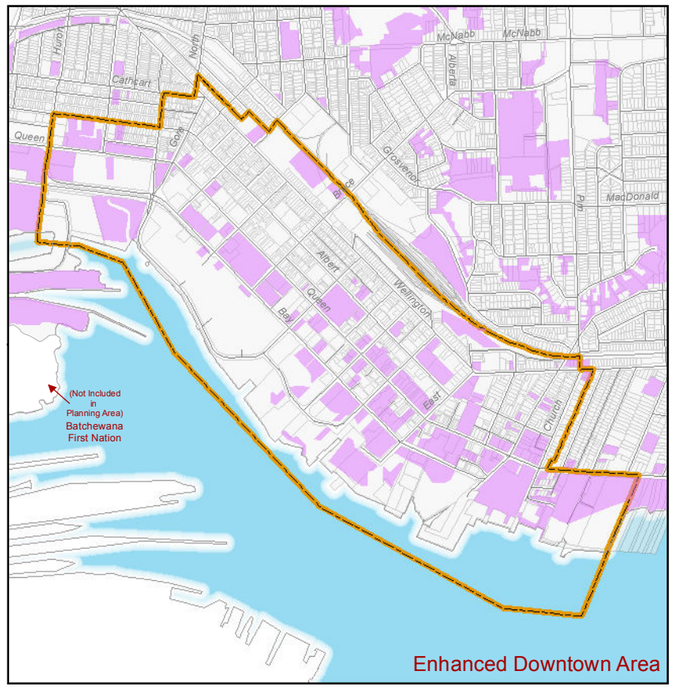
The initial project contact list includes City Council, various City and PUC staff, various government agencies, Aboriginal Communities, and all property owners within the study area. The list will be updated as needed as the study progresses.

2.6 Records Management

An excel spreadsheet will be used to track input received and responses issued by the project team.

Appendix B

Official Plan Schedule E



PRINCE TOWNSHIP
(Not Included in Planning Area)

Municipal Boundary

Municipal Boundary

Municipal Boundary

Batchewana First Nation
(Not Included in Planning Area)

(Not Included in Planning Area)
Batchewana First Nation

(Not Included in Planning Area)
Batchewana First Nation

Lake Superior/ Whitefish Bay

Canada USA

St. Marys River

CHIPPEWA COUNTY, STATE OF MICHIGAN

SUGAR ISLAND TWP. STATE OF MICHIGAN

City of Sault Ste. Marie

OP Schedule 'E'
Archaeological Resources

Archaeological Potential (ASI, Sept 2010 Master Plan) *Downtown (OPA 121)* *Shield Line*

The Corporation of the City of Sault Ste. Marie
Engineering & Planning Department
Planning Division
December 06, 2012

This map is for general reference only.
For official mapping, see the
Engineering and Planning Department.

Numeric reference in parenthesis after symbol in legend corresponds to section in Official Plan document

Vector Data:

Ontario Ministry of Natural Resources,
Sault Ste. Marie Region Conservation Authority
The City of Sault Ste. Marie

Projection Details:

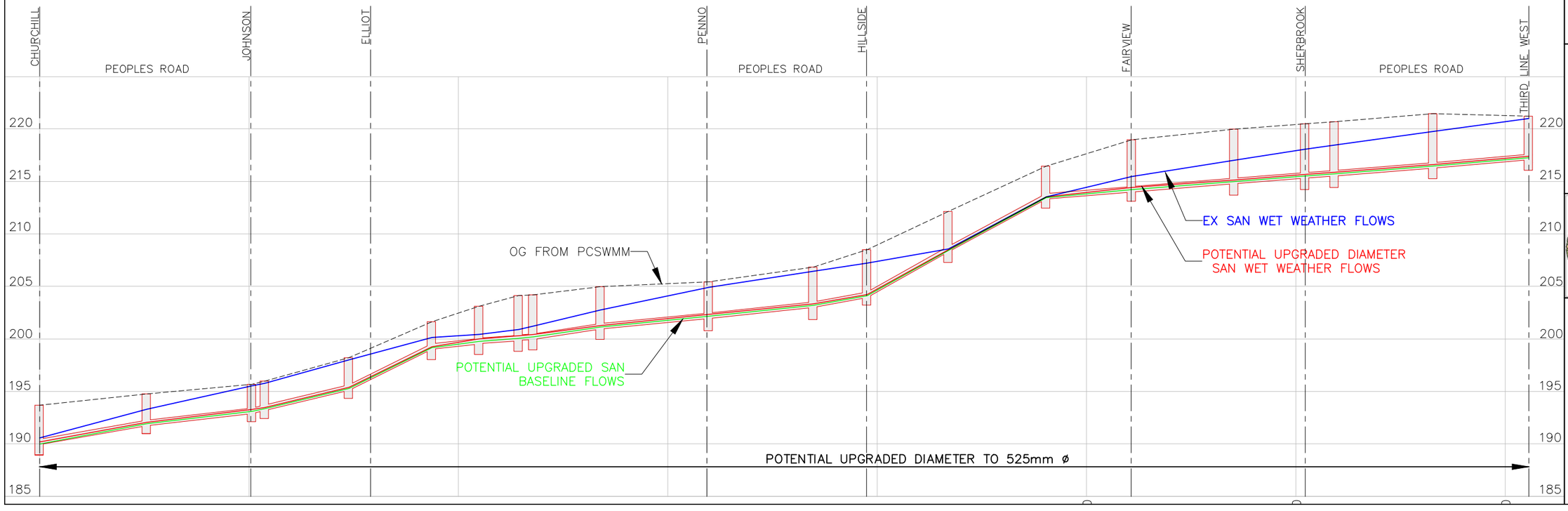
NAD 1983 UTM Zone 16N
GCS North American 1983
0 250 500 1,000 Meters

N

Appendix C

Waste Water Collection System Conceptual Plans

VE:X10



DRAWING No. 1

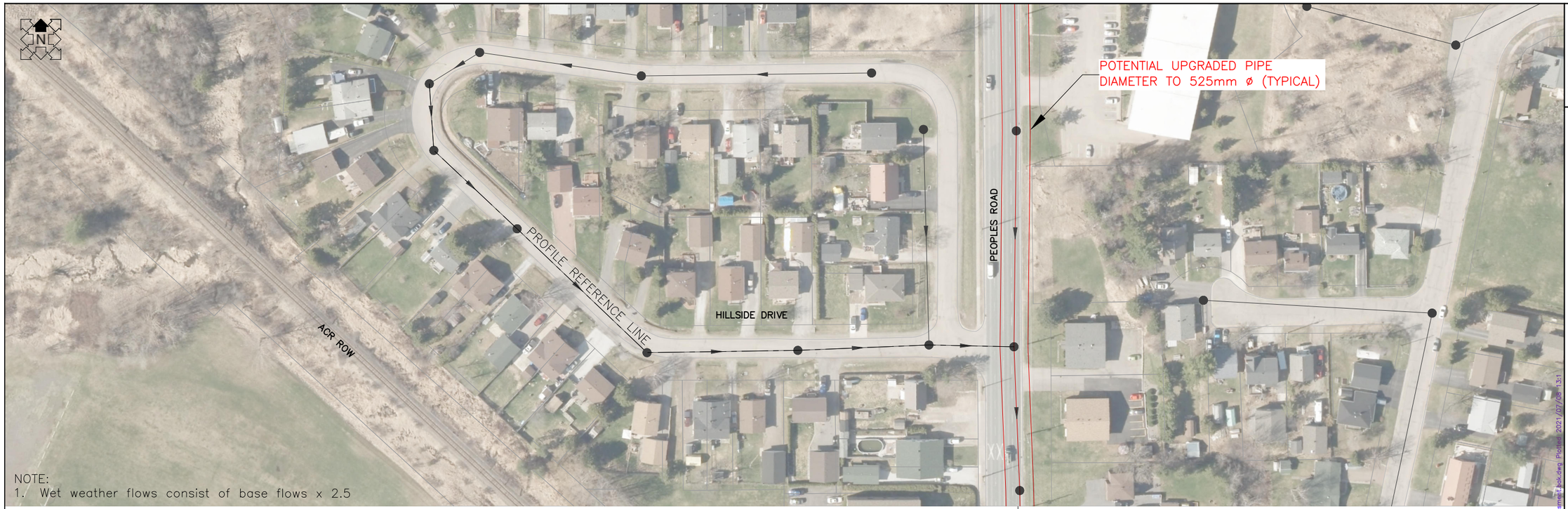
PLAN AND PROFILE

Flooding Assessment Class EA

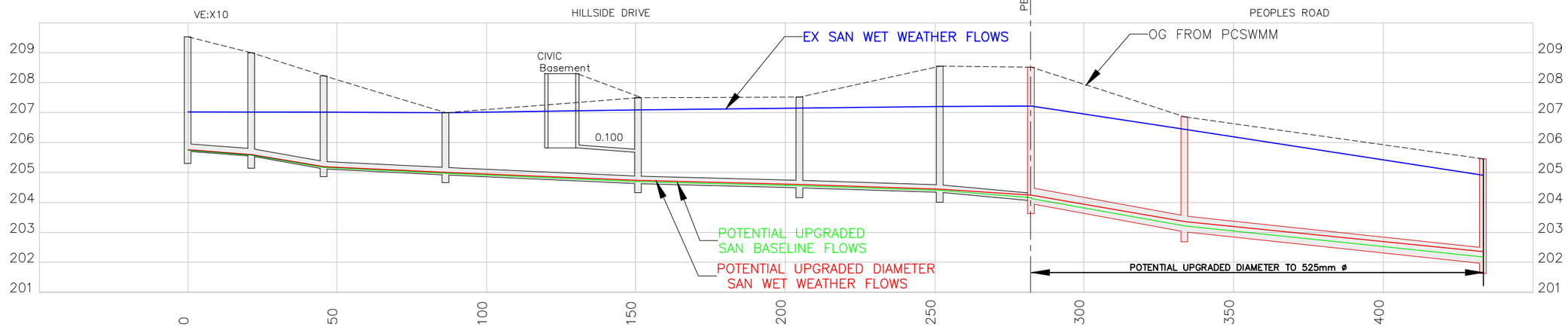
Upgraded Peoples Road Sanitary Sewer Alternative - Impact to Peoples Road Sanitary Sewer

DESIGNED	JST
DRAWN	JST
CHECKED	RET
PROJECT No.	60625445
SCALE	NTS
DATE	APRIL 2023

AECOM
AECOM Canada Ltd.
523 Wellington Street East, Sault Ste. Marie Ontario, Canada
P6A2M4 T705.942.2612 F705.942.3642



NOTE:
1. Wet weather flows consist of base flows x 2.5



DRAWING No. 2

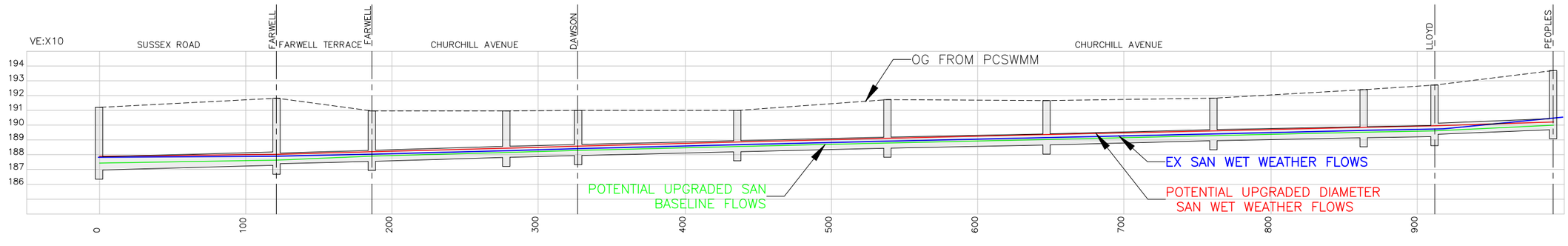
PLAN AND PROFILE

Flooding Assessment Class EA

Upgraded Peoples Road Sanitary Sewer Alternative - Impact to Hillside Drive Sanitary Sewer

DESIGNED	JST
DRAWN	JST
CHECKED	JST
PROJECT No.	60625445
SCALE	NTS
DATE	APRIL 2023

AECOM
AECOM Canada Ltd.
523 Wellington Street East, Sault Ste. Marie Ontario, Canada
P6A2M4 T705.942.2612 F705.942.3642



DRAWING No. 3

PLAN AND PROFILE

Flooding Assessment Class EA

Upgraded Peoples Road Sanitary Sewer Alternative - Impact to Churchill Avenue Sanitary Sewer

DESIGNED	JST
DRAWN	JST
CHECKED	RET
PROJECT No.	60625445
SCALE	NTS
DATE	APRIL 2023

AECOM
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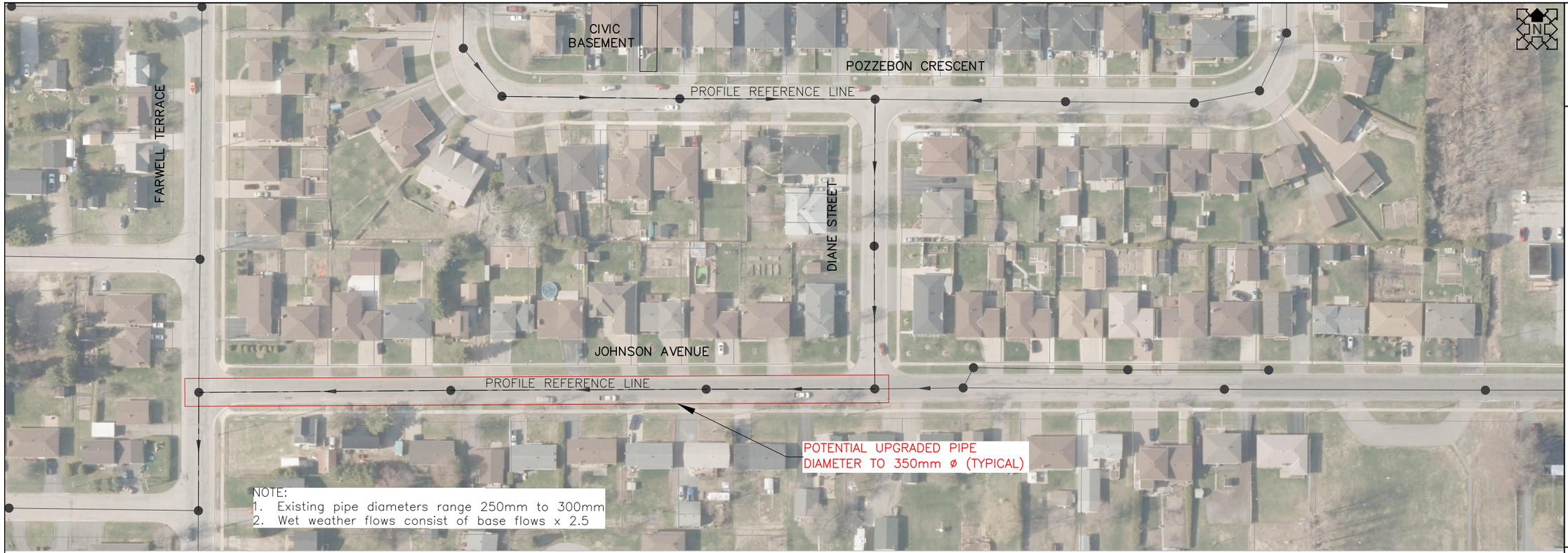

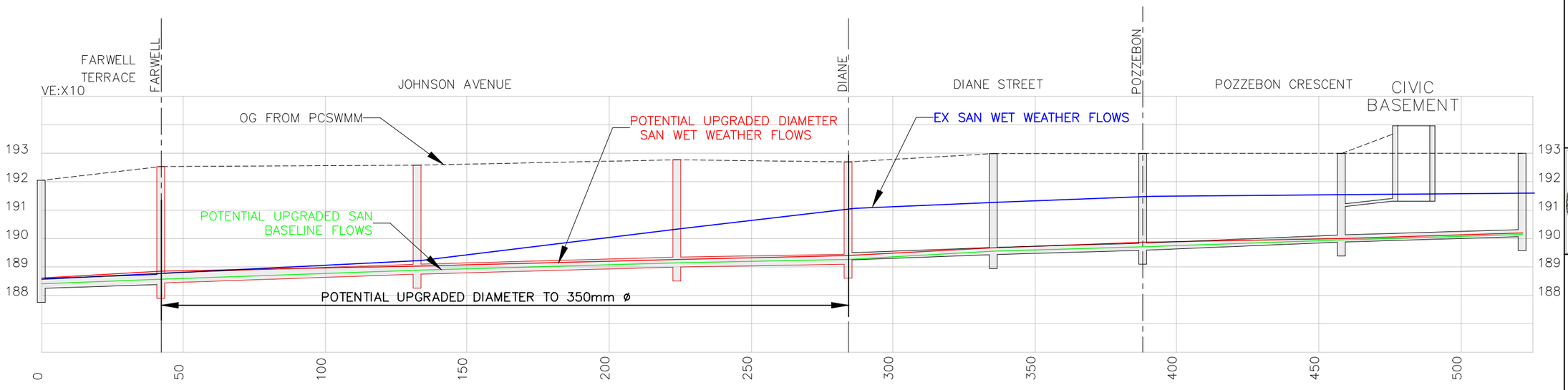

DRAWING No. 4

PLAN AND PROFILE

Flooding Assessment Class EA

Upgraded Johnson Avenue Sanitary Sewer Alternative - Impact to Johnson Avenue Sanitary Sewer

DESIGNED	JST
DRAWN	JST
CHECKED	RET
PROJECT No.	60625445
SCALE	NTS
DATE	APRIL 2023

AECOM
AECOM Canada Ltd.
523 Wellington Street East, Sault Ste. Marie Ontario, Canada
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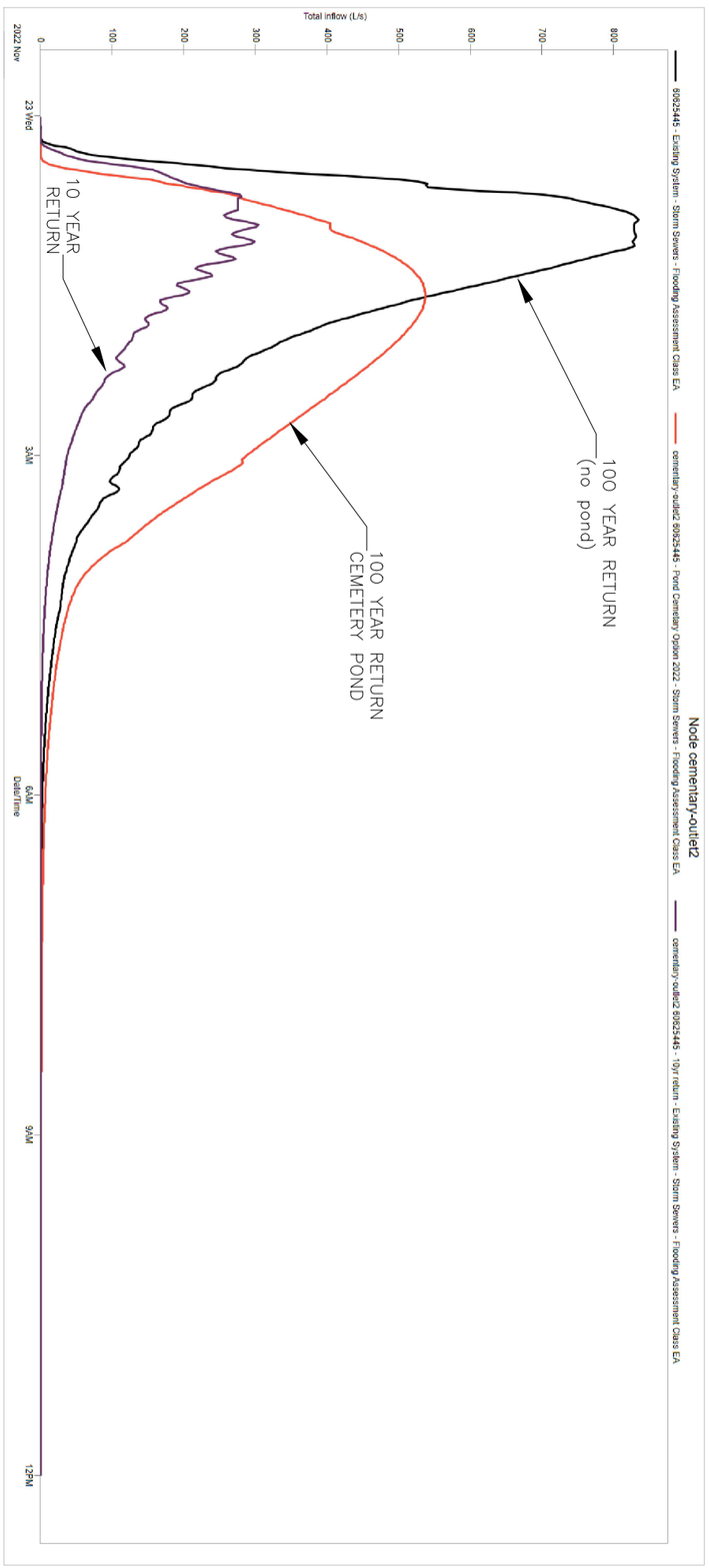
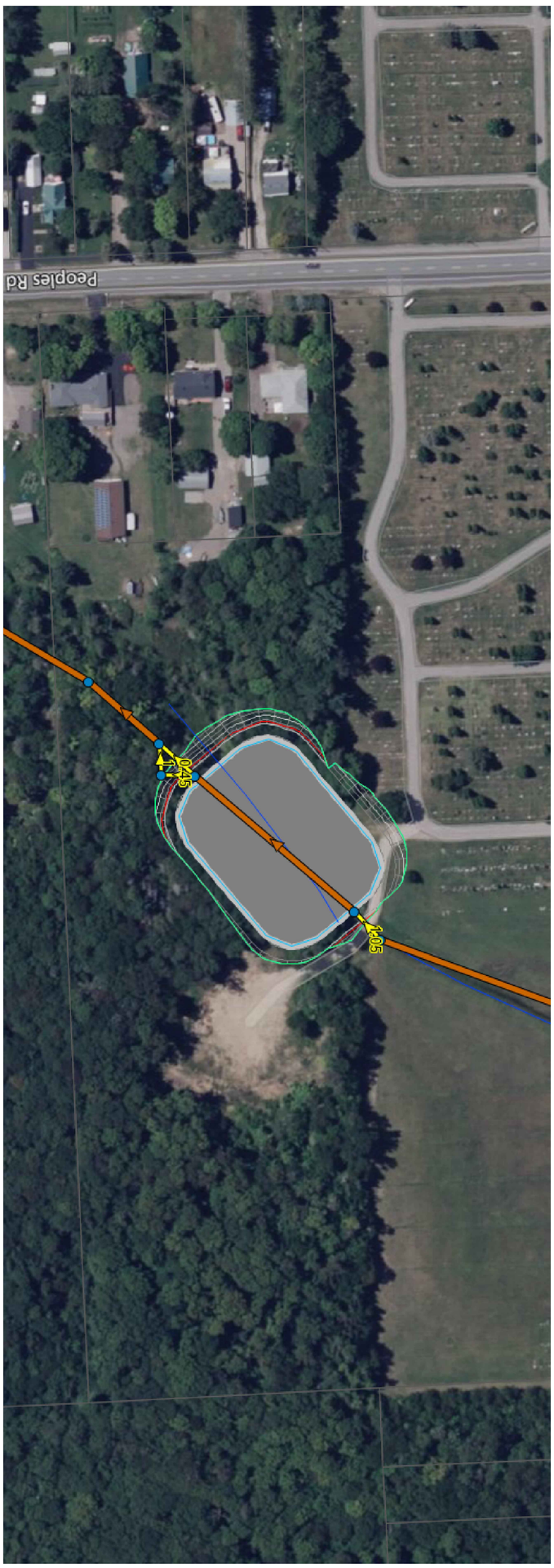
Appendix D

Stormwater Management Conceptual Plans





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DESIGNED	JST
DRAWN	JST
CHECKED	RET
PROJECT No.	60625445
SCALE	NTS
DATE	MAR 2023

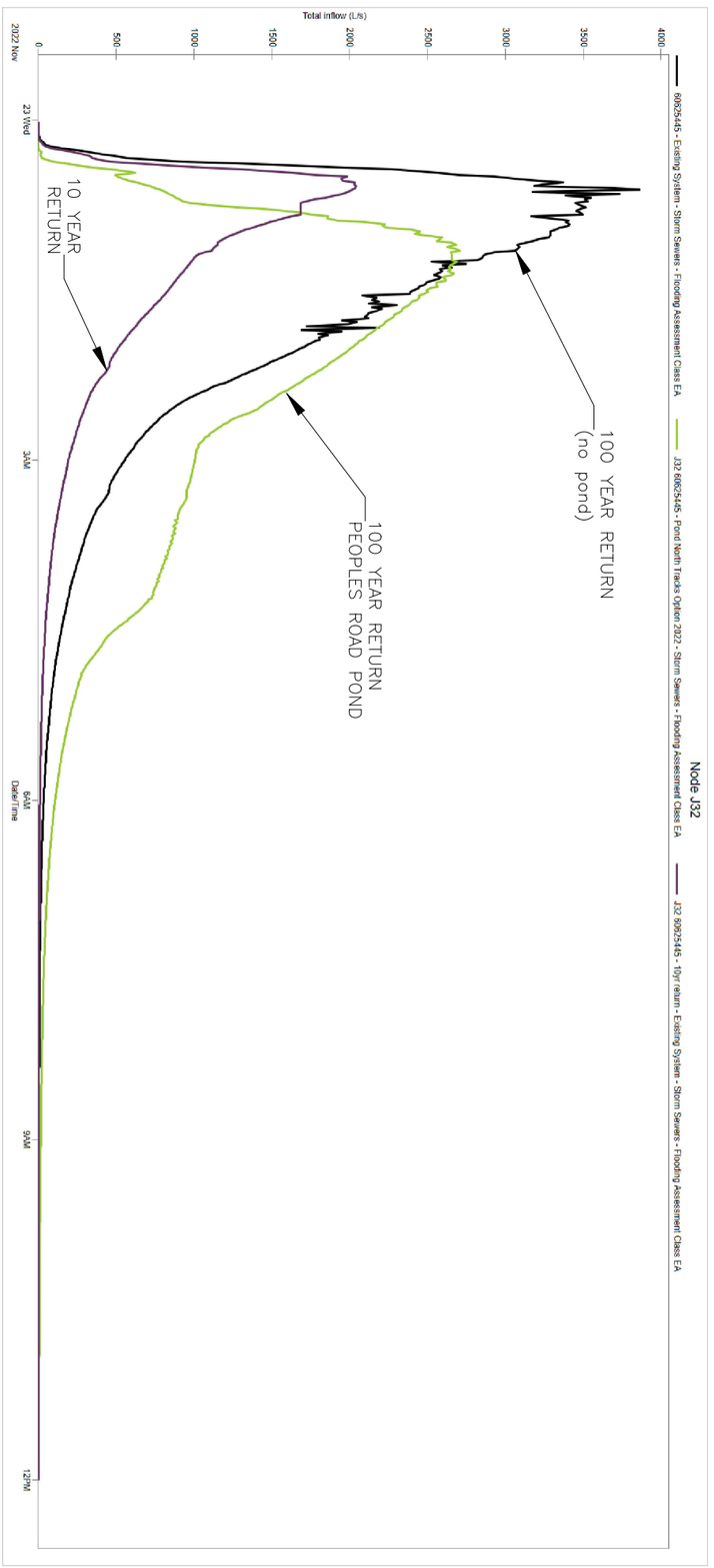
PLAN AND PROFILE

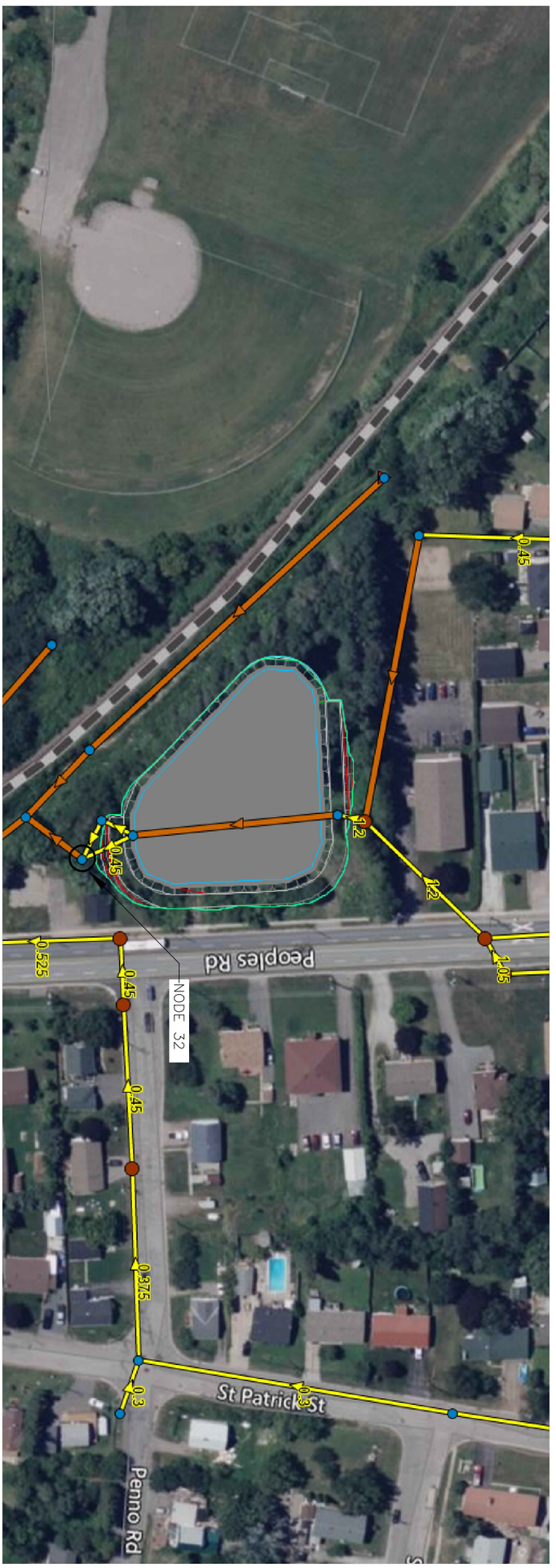
Flooding Assessment Class EA

CEMETERY DRY POND ALTERNATIVE - IMPACT TO DOWNSTREAM PEAK STORM FLOWS

DRAWING No.

5





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AECOM Canada Ltd.
523 Wellington Street East, Sault Ste. Marie Ontario, Canada
P6A2M4 T705,942,2612 F705,942,3642

DESIGNED	JST
DRAWN	JST
CHECKED	RET
PROJECT No.	60625445
SCALE	NTS
DATE	MAR 2023

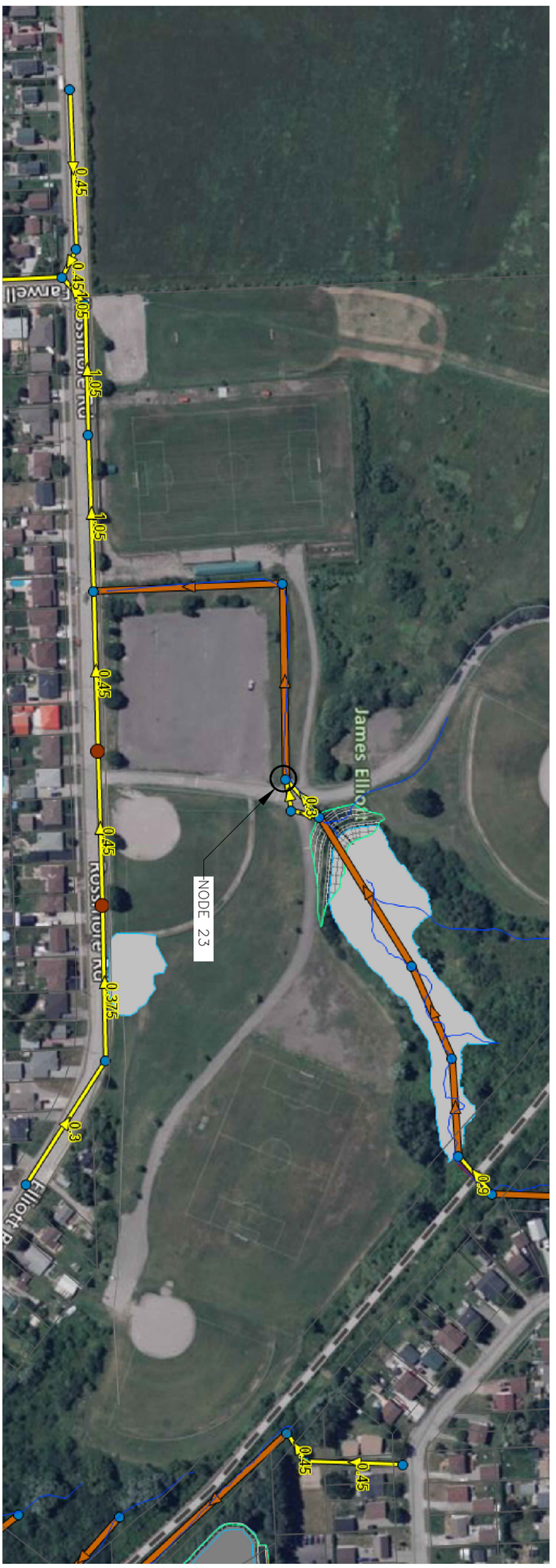
PLAN AND PROFILE

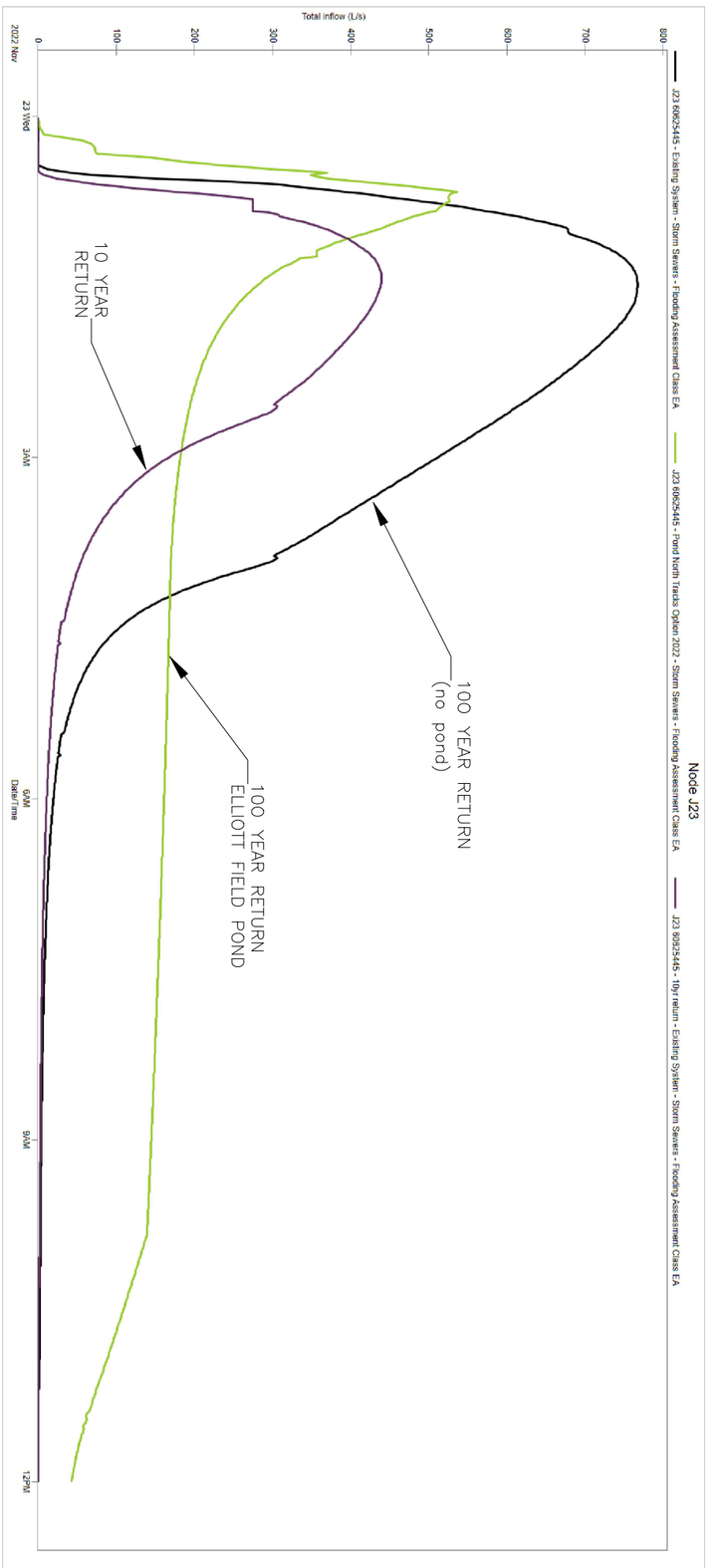
Flooding Assessment Class EA

PEOPLES ROAD DRY POND ALTERNATIVE - IMPACT TO DOWNSTREAM PEAK STORM FLOWS

DRAWING No.

6





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DRAWN	JST
CHECKED	RET
PROJECT No.	60625445
SCALE	NTS
DATE	MAR 2023

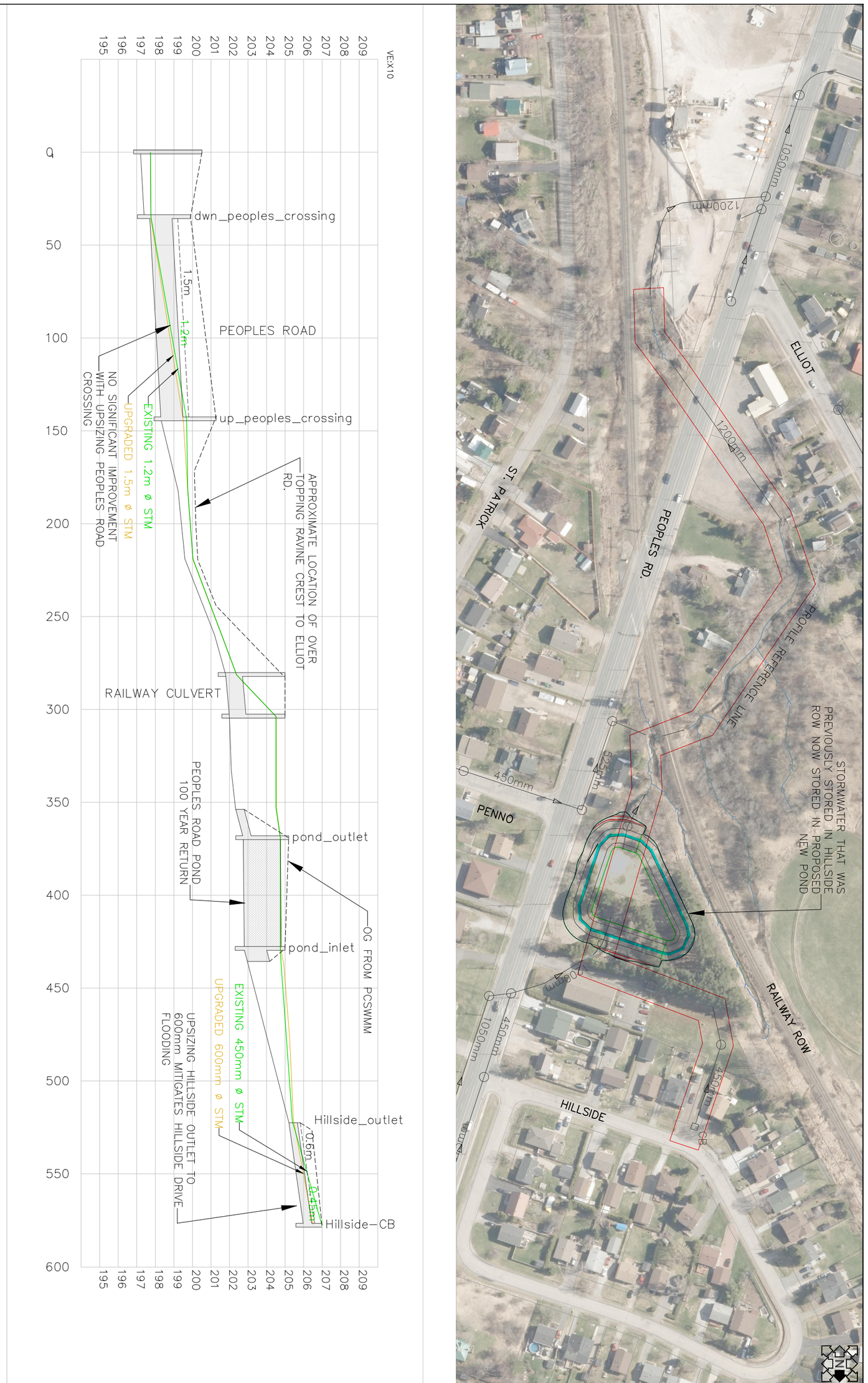
PLAN AND PROFILE

Flooding Assessment Class EA

ELLIOTT PARK DRY POND ALTERNATIVE - IMPACT TO DOWNSTREAM PEAK STORM FLOWS

DRAWING No.

7



AECOM
AECOM Canada Ltd.
523 Wellington Street East, Sault Ste. Marie Ontario, Canada
P6A2M4 T705,942,2612 F705,942,3642

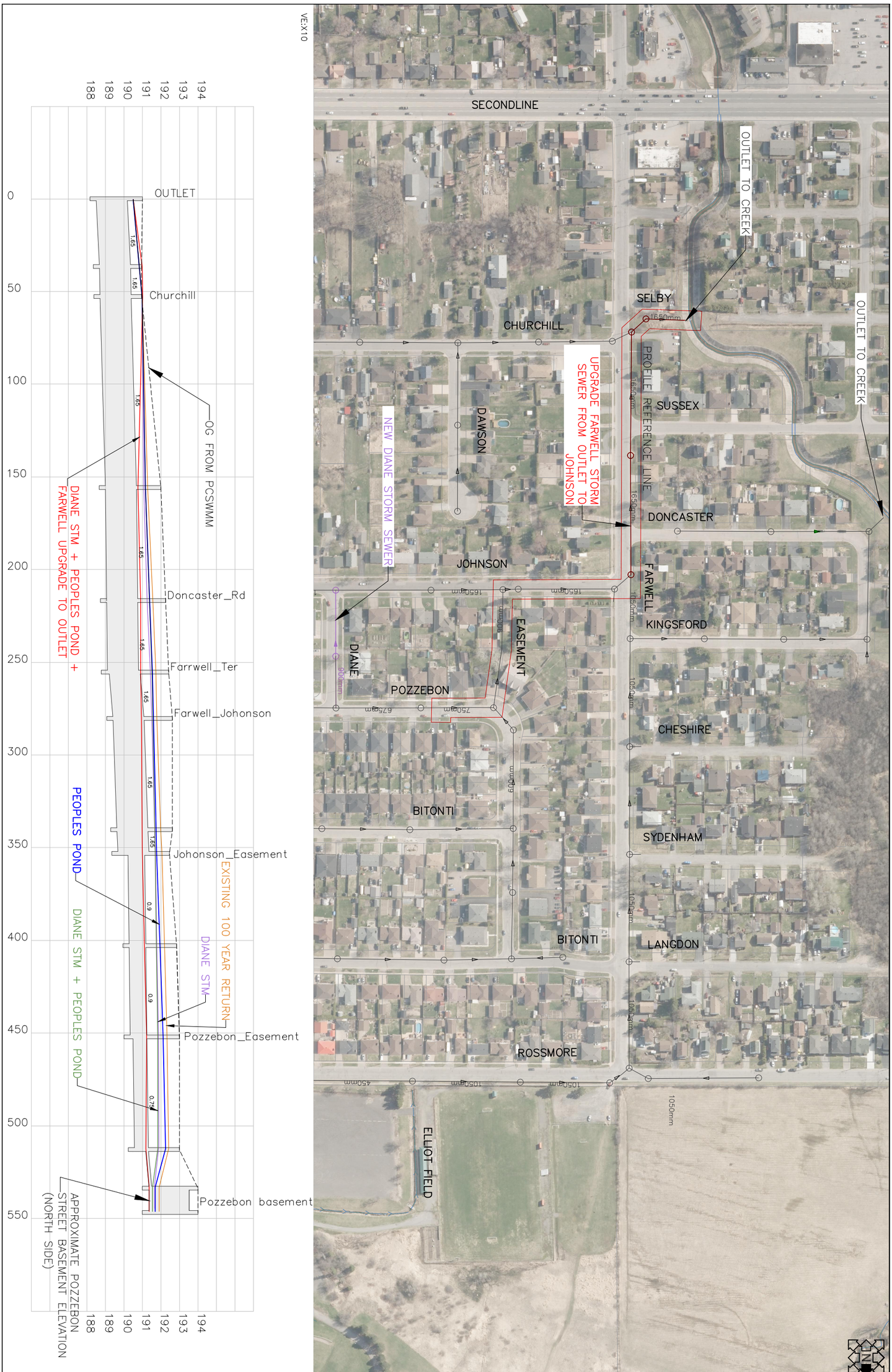
DESIGNED	JST
DRAWN	JST
CHECKED	RET
PROJECT No.	60625445
SCALE	NTS
DATE	MAR 2023

PLAN AND PROFILE

Flooding Assessment Class EA

HILLSIDE DRIVE STORM OUTLET UPGRADE AND PEOPLES ROAD DRY POND ALTERNATIVES - IMPACT TO DOWNSTREAM PEAK STORM FLOWS

DRAWING No. 8



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P6A2M4 T705.942.2612 F705.942.3642

DESIGNED	JST
DRAWN	JST
CHECKED	RET
PROJECT No.	60625445
SCALE	NTS
DATE	MAR 2023

PLAN AND PROFILE

Flooding Assessment Class EA

DIANE STREET AND FARWELL TERRACE STORM SEWER
UPGRADES AND PEOPLES ROAD DRY POND ALTERNATIVES
IMPACT TO DOWNSTREAM PEAK STORM FLOWS

DRAWING No.

9

Appendix E

Public Information Centre

Peoples Road Area Overland and Basement Flooding Class Environmental Assessment

Public Information Session – May 16, 2023

City of Sault Ste. Marie

60625445

July 2023

Delivering a better world

AECOM Canada Ltd.
523 Wellington Street East
Sault Ste. Marie, ON P6A 2M4
Canada

T: 705.942.2612
F: 705.998.2397
www.aecom.com

Ms. C. Taddo, P. Eng.
Manager, Development and Environmental Engineering
Public Works and Engineering Services
City of Sault Ste. Marie
99 Foster Drive, 5th Floor
Sault Ste. Marie, ON P6A 5X6

July 25, 2023

Project #
60625445

Subject: Peoples Road Area Overland and Basement Flooding Class Environmental Assessment – Public Information Session – May 16, 2023

Dear Ms. Taddo:

We are pleased to submit our report regarding the May 16, 2023 Public Information Session. This report includes a record of comments/input received during the public comment period together with our responses.

Should you have any question, please contact the undersigned.

Sincerely,
AECOM Canada Ltd.

Rick Talvitie, P. Eng.
Manager, Northern Ontario

Encl.

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("AECOM") for the benefit of the Client ("Client") in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");
- represents AECOM's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

AECOM shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. AECOM accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

AECOM agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement, but AECOM makes no other representations, or any guarantees or warranties whatsoever, whether express or implied, with respect to the Report, the Information or any part thereof.

Without in any way limiting the generality of the foregoing, any estimates or opinions regarding probable construction costs or construction schedule provided by AECOM represent AECOM's professional judgement in light of its experience and the knowledge and information available to it at the time of preparation. Since AECOM has no control over market or economic conditions, prices for construction labour, equipment or materials or bidding procedures, AECOM, its directors, officers and employees are not able to, nor do they, make any representations, warranties or guarantees whatsoever, whether express or implied, with respect to such estimates or opinions, or their variance from actual construction costs or schedules, and accept no responsibility for any loss or damage arising therefrom or in any way related thereto. Persons relying on such estimates or opinions do so at their own risk.

Except (1) as agreed to in writing by AECOM and Client; (2) as required by-law; or (3) to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by Client.

AECOM accepts no responsibility, and denies any liability whatsoever, to parties other than Client who may obtain access to the Report or the Information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report or any of the Information ("improper use of the Report"), except to the extent those parties have obtained the prior written consent of AECOM to use and rely upon the Report and the Information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

AECOM: 2015-04-13

Table of Contents

Appendices

1. Introduction

A public open house was conducted on May 16, 2023 at Superior Heights Collegiate and Vocational School Cafeteria, 750 North Street. The session provided a forum for interested individuals, Community leaders, agency representatives and property owners to review and discuss the preliminary preferred solution to mitigate significant basement and yard flooding impacts within an area bounded by Peoples Road and Farwell Terrace to the west, Old Goulais Bay Road and Fort Creek to the east, Fourth Line to the north and Second Line to the south.

Representatives of AECOM, and the City of Sault Ste. Marie were in attendance throughout the session to provide information, address questions, and facilitate discussions. The information session was open from 4:00 p.m. to 7:00 p.m. and was very well attended with a total of 74 individuals recording their names on the sign-in sheet.

2. Notification of Open House

Notification of the Open House was advertised as follows:

- Sault Star on May 6, 2023
- Sault this Week on May 4 and My 11, 2023.
- City of Sault Ste. Marie website.
- News Release.
- Sootoday classified advertisement.
- Shaw TV.
- Radio Advertising (Kiss 100.5 and Country 104.3).
- Social media including Spotify and Facebook post.
- Hardcopies of the Notice were mailed to all property owners in the study area.
- Individual Notices were also mailed or emailed to agencies on the contact list.

A copy of the Notice is included in Appendix A.

3. Information Available at the Open House

An Information Bulletin was available for pick-up at the registration table and displays were posted throughout the cafeteria to disseminate information to individuals that attended the open house. The following displays were posted on the walls (copies of the displays and Information Bulletin are included in the **Appendix A**):

- A display welcoming residents.
- An explanation of what attendees should do at the PIC.
- An introductory slide explaining the purpose of the study and limits of the study area.
- Definition of the problem/opportunity being addressed through the study.
- Class EA flow chart showing activities to be undertaken and where we are at in the process;
- Nine slides identifying the data and information that was reviewed and analysed including historical complaint records, property owner questionnaires, field visits, as-constructed records, GIS database, relevant City By-laws, relevant design guidelines, historical rainfall data and stormwater and wastewater collection system models.
- Recommended local remedial measures that may be appropriate for property owners to undertake to protect their properties (5 slides).
- Recommended sanitary and storm system remedial operations and maintenance measures.
- Alternative solutions considered in the study.
- Elements of the environment that were inventoried and considered in the evaluation of alternatives.

- How the alternatives were evaluated (2 slides).
- Summary of the evaluation of alternatives.
- Preliminary preferred solution.
- Next steps including the proposed schedule.

4. Comments and Questions

A total of 31 comment sheets and emails were received prior to, during and after the open house. The comment sheets allowed individuals to provide comments and input regarding the study.

The public consultation process was effective in obtaining a significant level of input, particularly from area residents. A detailed inventory of the comments and input received together with the project Team's responses are included in **Appendix B**.

Appendix F

Estimated Costs

CITY OF SAULT STE. MARIE

Flooding Assessment Class EA

Preliminary Cost Estimate for Preferred Solution

April 2, 2024

AECOM Project No.: 60625445

Item No.	Description of Item	Estimated Quantity	Unit	Unit Price	Total Price
Part 'A' - Peoples Road Sanitary Sewer Upgrades					
Scope:	> **Peoples Rd** (Third Line to Churchill) - replacement of existing sewer with 525mm dia. SAN including full restoration of the roadway				
A.1.1	General Items (i.e. ins, bond, mobilization etc.)	1	L.S.	$200,000.00	$200,000
A.1.2	SAN Sewer Removal	1420	metre	$30.00	$42,600
A.1.3	525mm dia. PVC Sanitary Sewer (excl. restoration)	1420	metre	$900.00	$1,278,000
A.1.4	1200mm Precast Concrete Sanitary Manholes	21	each	$16,000.00	$336,000
A.1.5	Sanitary Laterals	800	metre	$300.00	$240,000
A.1.6	Connections to Existing Sanitary Sewers/Structures	11	each	$5,000.00	$55,000
A.2.1	Remove and Dispose of Asphalt Pavement	20300	m2	$6.00	$121,800
A.2.2	Remove and Dispose of Concrete Curb and Gutter	2600	metre	$30.00	$78,000
A.2.3	Remove and Dispose of Concrete Sidewalk	1900	m2	$30.00	$57,000
A.2.4	Earth Excavation Grading	21750	m3	$40.00	$870,000
A.2.5	Geotextile	23000	m2	$5.00	$115,000
A.2.6	Granular Subbase (750mm)	15000	m3	$75.00	$1,125,000
A.2.7	Granular "A" Base for Roadway, Sidewalk & Boulevard	9612	tonne	$40.00	$384,480
A.2.8	HL8 HS Binder Course Asphalt - 50mm	2490	tonne	$230.00	$572,700
A.2.9	HL3 HS Surface Course Asphalt - 50mm	2490	tonne	$250.00	$622,500
A.2.10	Concrete Curb and Gutter	2800	metre	$150.00	$420,000
A.2.11	150mm Concrete Sidewalk	2250	m2	$200.00	$450,000
A.2.12	200mm Concrete Sidewalk Ramps	200	m2	$250.00	$50,000
A.2.13	HL3A Hot Mix Asphalt - Entrances & Boulevards	500	tonne	$400.00	$200,000
A.2.14	Tack Coat	15000	m2	$5.80	$87,000
A.2.15	Pavement Markings Durable	1	L.S.	$80,000.00	$80,000
A.2.16	Topsoil and Sod	7000	m2	$40.00	$280,000
A.2.17	Traffic Control Signing	1	L.S.	$60,000.00	$60,000
A.3.1	Construction Contingency Allowance	20	%	$7,725,080.00	$1,545,016
A.3.2	Engineering Allowance	15	%	$9,070,096.00	$1,360,514
				Sub-Total - Part 'A' ->	**$10,630,610**
Part 'B' - Johnson Avenue Sanitary Sewer Upgrades					
Scope:	> **Johnson Avenue** (Diane Street to Farwell Terrace) - replacement of existing sewer with 375mm dia. SAN				
B.1	General Items (i.e. ins, bond, mobilization etc.)	1	L.S.	$50,000.00	$50,000
B.2	SAN Sewer Removal	242	metre	$30.00	$7,260
B.3	375mm dia. PVC Sanitary Sewer (incl. restoration)	242	metre	$1,590.00	$384,780
B.4	1200mm Precast Concrete Sanitary Manholes	4	each	$16,000.00	$64,000
B.5	Connections of Existing Sanitary Laterals	24	each	$1,500.00	$36,000
B.6	Connections to Existing Sanitary Sewers/Structures	4	each	$5,000.00	$20,000
B.7	Construction Contingency Allowance	20	%	$562,040.00	$112,408
B.8	Engineering Allowance	15	%	$624,448.00	$93,667
				Sub-Total - Part 'B' ->	**$768,115**
Part 'C' - Hillside Drive Storm Outlet					
Scope:	> **Hillside Drive Storm Outlet** - construction of new 600mm STM outlet sewer through easement				
C.1	General Items (i.e. ins, bond, mobilization etc.)	1	L.S.	$15,000.00	$15,000
C.2	STM Sewer Removal	67	metre	$30.00	$2,010
C.3	600mm dia. Storm Sewer (incl. restoration)	67	metre	$1,140.00	$76,380
C.4	1200mm Precast Concrete STM Manholes	2	each	$15,000.00	$30,000
C.5	Outlet Structure	1	each	$5,000.00	$5,000
C.6	Construction Contingency Allowance	20	%	$128,390.00	$25,678
C.7	Engineering Allowance	15	%	$154,068.00	$23,110
				Sub-Total - Part 'C' ->	**$177,178**

CITY OF SAULT STE. MARIE

Flooding Assessment Class EA

Preliminary Cost Estimate for Preferred Solution

April 2, 2024

AECOM Project No.: 60625445

Item No.	Description of Item	Estimated Quantity	Unit	Unit Price	Total Price
Part 'D' - Diane Street Storm Sewer					
Scope:	> **Diane Street** (Pozzebon to Johnson) - construction of new 900mm dia. STM				
D.1	General Items (i.e. ins, bond, mobilization etc.)	1	L.S.	$20,000.00	$20,000
D.2	900mm dia. Sanitite Storm Sewer (incl. restoration)	99	metre	$1,900.00	$188,100
D.3	1500mm Precast Concrete STM Manholes	2	each	$20,000.00	$40,000
D.4	Construction Contingency Allowance	20	%	$248,100.00	$49,620
D.5	Engineering Allowance	15	%	$297,720.00	$44,658
				Sub-Total - Part 'D' ->	**$342,378**
Part 'E' - Farewell Terrace Storm Sewer Upgrades and Outlet					
Scope:	> **Farwell Terrace** (Johnson to Outlet) - construction of 2.0 x 1.675 Conc. Box STM sewer				
E.1	General Items (i.e. ins, bond, mobilization etc.)	1	L.S.	$150,000.00	$150,000
E.2	STM Sewer Removal	252	metre	$80.00	$20,160
E.3	2000 x 1675mm dia. Conc. Storm Sewer (incl. restoration)	252	metre	$6,760.00	$1,703,520
E.4	3000mm Precast Concrete STM Manholes	4	each	$50,000.00	$200,000
E.5	Outlet Structure	1	each	$50,000.00	$50,000
E.6	Connections to Existing Storm Sewers/Structures	3	each	$5,000.00	$15,000
E.7	Construction Contingency Allowance	20	%	$2,138,680.00	$427,736
E.8	Engineering Allowance	15	%	$2,566,416.00	$384,962
				Sub-Total - Part 'E' ->	**$2,951,378**
Part 'F' - Stormwater Detention Pond (south end of cemetery)					
Scope:	> construction of pond at south end of cemetery				
F.1	General Items (i.e. ins, bond, mobilization etc.)	1	L.S.	$50,000.00	$50,000
F.2	Clearing and Grubbing	2800	m2	$30.00	$84,000
F.3	Earth Grading	4600	m3	$50.00	$230,000
F.4	Inlet Structure and Appurtenances	1	L.S.	$40,000.00	$40,000
F.5	Outlet Structure and Appurtenances	1	L.S.	$40,000.00	$40,000
F.6	Ditching	100	metre	$200.00	$20,000
F.7	Topsoil, Seed & Mulch	6800	m2	$25.00	$170,000
F.8	Construction Contingency Allowance	20	%	$634,000.00	$126,800
F.9	Engineering Allowance	15	%	$760,800.00	$114,120
				Sub-Total - Part 'F' ->	**$874,920**
Part 'G' - Stormwater Detention Pond - Elliott Field (former pond location)					
Scope:	> construction of pond at Elliott field at former pond location				
G.1	General Items (i.e. ins, bond, mobilization etc.)	1	L.S.	$30,000.00	$30,000
G.2	Clearing and Grubbing	1500	m2	$30.00	$45,000
G.3	Earth Grading	2500	m3	$50.00	$125,000
G.4	Outlet Structure and Appurtenances	1	L.S.	$40,000.00	$40,000
G.5	Ditching	50	metre	$200.00	$10,000
G.6	Topsoil, Seed & Mulch	1500	m2	$25.00	$37,500
G.7	Construction Contingency Allowance	20	%	$287,500.00	$57,500
G.8	Engineering Allowance	15	%	$345,000.00	$51,750
				Sub-Total - Part 'G' ->	**$396,750**
Part 'H' - Stormwater Detention Pond - Elliott Field (at pickleball courts)					
Scope:	> construction of pond at Elliott field at pickleball courts				
H.1	General Items (i.e. ins, bond, mobilization etc.)	1	L.S.	$20,000.00	$20,000
H.2	Earth Grading	500	m3	$50.00	$25,000
H.3	Outlet Structure and Appurtenances	1	L.S.	$40,000.00	$40,000
H.4	Ditching	25	metre	$200.00	$5,000
H.5	Topsoil, Seed & Mulch	300	m2	$25.00	$7,500

CITY OF SAULT STE. MARIE

Flooding Assessment Class EA

Preliminary Cost Estimate for Preferred Solution

April 2, 2024

AECOM Project No.: 60625445

Item No.	Description of Item	Estimated Quantity	Unit	Unit Price	Total Price
H.6	Construction Contingency Allowance	20	%	$97,500.00	$19,500
H.7	Engineering Allowance	15	%	$117,000.00	$17,550
				Sub-Total - Part 'H' ->	**$134,550**
Part 'I' - Stormwater Detention Pond - Peoples Road/Hillside Drive					
Scope:	> construction of pond at west side of Peoples Rd, south of Hillside Drive				
I.1	General Items (i.e. ins, bond, mobilization etc.)	1	L.S.	$50,000.00	$50,000
I.2	Clearing and Grubbing	3500	m2	$30.00	$105,000
I.3	Earth Grading	4700	m3	$50.00	$235,000
I.4	Inlet Structure and Appurtenances	1	L.S.	$40,000.00	$40,000
I.5	Outlet Structure and Appurtenances	1	L.S.	$40,000.00	$40,000
I.6	Redundant Inlet Structure in downstream ravine (west side Peoples Rd)	1	L.S.	$75,000.00	$75,000
!.7	Ditching	250	metre	$200.00	$50,000
I.8	Topsoil, Seed & Mulch	4000	m2	$25.00	$100,000
I.9	Construction Contingency Allowance	20	%	$695,000.00	$139,000
I.10	Engineering Allowance	15	%	$834,000.00	$125,100
				Sub-Total - Part 'I' ->	**$959,100**
Part 'J' - Elliott Field Perimeter Ditching					
Scope:	> ditching along existing swale ditch south side of the eastern Elliott's sports field				
J.1	General Items (i.e. ins, bond, mobilization etc.)	1	L.S.	$10,000.00	$10,000
J.2	Ditching	220	metre	$100.00	$22,000
J.3	Topsoil, Seed & Mulch	880	m2	$25.00	$22,000
J.4	Construction Contingency Allowance	20	%	$54,000.00	$10,800
J.5	Engineering Allowance	15	%	$64,800.00	$9,720
				Sub-Total - Part 'J' ->	**$74,520**

SUMMARY OF ESTIMATED PROJECT COSTS

Part 'A' - Peoples Road Sanitary Sewer Upgrades	$10,630,610
Part 'B' - Johnson Avenue Sanitary Sewer Upgrades	$768,115
Part 'C' - Hillside Drive Storm Outlet	$177,178
Part 'D' - Diane Street Storm Sewer	$342,378
Part 'E' - Farwell Terrace Storm Sewer Upgrades and Outlet	$2,951,378
Part 'F' - Stormwater Detention Pond (south end of cemetery)	$874,920
Part 'G' - Stormwater Detention Pond - Elliott Field (former pond location)	$396,750
Part 'H' - Stormwater Detention Pond - Elliott Field (at pickleball courts)	$134,550
Part 'I' - Stormwater Detention Pond - Peoples Road/Hillside Drive	$959,100
Part 'J' - Elliott Field Perimeter Ditching	$74,520
TOTAL ESTIMATED PROJECTS COSTS (excl. HST) >>	**$17,309,500**

Notes:

1) Preliminary costs derived from Conceptual Class EA plans.
2) Estimated costs based on anticipated 2025 unit costs derived from previous City contracts.
3) Estimated costs for each Part assume standalone contracts inclusive of an allowance of general costs.
4) SAN sewer costs under Part A - Peoples Rd SAN Sewer include full restoration of the roadway and sidewalks.
5) Sewer unit costs under Parts B to E include restoration of the area disturbed by trench, only, including asphalt, curbs etc. where applicable.
6) Sewer costs exclude replacement of the sanitary laterals from sewer main to property line.
7) Part A could be phased to prioritize runs that provide the most flooding relief.
8) Parts G and H generally consist of construction of a dike with limited alteration of the upstream naturally vegetated areas.