REGION OF PEEL

ENVIRONMENTAL ASSESSEMENT: CLAREDALE ROAD TO BEECHWOOD PUMPING STATION

FINAL REPORT

FEBRUARY 24, 2021

CLAREDALE ROAD TO BEECHWOOD PUMPING STATION

ENVIRONMENTAL ASSESSMENT

REGION OF PEEL

PROJECT NO.: 19M-00593-00
DATE: FEBRUARY 24, 2021

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February 24, 2021

Region of Peel
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Attention: Lyle LeDrew

Subject: Project File for the Claredale Road to Beechwood Pumping Station Project

Dear Mr. Lyle:

WSP Canada Inc. is pleased to provide you with the Project File report for the Claredale Road to Beechwood Pumping Station Diversion Project. Enclosed, in addition to the report, are supporting documentation in the form of technical memorandums, reports, and investigations pertinent to the project scope.

Thank you for the opportunity to complete this assignment. Please contact the undersigned with any questions or comments.

Yours sincerely,

Michelle Albert, P.Eng.

MB/ma
Encl.
cc:
WSP ref.: 19M-00593-00

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1 EXECUTIVE SUMMARY

The Region of Peel has identified the need to replace the existing siphons under Cooksville Creek and install a new sanitary sewer to connect the Claredale Road sanitary catchment area to Beechwood SPS. The project is being carried out as a Schedule 'B' Municipal Class Environmental Assessment to address the following problem statement.

The double siphons used to convey wastewater from the Claredale Road sanitary catchment area under Cooksville Creek are approaching the end of their service life. Furthermore, the siphons do not comply with Region of Peel sanitary sewer design standards. As a result, the siphons have experienced frequent obstructions, subjecting the Claredale Road sanitary catchment area to sewer and lateral connection backups. The Region of Peel has been challenged with the frequency and degree of maintenance required to unblock the obstructed siphons and tributary sewers.

This Project File has been prepared to document the evaluation and selection of the preferred solution. Agencies and the public have been engaged via stakeholder meetings, issuance of the notice of project commencement and public consultation including the publication of a public consultation presentation for review by Indigenous groups, agencies and the public.

Three alternative solutions were identified and reviewed relative to the problem statement. The alternatives were evaluated based on technical feasibility, natural environmental impacts, social and cultural impacts as well as economic/financial impacts. The final preferred solution includes the installation of a new gravity sewer connecting the existing maintenance hole south of the C.N. Rail tracks, directly to Beechwood PS. This includes crossing under the Cooksville Creek.

In support of the preferred solution, implementation considerations were identified, and mitigation measures developed.

The following Project File provides detailed information on the Municipal Class EA process which was closely followed for this project as well as the substantiating reports commissioned in support of the project.

2 INTRODUCTION

2.1 STUDY PURPOSE AND OBJECTIVES

The purpose of this Municipal Class Environmental Assessment (EA) study is to provide a comprehensive and environmentally sound planning process, open to public participation, to select the preferred solution which fully addresses the current issues regarding the siphons crossing Cooksville Creek. The proximate residential areas, existing Beechwood SPS, site constraints and environmental risks were taken into consideration. Study objectives include:

- Protection of the environment, as defined in the Environmental Assessment Act (EAA), through the wise management of resources;
- Extensive consultation with all affected and interested parties, including participation of a broad range of stakeholders to allow for the sharing of ideas, education, testing of creative solutions and developing alternatives;
- Facilitation of dialogue between those with different or contrasting interests;
- Documentation of the study process in compliance with required phases of the Municipal Class EA planning process;
- Selection of an optimal solution which is both technically viable and cost effective; and
- Documentation of mitigation and monitoring requirements which will ensure minimal disruption during construction to resident, businesses and the natural environment and fulfillment of commitments, as required.

By completing the Class EA planning process, the preferred solution should address environmental, social and technical concerns and be acceptable to the majority of residents, stakeholders and review agencies.

2.2 DESCRIPTION OF THE STUDY AREA

The Study Area for this project includes the entire Claredale sanitary catchment which could be impacted by the work. Inside the Study Area we have delineated a separate Area of Focus. The Area of Focus, bound by the C.N. Rail Tracks to the north, Beachcomber Road to the east, Lakeshore Road East to the south, and Enola Avenue to the west. It is defined as the area that may be directly impacted by the works considered in the EA process. Figure 2-1 Area of Focus, Study Area and Context Area below shows a map of the Area of Focus, Study Area and Context Area for this project.

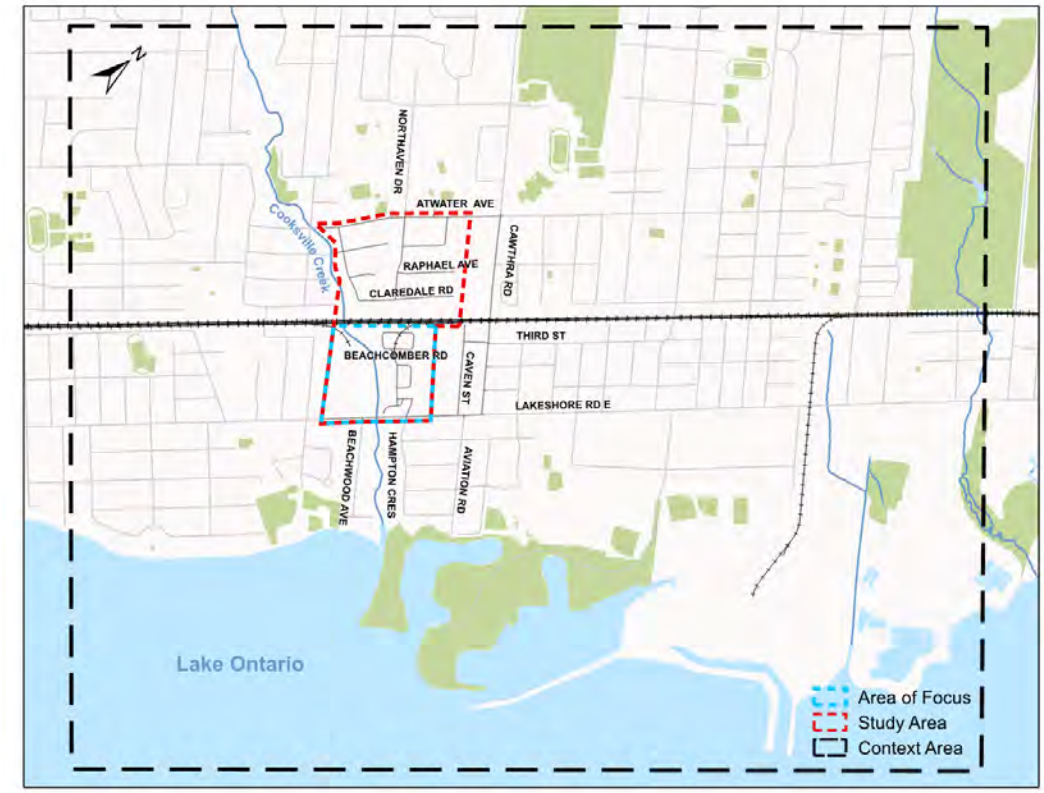


Figure 2-1 Area of Focus, Study Area and Context Area

2.3 BACKGROUND

The Region of Peel (Region) has identified the need to replace the existing siphons under Cooksville Creek and install a new sanitary gravity sewer to connect the Claredale Road sanitary catchment area to Beechwood Sewage Pumping Station (SPS).

Claredale Road is a residential street located in the City of Mississauga, west of Cawthra Road and between Atwater Avenue and the C.N. Rail tracks situated north of Lakeshore Road East. The Claredale Road sanitary sewer network collects flows from all sanitary lateral connections on Claredale Road, Ettridge Court, Raphael Avenue and Avonwood Drive, as well as a small portion of the lateral connections on Atwater Avenue and Northaven Drive. In addition, weeping tiles and homeowner sump pumps discharge to the Claredale Road sanitary sewer network.

The Claredale Road sanitary drainage area has a maximum flow of 29 L/s that is conveyed via a 250 mm diameter gravity sewer south towards Lakeshore Road East. Beach Street SPS previously serviced the communities of Port Credit and Lakeview in southern Mississauga, including the Claredale Road sewer network, however the majority of these flows are now being directed to Beechwood SPS.

The Claredale Road wastewater drainage area regularly experiences sewer and lateral connection backups resulting from frequent blockages of the double siphons at the Cooksville Creek crossing. The Region's operations staff are frequently required to conduct maintenance on the siphon to clear obstructions.

In summary, the following conditions inform the study and problem statement.

- The siphons under Cooksville Creek are approaching the end of their service life and do not meet the Region's current design standards for minimum flow velocity in sewers;
- The siphons are prone to frequent blockage, resulting in regular sewer and lateral connection backups;
- To prevent blockages, the siphons require frequent maintenance and cleaning at considerable expense and effort to the Region;

- The Region has experienced accessibility and maintenance challenges to unblock the frequently obstructed siphons; and,
- The existing sanitary maintenance hole on the north bank of Cooksville Creek is at risk of exposure due to further erosion.

2.4 PROBLEM STATEMENT

The problem statement for the Claredale Road to Beechwood Pumping Station Diversion Class EA is defined as follows:

The double siphons used to convey wastewater from the Claredale Road sanitary catchment area under Cooksville Creek are approaching the end of their service life. Furthermore, the siphons do not comply with Region of Peel sanitary sewer design standards. As a result, the siphons have experienced frequent obstructions, subjecting the Claredale Road sanitary catchment area to sewer and lateral connection backups. The Region of Peel has been challenged with the frequency and degree of maintenance required to unblock the obstructed siphons and tributary sewers.

To address the problem statement, the Region has initiated this Municipal Class EA planning process which evaluates alternative solutions to solve the problem identified above. This Project File Report has been prepared to document the findings of the evaluation and the selection of the preferred solution.

2.5 PUBLIC REVIEW AND NEXT STEPS

This Project File meets the requirements of a Schedule 'B' Municipal Class EA study. Filing of this Project File initiates the 30-day public review period starting Feburary 25, 2021 and ending March 31, 2021. To facilitate public review of this document, an electronic copy of the Project File Report will be made available online at:

https://www.peelregion.ca/public-works/environmental-assessments/mississauga/beechwood-pumping-station.asp

If a hard copy of the Project File Report is required for review purposes, please contact the Region's Project Manager:

Lyle LeDrew, C.E.T
Project Manager, Region of Peel
10 Peel Centre Drive, Suite B 4th Floor
Brampton, ON L6T 4B9
Phone: 905-791-7800 ext. 7836
Email: lyle.ledrew@peelregion.ca

If you have any questions or concerns about the report, please take the following steps:

1. Contact the Region's Project Manager to discuss your questions or concerns:
2. Arrange a meeting with the Region's Project Manager.

If you have significant concerns, the Region will attempt to negotiate a resolution of the issue(s). A mutually acceptable time period for this negotiation will be set. For concerns that involve the prevention, mitigation or remediation of adverse impacts on constitutionally protected Aboriginal and treaty rights, you may request the Minister of the Environment, Conservation and Parks to require the Region to comply with Part II of the Environmental Assessment Act (EAA) before proceeding with the project. This is called a Part II Order or "bump up request".

Requests should specify what kind of order is being requested (request for additional conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate or remedy those potential adverse impacts, and any information in support of the statements in the request. Requests should also include the requester contact information. This will ensure that the Ministry is able to efficiently begin reviewing the request.

After reviewing the Part II Order request and the project documents in detail, the Minister may make one of the following decisions:

a. Deny the request, with or without conditions;

b. Refer the matter to mediation; or,

c. Require that the Region comply with Part II of the *EAA* by undertaking one of the following:

   i. Set out directions with respect to the Terms of Reference and preparing an Individual EA for the undertaking;

   ii. Declare that the Region has satisfied requirements for the preparation of the Class EA Study, as are specified in the order; or,

   iii. Impose additional conditions, in addition to those set out in the Class EA Study.

Requests must be submitted in writing to the Minister of the Environment, Conservation and Parks within the 30-day review period. As of July 1, 2018, a Part II Order Request Form must be used to request a Part II Order. The Part II Order Request Form is available online on the Forms Repository website (http://www.forms.ssb.gov.on.ca/) by searching "Part II Order" or "012-2206E" (the form ID number). A copy of the form should also be submitted to the Director of Environmental Assessment and Permission Branch:

Minister of the Environment, Conservation and Parks
Ministry of the Environment, Conservation and Parks
11th Floor
77 Wellesley Street West
Toronto, ON M7A 2T5
minister.mecp@ontario.ca

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto ON, M4V 1P5
EABDirector@ontario.ca

A copy of the request must also be forwarded to the attention of the Region's Project Manager at the address provided above.

If no Part II Order requests are received, the Region will proceed with detailed design and construction of the proposed works as presented in this Project File.

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

3 MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT PLANNING PROCESS

3.1 ENVIRONMENTAL ASSESSMENT ACT (1990)

Ontario's *Environmental Assessment Act*, R.S.O. 1990 (henceforth referred to as "the Act") was passed in 1975 and proclaimed in 1976. Class Environmental Assessments were approved by the Minister of the Environment in 1987 for municipal projects having predictable and preventable impacts. The Class EA approach streamlines the planning and approvals process for municipal projects which have the following characteristics:

- Recurring;
- Similar in nature;
- Usually limited in scale;
- Predictable range of environmental impacts; and,
- Environmental impacts are responsive to mitigation.

The Municipal Class Environmental Assessment document, prepared by the Municipal Engineers Association (MEA) (October 2000, as amended in 2007, 2011, and 2015), outlines the procedures to be followed to satisfy Class EA requirements for water, wastewater and road projects (MEA, 2015). The process includes five phases:

- Phase 1: Problem Definition;
- Phase 2: Identification and Evaluation of Alternative Solutions to Determine a Preferred Solution;
- Phase 3: Examination of Alternative Methods of Implementation of the Preferred Solution;
- Phase 4: Documentation of the Planning, Design and Consultation Process; and,
- Phase 5: Implementation and Monitoring.

Since projects undertaken by municipalities can vary in their complexity and potential environmental impacts, projects are classified in "Schedules" as shown in Table 3–1 (MEA, 2015):

Table 3–1 Municipal Class Environmental Assessment Schedules

MCEA SCHEDULE	DESCRIPTION
Schedule A	Generally, includes normal or emergency operational and maintenance activities. The environmental effects of these activities are usually minimal and, therefore, these projects are pre-approved. (i.e. no public consultation is required)
Schedule A+	In 2007, MEA introduced Schedule 'A+.' These projects are pre-approved. However, the public is to be advised prior to project implementation.
Schedule B	Generally includes improvements and minor expansions to existing facilities/infrastructure. There is the potential for some adverse environmental impacts and, therefore, the Proponent is required to proceed through a screening process including consultation with those who may be affected. Typical projects that follow a Schedule 'B' process will include projects requiring watercourse crossings, construction of watermains and sewers outside of existing road allowances, construction of pumping stations and reservoirs.

MCEA SCHEDULE	DESCRIPTION
Schedule C	Generally includes the construction of new facilities and major expansions to existing facilities. Typical projects that follow the Schedule 'C' process include the expansion of existing, or construction of new Water and Sewage Treatment Facilities.

Public and agency consultation are integral to the Class EA planning process. It is important to note that the Schedule assigned to a particular project is proponent-driven. For example, if a project has been designated as Schedule 'A', the proponent can decide to comply with the requirements of a Schedule 'B' or 'C' of the MEA process based on the magnitude of anticipated impacts or the special public and agency consultation requirements specific to that particular project (MEA, 2015).

The Class EA process also provides an appeal mechanism to change the project status. Under the provisions of Subsection 16 of the amended EA Act, there is an opportunity under the Class EA planning process for the Minister to review the status of a project. Members of the public, interest groups and review agencies may request the Minister to require a Proponent to comply with Part II of the EA Act before proceeding with a proposed undertaking.

For Schedule 'B' and 'C' projects the public has the opportunity to request additional investigation by filing a Part II Order Request to the Ministry of the Environment, Conservation and Parks. The Minister determines whether or not this is necessary, with the Minister's decision being final. The procedure for dealing with concerns, which may result in the Minister, by order, requiring the Proponent to comply with Part II of the Act is outlined in the MEA document (MEA, 2015).

3.2 PRINCIPLES OF ENVIRONMENTAL PLANNING

The Act sets a framework for a systematic, rational and replicable environmental planning process that is based on five key principles, as follows:

- **Consultation with affected parties** - Consultation with the public and government review agencies is an integral part of the planning process. Consultation allows the proponent to identify and address concerns cooperatively before final decisions are made. Consultation should begin as early as possible in the planning process.
- **Consideration of a reasonable range of alternatives** – Alternatives should include functionally different solutions to the proposed undertaking and alternative methods of implementing the preferred solution. The "do nothing" alternative must also be considered.
- **Identification and consideration of the effects of each alternative on all aspects of the environment** - This includes the natural, social, cultural, technical, and economic environments.
- **Systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental effects** - The evaluation shall increase in the level of detail as the study moves from the evaluation of alternatives to the proposed undertaking to the evaluation of alternative methods.
- **Provision of clean and complete documentation of the planning process followed** – This will allow traceability of decision-making with respect to the project. The planning process must be documented in such a way that it may be repeated with similar results.

3.3 CONFIRMATION OF MCEA SCHEDULE

The Claredale Road to Beechwood Pumping Station project is proceeding in accordance with the Class EA process in the MEA document (MEA, 2015). This Class EA is being completed as a Schedule 'B' project. This project generally fits the description listed under Item 1 for Schedule 'B' Wastewater Projects in Appendix 1 of the MEA Class EA document:

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

Schedule 'B' projects require the completion of Phases 1 and 2 followed by Phase 5.

As required for Schedule 'B' projects, this report documents requirements of Phases 1 and 2 of the Municipal Class EA Planning and Design Process

3.3.1 COMMUNICATION AND CONSULTATION SUMMARY

The following public and agency consultation activities were undertaken as part of the Class EA process:

- Notice of Study Commencement;
- Online Public Consultation; and,
- Notice of Study Completion.

3.3.1.1 CONTACT LIST

A Study Contact List was compiled and includes review agencies, the City of Mississauga, Credit Valley Conservation Authority, Indigenous Communities and interested members of the community. The list was used for mail and e-mail correspondence, as applicable. stakeholders included:

- Rail and Transit;
- Alectra Utilities;
- Peel Public Health;
- Provincial Ministries;
- Fisheries and Oceans Canada;
- City of Mississauga;
- Credit Valley Conservation; and,
- Condominium Corporations.

A full Study Contact List is provided in Appendix A-2.

3.3.1.2 STUDY COMMENCEMENT

The formal Notice of Study Commencement and Online Public Engagement was distributed to all stakeholders included in the Study Contact List and to local residents and businesses on July 2, 2020 and advertised in the Mississauga News on July 2, 2020. The Notice of Study Commencement and Online Public Engagement was also posted on the Region of Peel's project website.

A copy of the Notice of Study Commencement and Online Public Engagement can be found in Appendix A-3.

3.3.1.3 PUBLIC CONSULTATON

Public consultation is an important component of the Class EA process and includes informing members of the community and stakeholders to provide balanced and objective information. It also includes the consultation of the stakeholder to obtain feedback on the study process, alternatives, and preliminary preferred solution. The Region of Peel has coordinated with the City of Mississauga and Credit Valley Conservation regarding EA and road widening projects within the Study Area.

The primary goals and objectives of the public consultation process are to:

- Present clear and concise information at key stages of the study process;
- Solicit community, regulatory and Regional staff input;
- Identify concerns that might arise from the undertaking;

- Consider stakeholder comments when developing the preferred solution; and,
- Meet Municipal Class EA consultation requirements.

Public consultation was arranged online by posting a project overview presentation on the Region of Peel's project website. The presentation was made available to the public on July 2, 2020, with the opportunity for public review and input ending on July 24, 2020. Region of Peel contact information was provided in the public consultation materials with stakeholders contacting the Region of Peel's PM for additional information.

3.3.1.4 *STUDY COMPLETION*

The formal Notice of Study Completion was distributed to all stakeholders included in the Study Contact List and to local residents and businesses on February 25, 2021 and advertised in the Mississauga News on February 25, 2021. The Notice of Study Completion was also posted on the Region of Peel's project website.

A copy of the Notice of Study Completion can be found in Appendix A-6.

3.4 INDIGENOUS CONSULTATION

Indigenous communities for EA consultation were identified using the Government of Canada's web-based, geographic information system called the Aboriginal and Treaty Rights Information System (ATRIS). ATRIS was launched to the public in September 2013 and is a key tool that provides access to narrative records and maps to assist interested parties in determining and fulfilling their consultation obligations.

The ATRIS search identified the following 40 Indigenous communities:

Aamjiwnaang	Mississaugas of Scugog Island
Alderville First Nation	Mississaugas of the Credit
Atikameksheng	Mohawks of Akwesasne
Aundeck-Omni-Kaning	Mohawks of the Bay of Quinte
Batchewana	Nipissing First Nation
Beausoleil	Sagamok Anishnawbek
Chippewas of Georgina Island	Saugeen
Chippewas of Kettle and Stony Point	Serpent River
Chippewas of Nawash	Shawanaga
Chippewas of Rama	Sheguiandah
Chippewas of the Thames	Sheshegwaning
Curve Lake	Six Nations of the Grand River
Dokis	Temagami
Garden River	Thessalon
Henvey Inlet	Wahnapitae

Hiawatha	Walpole Island
Magnetawan	Wasauksing
M'Chigeeng	Whitefish River
Metis Nation of Ontario	Wikwemikong
Mississauga	Zhiibaahaasing

A draft Notice of Study Commencement and Online Public Engagement was sent to the MECP to confirm the list of Indigenous communities that are to be contacted in order to comply with the Duty to Consult. In the letter received from the MECP, dated September 27, 2019, the MECP identified the following Indigenous communities:

- Mississaugas of the Credit First Nation;
- Six Nations of the Grand River;
- Haudenosaunee Confederacy Chiefs Council; and,
- Huron-Wendat Nation.

The Notice of Study Commencement and Online Public Engagement was sent both electronically and by mail to the Indigenous groups identified by the MECP on July 2, 2020.

The Notice of Study Completion was sent both electronically and by mail to the Indigenous groups identified by the MECP on February 25, 2021.

The letter received from the MECP can be referred to in Appendix A-4.

3.5 AGENCY CONSULTATION

3.5.1 CREDIT VALLEY CONSERVATION CONSULTATION

As the project area is located within the Credit Valley Conservation's (CVC) regulated area, the need to consult with the CVC was identified early in the process. The project team reached out to the City starting in August 2019. Table 3–2 below summarizes the consultation meeting with the CVC. The complete meeting notes can be referred to in Appendix A-1.

Table 3–2 Credit Valley Conservation Consultation Meeting

DATE HELD	MEETING SUMMARY
August 13, 2019	Pre-Consultation Meeting • WSP presented an overview of the scope of the project and the expected corresponding works. • CVC regulated areas and floodplain mapping was discussed. • Review of existing studies and potential need to conduct additional studies was discussed. • CVC requirements for maintenance hole locations and sewer crossing under Cooksville Creek was discussed.
December 2, 2020	Review Meeting • Upon review of the Project File Report, the CVC provided WSP with comments. The purpose of this meeting was to review WSP's responses to the CVC's comments.

3.5.2 CITY OF MISSISSAUGA CONSULTATION

As the project is located within the City of Mississauga, the need to consult with the City was identified early in the process. The project team reached out to the City starting in December 2019. Table 3–3 below summarizes the consultation meetings held with the City of Mississauga. The complete meeting notes can be referred to in Appendix A-1.

Table 3–3 City of Mississauga Consultation Meetings

DATE HELD	MEETING SUMMARY
December 5, 2019	Pre-Consultation Meeting • WSP presented an overview of the scope of the project and the expected corresponding works. • Ownership, recent works, and maintenance of the Greenlands zone east of Cooksville Creek and south of the C.N. Rail Tracks was discussed. • Environmental and social impacts were discussed. • Public consultation strategy was discussed.
April 27, 2020	Consultation Meeting • Alternative sewer routes were discussed and confirmed.
December 2, 2020	Review Meeting • Upon review of the Project File Report, the City of Mississauga provided WSP with comments. The purpose of this meeting was to review WSP's responses to the City's comments.

4 BASELINE FEATURES AND SERVICING CONDITIONS

The following section describes the Study Area and the project's specific Area of Focus, including its location, current wastewater servicing system, and existing and future land uses. Also discussed are future infrastructure projects, the socio-economic, physical and natural environments and social/cultural features. Servicing and planning considerations are also presented. The information described in this section was considered when reviewing potential effects of the alternative solutions.

4.1 PLANNING AND SERVICING CONSIDERATIONS

4.1.1 CITY OF MISSISSAUGA ZONING BY-LAW 0225-2007

The purpose of the City of Mississauga Zoning By-law is to regulate the use of land, building and structures and to implement the City of Mississauga Official Plan. Per Part 2: General Provisions, Section 2.1.1.3 of the Zoning By-law, a structure required for the purpose of providing wastewater management facilities or piped services is a permitted use in all zones.

Per City of Mississauga Zoning By-law 0225-2007, the proposed sewer construction works be installed on lands classified as G1: Greenlands – Natural Hazards Zone. Per Section 2.1.1 of the By-law, these lands are generally exempt from the requirements of the By-law.

4.2 EXISTING LINEAR INFRASTRUCTURE

This section presents a summary of the linear infrastructure in the Study Area.

4.2.1 WASTEWATER SERVICING

Per the as-constructed drawings by F. Schaeffer & Associates Ltd., dated November 1965, an existing 250 mm diameter sanitary sewer is located between houses 1116 and 1120 on Claredale Road, beneath the C.N. Rail tracks via a steel tunnel liner, crosses the Cooksville Creek by means of double siphons, discharges southerly to Beechwood Avenue and ultimately discharges to Beechwood Sewage Pumping Station (SPS). The drawings showing the existing sanitary sewer alignment are included in Appendix D-2.

Furthermore, per the as-built drawings for Beechwood SPS (WSP, 2014), there is an existing 1500 mm diameter sanitary sewer located along Beechwood Avenue. The drawings showing the sanitary sewers on Beechwood Avenue are included in Appendix D-1.

Per the as-built drawings for the Port Credit Trunk Sewers and Forcemains (Genivar, 2008), there are existing twin 750 mm diameter sanitary forcemains that are located on Lakeshore Road East. The drawings showing the forcemain routing on Lakeshore Road East are included in Appendix D-3.

Confirmation of the location of the existing sanitary sewers is recommended during the detailed design phase to ensure there are no conflicts with the proposed sewer alignment.

A map of the Claredale Road sanitary catchment area is shown in Figure 4-1. All sewers and maintenance holes upstream of the siphons are coloured red.

Figure 4-1: Claredale Road Sanitary catchment Area and Existing Sewer Network

4.2.2 WATERMAINS

Per the as-built drawings for Beechwood SPS (WSP, 2014), there is an existing 200 mm diameter watermain along Beechwood Avenue with a 50 mm diameter line extending to the north side of Beechwood SPS. The drawings showing the watermain along Beechwood Avenue are included in Appendix D-1.

Per the as-built drawings for the Port Credit Trunk Sewers and Forcemains (Genivar, 2008), there is an abandoned 200 mm diameter watermain and in-service 300 mm diameter watermain that run along Lakeshore Road East. The drawings showing the watermains along Lakeshore Road East are included in Appendix D-3.

The existing watermain is shallow and therefore it is not anticipated to conflict with new linear infrastructure. However, confirmation of the location of the existing watermains is recommended during the detailed design phase to ensure there are no conflicts with the proposed sewer alignment.

4.2.3 STORM

Per the as-built drawings for Beechwood SPS (WSP, 2014), there is an existing 900 mm diameter storm sewer which travels perpendicular to Beechwood Avenue, discharging to Cooksville Creek via outfall structure. The drawings showing the storm sewer crossing Beechwood Avenue are included in Appendix D-1.

Per the as-constructed drawings by McCormick, Rankin & Associates Ltd., dated April 1976, there is an existing 3000 mm by 1500 mm twin box culvert which travels along the east side of Cooksville Creek, and eventually discharges to Cooksville Creek via outfall structure. The drawings showing the culvert location are included in Appendix D-2.

Per the as-built drawings for the Port Credit Trunk Sewers and Forcemains (Genivar, 2008), there is an existing 900 mm diameter storm sewer that runs perpendicular to Lakeshore Road East, crossing under the road and discharging to Cooksville Creek via outfall structure. The drawings showing the storm sewer crossing Lakeshore Road East are included in Appendix D-3.

Due to the location and relatively shallow depth of the existing storm sewers, the proposed sanitary sewer alignment is not expected to result in any conflicts. However, confirmation of the location of the existing watermains is recommended during the detailed design phase to ensure there are no conflicts with the proposed sewer alignment.

4.2.4 NATURAL GAS

Natural Gas pipelines in the City of Mississauga are generally owned and operated by Enbridge Gas Distribution.

Per the as-built drawings for Beechwood SPS (WSP, 2014), there is an existing gas line immediately east of Beechwood Avenue, providing service to Beechwood SPS. The drawings showing the gas line location along Beechwood Avenue are included in Appendix D-1.

Per the as-built drawings for the Port Credit Trunk Sewers and Forcemains (Genivar, 2008), there is an existing gas service which runs along the north side of Lakeshore Road East. The drawings showing the gas line along Lakeshore Road East are included in Appendix D-3.

Confirmation of the location of the existing gas lines is recommended during the detailed design phase to ensure there are no conflicts with the proposed sewer alignment.

4.2.5 HYDRO AND COMMUNICATIONS

Hydro-electric service in the City of Mississauga is generally provided by Alectra Utilities. Existing hydro poles and overhead hydro lines were observed along the north side of Lakeshore Road East.

Per the as-built drawings for Beechwood SPS (WSP, 2014), there is an existing duct bank immediately east of Beechwood Avenue, connecting to the hydro pole at the northeast corner of Lakeshore Road East and Beechwood Avenue, and providing service to Beechwood SPS. The drawings showing the duct bank location along Beechwood Avenue are included in Appendix D-1.

Confirmation of the location of the existing duct bank is recommended during the detailed design phase to ensure there are no conflicts with the proposed sewer alignment.

4.3 PHYSICAL ENVIRONMENT

4.3.1 SUBWATERSHEDS

The proposed construction works are situated within the Cooksville Creek floodplain which is under jurisdiction of the CVC.

4.3.2 TOPOGRAPHY, PHYSIOGRAPHY, AND GEOLOGY

The topography of the Study Area provides fairly low relief. In general, the ground surface elevation slopes south towards Lake Ontario, ranging from 92 m near Atwater Avenue to 78 m near Lakeshore Road East. The ground surface also gently slopes towards Cooksville Creek.

The Study Area is located within the Peel Plain physiographic region. The general topography of the Peel Plain region consists of level to gently rolling terrain, sloping gradually southward towards Lake Ontario.

4.3.3 GROUNDWATER CONDITIONS

Regional groundwater flow is from the northwest to the southeast towards Lake Ontario. Shallow groundwater flow is influenced by local topography with recharge occurring in the upland areas and discharge occurring within the river valleys and low-lying areas.

4.4 GEOTECHNICAL ANALYSIS

4.4.1 DESKTOP STUDY

A desktop geotechnical analysis was undertaken by WSP to characterize the general geotechnical conditions of the investigation area, to provide a preliminary interpretation of the ground and groundwater conditions as relevant to the overall geotechnical design and construction of the proposed infrastructure.

The desktop geotechnical investigation included the review of previous environmental and geotechnical reports for other projects within the Study Area:

- Preliminary Geotechnical Investigation: Port Credit Sanitary Sewer Improvements (Terraprobe Ltd., 2007);
- Geotechnical Investigation: 503 Lakeshore Road East at Cooksville Creek (John Emery Geotechnical Engineering Ltd., 2008);
- Geotechnical Investigation: Proposed Sewage Pumping Station (Coffey Geotechnics Inc., 2009);
- Geotechnical Investigation: Proposed Forcemain and Sewer – Lakeshore Road East, Enola to Alexandria Avenues (Trow Associates Inc., 2009);
- Report on Geotechnical and Preliminary Hydrogeological Investigation: Proposed Beechwood Sewage Pumping Station (SPL Consultants Ltd., 2013);
- Environmental Soil and Groundwater Investigations: 501 Lakeshore Road East (SPL Consultants Ltd., 2013); and,
- Draft Report on Geotechnical Investigation: Proposed 375mm Gravity Sewer – Beechwood Sewage Pumping Station (SPL Consultants Ltd., 2014).

The geotechnical review determined that the sewer alignments are underlain by gravelly sand to silty sand over silty clay to clayey silt, which is underlain by the bedrock of Georgian Bay Formation which is a grey shale with light

grey siltstone and/or limestone interbeds. Generally, bedrock is expected to lie at 2 m to 4 m below the ground surface.

The geotechnical investigation reports can be made available upon request from the Region's Project Manager.

4.5 RISK ASSESSMENT

As part of the Beechwood SPS project, a risk assessment report was completed by exp Services Inc. in 2014 for Trinity Development Group Inc. The report documents the presence of varying levels of contaminated soil in the lands west of Cooksville Creek.

Soil excavated for the proposed construction works will require coordination between the Region of Peel and the landowner, Trinity Development Group Inc. for disposal of the contaminated soil. Backfill shall consist of uncontaminated soil with a geotextile layer segregating the contaminated and uncontaminated backfill soil. Furthermore, if dewatering activities are required, additional environmentally protective measures shall be taken to ensure the contaminated fluids are disposed of properly.

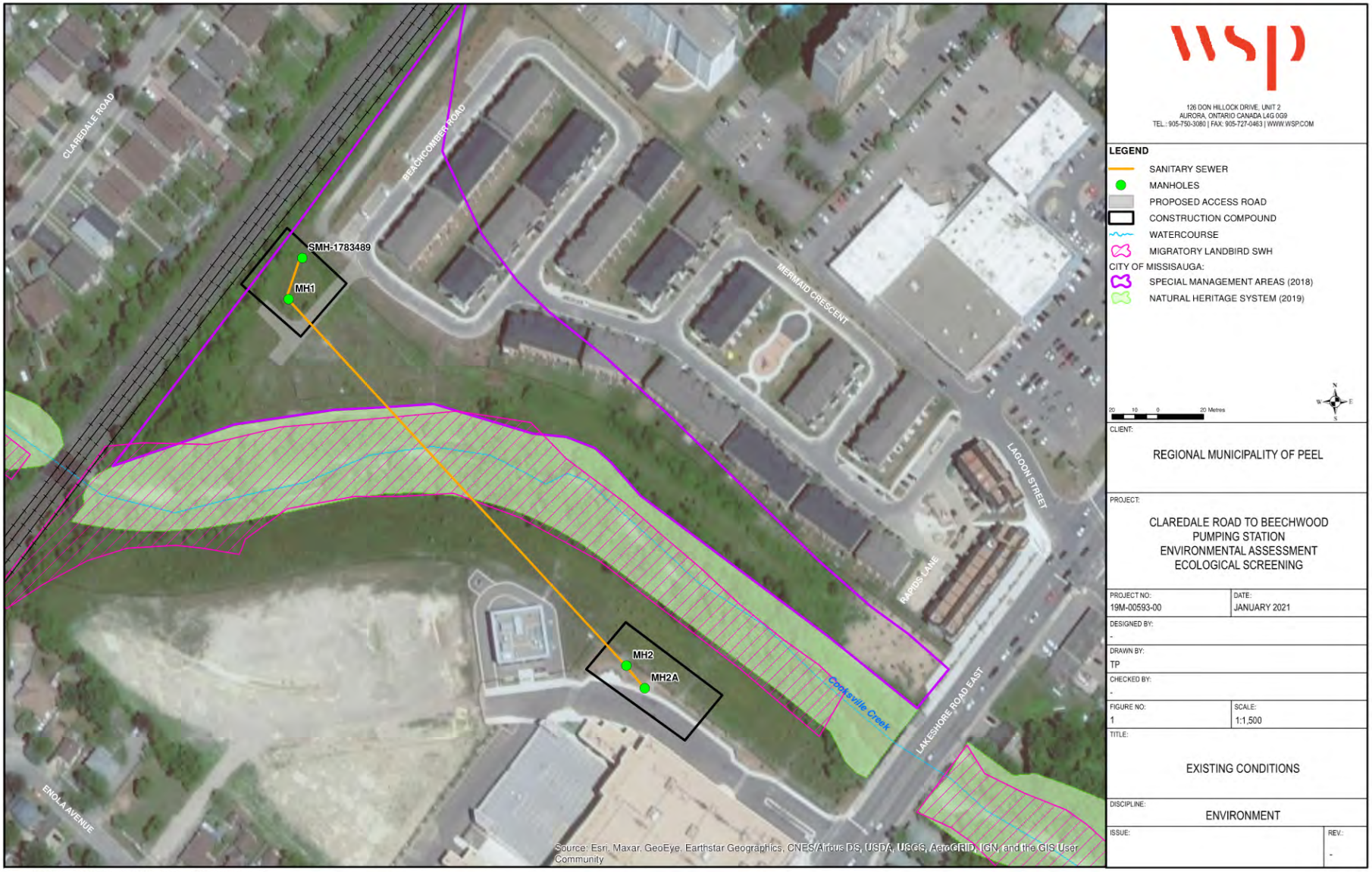
The risk assessment report can be made available upon request from the Region's Project Manager.

4.6 NATURAL ENVIRONMENT

4.6.1 POLICY CONTEXT

4.6.1.1 *CITY OF MISSISSAUGA OFFICIAL PLAN*

Chapter 6 of the Official Plan (OP; 2020) outlines the City's commitment to 'Living Green', describes components of the City's Green System, and specifies policies designed to protect the natural environment. The City's Green System is comprised of the Natural Heritage System, Urban Forest, Natural Hazard Lands, and Parks and Open Spaces. The OP aims to both restore and enhance the Natural Heritage System and areas contributing to this system. The Natural Heritage System is composed of Significant Natural Areas (SNA), Natural Green Spaces, Special Management Areas, Residential Woodlands and Linkages. OP mapping identifies the location of these areas; however, the exact limits are to be determined through site-specific studies. Portions of the site occur within the City's Natural Heritage System, specifically a Significant Natural Area associated with the wooded valleyland of Cooksville Creek, and a Special Management Area which occupies the land adjacent to the Significant Natural Area. According to the OP, Special Management Areas are to be managed or restored to support the features within the adjacent SNA. Refer to Figure 4-2 for locations of these features.



Document Path: D:\aProjects\19M-00593-00\MXD\19M-00593-00 Figure 1 Existing Conditions.mxd

Figure 4-2: Ecological Areas – Existing Conditions

4.6.2 SITE DESCRIPTION

A review of aerial imagery (Google Earth; 2018 & 2019) suggests the site is comprised of cultural meadow, thicket or early successional forest among both construction compounds, and a deciduous forest partly within and adjacent to the northern construction compound (Figure 4-2). The City's 2019 *Natural Areas Update* mapping depicts the forested area associated with the Cooksville Creek corridor SNA as a Fresh – Moist Willow Lowland Deciduous Forest Type (FOD7-3).

The City provided lists of documented vegetation and wildlife within the site with source dates ranging between 2005 and 2016. Vegetation consisted of both native and introduced species, and those associated with upland or lowland conditions, such as Manitoba Maple (*Acer negundo*), Norway Maple (*Acer platanoides*), Garlic Mustard (*Alliaria petiolate*), Chicory (*Cichorium intybus*), Red-osier Dogwood (*Cornus stolonifera*), Staghorn Sumac (*Rhus typhina*), and Canada Goldenrod (*Solidago canadensis*). Of significance, are records for two (2) locally rare species, namely, Cockspur Hawthorn (*Crataegus crus-galli*) and Foxglove Beardtongue (*Penstemon digitalis*), and three (3) species considered locally uncommon, including, Downy Willow Herb (*Epilobium strictum*), Canada Plum (*Prunus nigra*), and Mountain Ash (*Sorbus americana*). These species have potential to occur within the construction areas due to their preference or occasional occurrence in open, upland conditions.

Wildlife documented within the site are considered common across southern Ontario and are known to occur in small natural areas in urban centres, including Gray Catbird (*Dumetella carolinensis*), Eastern Grey Squirrel (*Sciurus carolinensis*), and Raccoon (*Procyon lotor*).

The CVC provided spatial data for both Significant Wildlife Habitat (SWH) and fish collection records within and adjacent to the site. Migratory Landbird SWH occurs within the site, while an Important Bird Area and Mast SWH occur approximately 230 m and 420 m south of the site, respectively. Migratory Landbird SWH is associated with woodlands greater than 5 ha in size and occurring within 5 km of Lake Ontario or Lake Erie. The construction compounds are outside of the FOD7-3 community and do not contain woodlands in excess of 5 ha in size.

The Cooksville Creek watershed drains into Lake Ontario, approximately 520 m south of the site. Within the site, it has an approximate 6 m wetted width (Google Earth imagery) and gently meanders through the Significant Natural Area. Fish occurrence records from two (2) CVC aquatic sampling stations within Cooksville Creek, one approximately 524 m upstream (north) of the site and one approximately 175 m downstream (south) of the site, in addition to information obtained from the Ministry of Natural Resources and Forestry's (MNRF) Aquatic Resource Area spatial layers, suggest a cool to coldwater fishery. Documented fish species include Emerald Shiner (*Notropis atherinoides*), Lake Chub (*Couesius plumbeus*), Longnose Dace (*Rhinichthys cataractae*), White Sucker (*Catostomus commersonii*), Brook Stickleback (*Culaea inconstans*), Common Shiner (*Luxilus cornutus*), Rainbow Trout (*Oncorhynchus mykiss*) and Round Goby (*Neogobius melanostomus*).

4.6.3 SPECIES AT RISK

WSP ecologists completed a review of public databases and requested Species at Risk (SAR) information for the site from the Ministry of Environment, Conservation and Parks (MECP) and the Natural Heritage Information Centre's (NHIC) division of the Ministry of Natural Resources and Forestry (MNRF).

The following databases were reviewed as part of this process:

- NHIC database (Accessed: January 2021);
- iNaturalist (Accessed: January 2021)
- eBird (Cornell Lab of Ornithology, (Accessed: January 2021)),
- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019; (Accessed: January 2021), and
- Department of Fisheries and Oceans (DFO) Aquatic SAR Mapping (Accessed: January 2021).

The NHIC provided a list of SAR records for the area. At the time of writing this report, the MECP had not provided a response (Appendix A-4).

A total of twenty-three (23) SAR were identified as known or having potential to occur within or adjacent to the site. These SAR are listed in the table below, along with a screening for occurrence potential on site. As no field surveys were completed, the occurrence ranking has been assigned based on a review of aerial imagery.

Table 4–1 Species at Risk Screening Table

SPECIES	ESA STATUS[1] AND REGIONAL OCCURRENCE	KEY HABITATS USED BY SPECIES IN ONTARIO	REASONABLE LIKELIHOOD OF PRESENCE IN STUDY AREA
Bank Swallow (*Riparia riparia*)	THR	It nests in a wide variety of naturally and anthropogenically created vertical banks, which often erode and change over time including aggregate pits and the shores of large lakes and rivers.	Moderate to High – This species may forage over the site and may nest along the banks of Cooksville Creek.
Barn Swallow (*Hirundo rustica*)	THR	This species prefers farmland; lake/river shorelines; wooded clearings; urban populated areas; rocky cliffs; and wetlands. They nest inside or outside buildings; under bridges and in road culverts; on rock faces and in caves etc.	Moderate – This species may forage over the site, although due to the absence of open structures is unlikely to use the site for nesting.
Bobolink (*Dolichonyx oryzivorus*)	THR	Generally prefers open grasslands and hay fields. In migration and in winter uses freshwater marshes and grasslands.	Low – The small size of the open habitat area and isolated nature of the site from other meadow or tall grass areas, suggest low potential for this species.
Chimney Swift (*Chaetura pelagica*)	THR	Historically found in deciduous and coniferous, usually wet forest types, all with a well-developed, dense shrub layer; now most are found in urban areas in large uncapped chimneys.	Moderate – This species may forage over the site, although due to the absence of tall structures with openings, is unlikely to use the site for nesting.
Eastern Wood-pewee (*Contopus virens*)	SC	Associated with deciduous and mixed forests. Within mature and intermediate age stands it prefers areas with little understory vegetation as well as forest clearings and edges.	Low to Moderate – This species may nest within the forested habitats on site.
Bald Eagle (*Haliaeetus leucocephalus*)	SC	Prefers deciduous and mixed- deciduous forest; and habitat close to water bodies such as lakes and rivers; They roost in super canopy trees such as Pine.	Low – This species is unlikely to use the site for nesting due to the absence of super canopy.
Wood Thrush (*Hylocichla mustelina*)	THR	Nests mainly in second-growth and mature deciduous and mixed forests, with saplings and well-developed understory layers. Prefers large forest mosaics, but may also nest in small forest fragments.	Low – The small size of the forested areas on site are unlikely to provide nesting habitat for this species.

SPECIES	ESA STATUS[1] AND REGIONAL OCCURRENCE	KEY HABITATS USED BY SPECIES IN ONTARIO	REASONABLE LIKELIHOOD OF PRESENCE IN STUDY AREA
Canada Warbler (*Cardellina canadensis*)	SC	Generally prefers wet coniferous, deciduous and mixed forest types, with a dense shrub layer. Nests on the ground, on logs or hummocks, and uses dense shrub layer to conceal the nest.	Low – The small size of the forested areas on site are unlikely to provide nesting habitat for this species.
Horned Grebe (*Podiceps auritus*)	SC	Nests in small ponds, marshes and shallow bays that contain areas of open water and emergent vegetation.	Low – Optimal habitat not present.
Peregrine Falcon (*Falco peregrinus*)	SC	Generally nest on tall, steep cliff ledges adjacent to large waterbodies; some birds adapt to urban environments and nest on ledges of tall buildings, even in densely populated downtown areas.	Low – This species is unlikely to use the site for nesting due to the absence of super canopyor tall buildings.
Henslow's Sparrow (*Ammodramus henslowii*)	END	Generally found in old fields, pastures and wet meadows. They prefer areas with dense, tall grasses, and thatch, or decaying plant material.	Low – The small size of the open habitat area and isolated nature of the site from other meadow or tall grass areas, suggest low potential for this species.
Monarch (*Danaus plexippus*)	SC	Exist primarily wherever milkweed and wildflowers exist; abandoned farmland, along roadsides, and other open spaces.	Moderate to High – Open areas / meadow habitat on site suggests potential for this species.
Little Brown Bat (*Myotis lucifugus*)	END	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal Roosts: Often associated with buildings (attics, barns etc.). Occasionally found in trees (25-44 cm dbh).	Moderate to High – The presence of forest and treed habitats on site suggests potential roosting habitat for this species.
Northern Long-eared Bat (*Myotis septentrionalis*)	END	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal Roosts: Often associated with cavities of large diameter trees (25-44 cm dbh). Occasionally found in structures (attics, barns etc.).	Moderate to High – The presence of forest and tree habitats on site suggests potential roosting habitat for this species.

SPECIES	ESA STATUS[1] AND REGIONAL OCCURRENCE	KEY HABITATS USED BY SPECIES IN ONTARIO	REASONABLE LIKELIHOOD OF PRESENCE IN STUDY AREA
Small-footed Bat (*Myotis leibii*)	END	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal Roosts: primarily under loose rocks on exposed rock outcrops, crevices and cliffs, and occasionally in buildings, under bridges and highway overpasses and under tree bark.	Moderate to High – The presence of forest and tree habitats on site suggests potential roosting habitat for this species.
Tri-colored Bat (*Perimyotis subflavus*)	END	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal Roosts: Manmade structures or tree cavities. Foraging over still water, rivers, or in forest gaps.	Moderate to High – The presence of forest and tree habitats on site suggests potential roosting habitat for this species.
Butternut (*Juglans cinerea*)	END	Generally grows in rich, moist, and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those made up of limestone. It is also found, though seldomly, on dry, rocky and sterile soils. In Ontario, the Butternut generally grows alone or in small groups in deciduous forests as well as in hedgerows.	Moderate to High – The forested area partly within and north of the northerly construction compound, and scattered trees across the site suggests potential for this species. The valleyland forest habitat (FOD7-3) did not have records of Butternut.
Snapping Turtle (*Chelydra serpentina*)	SC	Generally inhabit shallow waters where they can hide under the soft mud and leaf litter. Nesting sites usually occur on gravely or sandy areas along streams. Snapping Turtles often take advantage of man- made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.	Moderate– Cooksville Creek may offer suitable habitat for this species.

SPECIES	ESA STATUS[1] AND REGIONAL OCCURRENCE	KEY HABITATS USED BY SPECIES IN ONTARIO	REASONABLE LIKELIHOOD OF PRESENCE IN STUDY AREA
Blanding's Turtle (*Emydoidea blandingii*)	THR	Generally occur in freshwater lakes, permanent or temporary pools, slow- flowing streams, marshes and swamps. They prefer shallow water that is rich in nutrients, organic soil and dense vegetation. Adults are generally found in open or partially vegetated sites, and juveniles prefer areas that contain thick aquatic vegetation including sphagnum, water lilies and algae. They dig their nest in a variety of loose substrates, including sand, organic soil, gravel and cobblestone. Overwintering occurs in permanent pools that average about one metre in depth, or in slow-flowing streams.	Low – The presence of Cooksville Creek may offer potential habitat for this species; however, due to the absence of wetland habitats, potential is considered low.
Northern Map Turtle (*Graptemys geographica*)	SC	Generally inhabits both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation. These turtles need suitable basking sites (such as rocks and logs) and exposure to the sun for at least part of the day.	Low – The presence of Cooksville Creek may offer habitat potential for this species; however, due to the absence of wetland habitats, potential is considered low.
Eastern Musk Turtle (*Sternotherus odoratus*)	SC	Found in ponds, lakes, marshes and rivers that are generally slow- moving, have abundant emergent vegetation, and muddy bottoms. Nesting is in soil, decaying vegetation and rotting wood close to the water and exposed to direct sunlight.	Low – The presence of Cooksville Creek may offer habitat potential for this species; however, due to the absence of wetland habitats, potential is considered low.
Western Chorus Frog (*Pseudacris triseriata*)	(THR) Federal Protection	This species is primarily a lowland, terrestrial species, found on the ground or on low bushes and herbage. They commonly prefer moist, open habitats, including; marshes and damp fallow lands, woodlands, meadows and cultivated fields. This species hibernates in terrestrial habitats under rocks, logs, leaf litter, loose soil, or animal burrows, but hibernation sites are sometimes flooded. Breeding habitats include open-canopy small or shallow aquatic habitats such as ditches, marshes, flooded fields and pastures, temporary ponds and pools, and swamps.	Low to Moderate – the absence of wetland areas and distinguishable wet depressions within the aerial imagery suggests this species is unlikely to occur on site.

SPECIES	ESA STATUS[1] AND REGIONAL OCCURRENCE	KEY HABITATS USED BY SPECIES IN ONTARIO	REASONABLE LIKELIHOOD OF PRESENCE IN STUDY AREA
Jefferson Salamander (*Ambystoma jeffersonianum*)	END	Inhabit deciduous and mixed deciduous forests with suitable breeding areas which generally consist of ephemeral (temporary) bodies of water that are fed by spring runoff, groundwater, or springs.	Low to Moderate – the absence of wetland areas and distinguishable wet depressions within the aerial imagery suggests this species is unlikely to occur on site.

[1] END: Endangered; THR: Threatened; SC: Special Concern

4.6.4 PRELIMINARY IMPACT ANALYSIS

Trenchless methods will be used to install the sewer under Cooksville Creek and therefore impacts will be limited to the areas of the two construction compounds and new access road. Fish and wildlife occurring within the valleyland system will generally remain undisturbed. Measures to exclude wildlife and potential SAR from the construction compounds, such as siltation fencing, will also function to capture debris and manage runoff.

Monarch has potential to occur within the construction compound areas. Through application of standard mitigation practices, including limiting vegetation removal during the spring and summer months, impacts to this species can be avoided.

The Endangered Species Act (ESA) protects species and habitat of species designated as Threatened or Endangered. Based on the results of this desktop review, SAR bats and Butternut are thought to have potential to occur within or adjacent to the site and may be impacted by the proposed works. As it relates to SAR bats, the treed area occurring partly within the northern compound is narrow and may function similar to a hedgerow feature. In WSP's experience through previous consultation with MECP, hedgerows provide less valuable roosting habitat than that found within larger forested areas, and as such, removal of these trees is not expected to pose a constraint to development, provided removals occur outside of the bat active period (i.e., tree removals should occur between October 1 and March 31 of any given year). Construction plans should consider the potential for these species to occur on site and at a minimum include the mitigation recommendations outlined in the following section.

4.7 GEOMORPHOLOGY

As part of the Beechwood SPS project, WSP retained PARISH Aquatic Services (PARISH) to provides fluvial geomorphic expertise and recommendations for replacement of the existing siphons. PARISH's findings and recommendations were documented in the report, Cooksville Creek Geomorphic Assessment: Recommendations Regarding Sanitary Sewer Works, submitted in April 2015. The report is included in Appendix B-1. The key findings and recommendations are summarized below.

- The channel valley corridor is approximately 35 m wide, extending for a couple metres into the floodplain beyond the top-of-bank.
- Bankfull widths measured across riffle sections ranged from 12 m to 15 m wide. The measured bankfull widths measured were narrower than previously recorded values due to ice-cover limiting measurement capabilities.
- Bankfull depths measured ranged from 0.4 m to 0.55 m deep. Pool depths were not measured due to ice-cover.
- Rapid Stream Assessment Technique results yielded an overall score of 24 out of 50; Cooksville Creek is classified to be in Moderate condition.

- Rapid Geomorphic Assessment results yielded a Stability Index of 0.32; Cooksville Creek is classified to be in Transitional condition.
- Erosion along the bed was estimated at a maximum of 1.14 m to a minimum of 0.43 m over the course of 50 years. Changes in bed erosion indicate that there is a high likelihood that the siphons become exposed within the next 50 years, assuming a conservative erosion rate of 0.01 m per year.
- The proposed sewer pipe shall be placed at a depth of 2 m below the channel bed, assuming a continued erosion rate of 0.01 m per year. The timeline for this extent of bed erosion well exceeds the 100-year planning horizon. Removal of the existing siphons after decommissioning is not recommended.
- The existing maintenance hole, located along the right bank, immediately upstream of the storm sewer outfall, is at risk for exposure within the next 10 to 15 years should current conditions continue. The proposed maintenance hole shall be located 6 m away from the existing top of bank. The bank is expected to erode into the proposed maintenance hole within the 100-year planning horizon, thus secondary protection measures shall be installed.

4.8 LANDSCAPING WORKS

Landscaping works were recently completed in the Greenlands zone bounded by Cooksville Creek to the west, C.N. Rail tracks the north, Beachcomber Road to the east and Lakeshore Road East to the south. The landscaping works included regrading and vegetation as well as the installation of pits and mounds bordering Cooksville Creek. The pits and mounds consist of berms and depressions which improve the naturalized aesthetic of the area.

The landscaping plan (JSW and Associates, 2015) can be referred to in Appendix B-2.

4.9 ARCHAEOLOGICAL ASSESSMENT

Substantial area to the west of Cooksville Creek was disturbed during the recent construction of the Beechwood SPS. To the east of Cooksville Creek, the lands were recently excavated and landscaped. An Archaeological Assessment is not expected to be required for this project.

4.10 TRAFFIC IMPACT ASSESSMENT

Lakeshore Road East is an urban arterial roadway within the jurisdiction of the City of Mississauga with four travel lanes and sidewalks on both sides. Within the Study Area, the posted speed limit on Lakeshore Road East is 50 km/h. Beachcomber Road and Beechwood Avenue are local side roads with two travel lanes with a posted speed limit of 40 km/h. Beachcomber Road has a sidewalk on one side of the road, while Beechwood Avenue has sidewalks on both sides.

The preferred alternative requires construction vehicle access through Beachcomber Road and Beechwood Avenue without any major traffic constraints to Lakeshore Road East. The proposed construction works will not be taking place in the roadway; however, construction vehicles may utilize a single lane on Beachcomber Road and Beechwood Avenue during construction. No significant impacts are expected on traffic operations during construction. A Traffic Impact Assessment shall be completed during the detailed design phase of this project.

5 PHASE 2: ALTERNATIVE SOLUTIONS

This section describes the process undertaken to identify, develop and evaluate alternative solutions to address the problem/opportunity statement identified in Phase 1 of the Class EA. Alternative solutions were identified, screened, and evaluated to identify the preferred solution. This was achieved following the completion of the baseline inventory of natural, social, and economic factors.

5.1 IDENTIFICATION OF ALTERNATIVE OPTIONS

Various high-level options ("Alternative Options") to address the problem were identified. A detailed review of the alternatives was provided in Technical Memorandum 1 – List of Alternatives for the Claredale EA Project (WSP, 2020) and can be referred to Appendix C-2. These alternatives include the "Do Nothing" option that are typically used as a baseline for comparison in Class EAs. The alternatives are described in Table 5–1.

Table 5–1 Screening of Alternative Options

OPTION	DESCRIPTION	SCREENING
Alternative 1: **Do Nothing**	The Municipal Class Environmental Assessment document indicates that the "Do Nothing" option should be considered. In the "Do Nothing" option, no improvements or changes would be made to solve the identified problem or opportunity (MEA, 2015).	Alternative 1 does not address current condition, capacity, and operational issues associated with the siphons.
Alternative 2: **Inflow and Infiltration Reduction**	This strategy involves limiting growth within the Claredale neighbourhood. No improvements of changes would be made to solve the identified problem or opportunity.	Alternative 2 may address the capacity issues associated with the siphons but does not address condition and operation-related concerns.
Alternative 3 **Rerouting of Flows from the Claredale Road Sanitary Catchment**	This strategy involves installing a new sewer to reroute flows from the Claredale Road sanitary catchment, bypassing the existing siphons.	Alternative 3 fully addresses the concerns related to the condition, capacity and operation of the siphons and is therefore, carried forward for further evaluation.

Under Alternative 3, various alternative sewer alignments were identified. To determine the limits of the existing sewer that requires replacement, WSP conducted a hydraulic analysis, modelling existing and potential proposed sewer alignments. The results of this analysis are documented in Technical Memorandum: Claredale EA Project – Hydraulic Analysis (WSP, 2020), and can be referred to in Appendix C-1. Based on the analysis results, it was determined that replacement of the sewer starting south of the C.N. Rail tracks is sufficient for addressing the problem statement. As such, two alternative sewer alignments were identified.

Both alternatives involve decommissioning the existing siphons. As the existing siphons cross under Cooksville Creek, removal of the siphons would result in significant environmental impacts to Cooksville Creek. Furthermore, based on the findings of the Geomorphic Assessment, the siphons are estimated to become exposed within the next 50 years, representing a low risk of exposure within the near future. Rather than remove the siphons, the siphons shall be decommissioned by means of filling the entire length of pipe with grout and then plugging or capping the pipe ends. The decommissioning strategy for the siphons will be reviewed further during detailed design.

Both alternatives will also involve decommissioning of the existing maintenance holes along the existing sewer alignment. Removal of the existing maintenance holes proximate to the banks of Cooksville Creek would result in significant environmental impacts to Cooksville Creek. During detailed design, the existing maintenance holes will be reviewed with respect to their risk of exposure and the maintenance holes deemed to be a high risk of exposure will be decommissioned. In particular, the maintenance hole on the east bank of Cooksville Creek was identified in the Geomorphic Assessment as being at risk for exposure within the next 10 to 15 years and will certainly require decommissioning. Generally, the maintenance holes will be decommissioned by means of filling the maintenance

hole with grout, removing the top riser sections and burying the maintenance hole. The decommissioning strategy for the maintenance holes will be reviewed further during detailed design.

Alternative 3A

- Installation of a new sewer connecting to an existing maintenance hole south of the C.N. Rail tracks, then crossing Cooksville Creek with connection to Beechwood SPS.

Alternative 3B

- Installation of a new sewer connecting to an existing maintenance hole south of the C.N. Rail tracks with connection to the future Lakeshore Road East sewer.

Upon initial review, both Alternatives 3A and 3B are deemed feasible and are carried forward for further evaluation.

5.1.1 ALTERNATIVE 3A

5.1.1.1 GENERAL

Alternative 3A involves rerouting flows from the Claredale Road sanitary catchment via a new 300 mm gravity sewer which connects to existing maintenance hole SMH-1783489 and crosses under Cooksville Creek, discharging into existing MH-2A, located southeast of Beechwood SPS.

To connect the Claredale sewer network to MH-2A via the new 300 mm gravity sewer, two new maintenance holes will be constructed:

- One maintenance hole within the open space south of the C.N. Rail tracks, east of Cooksville Creek; and,
- One maintenance hole immediately upstream of MH-2A, west of Cooksville Creek.

The maintenance holes will be situated such that there is sufficient clearance between the proposed sewer alignment and existing siphons and Beechwood sewage pumping station. The depth of the proposed sewer will be approximately 8 to 10 metres below the existing surface grade, ensuring the obvert of the proposed sewer crossing Cooksville Creek is greater than 2 m below the invert of Cooksville Creek at the location of crossing.

A permanent access road to MH1 will be installed for maintenance purposes. The access road will be comprised of permeable pavers suitable for flushing and CCTV truck loading.

A key plan of the proposed sanitary sewer alignment is shown in Figure 5-1. As shown on the key plan, there will be sufficient clearance between the proposed sewer and the existing siphon, allowing the existing sewers to remain operational during construction.

5.1.1.2 CONSTRUCTION METHODOLOGY

To limit disruption to the watercourse, microtunneling (MTBM) is proposed for the installation of the new gravity sewer crossing under the Cooksville Creek. A MTBM with a minimum inside pipe diameter of 900 mm will be required to complete the proposed tunnel drive length. The proposed sewer crossing Cooksville Creek will be constructed within a protective 900 mm liner.

To take advantage of the existing access road to Beechwood SPS, it is proposed that the microtunnel entry shaft be located at MH2 and the exit shaft be located at MH1. Due to the short connection distance, open cut construction will be utilized for the sewer between SMH-1783489 and MH1, and between MH2 and MH-2A.

Site access and egress to the construction compound for proposed MH1 will be via Beachcomber Road (south of the tracks, east of the Creek) and a newly constructed access road extending off Beachcomber Road.

The proposed compound for MH2 adjacent to MH-2A will be located on the Beechwood SPS site (south of the tracks, west of the Creek) which allows for access from Lakeshore Road for construction equipment and materials.

Since the proposed infrastructure will only convey flows from the Claredale Road catchment, the sewer on Claredale Road can remain live until final connections of the proposed sewer are completed. Sanitary bypass pumping will be required for the final connection.

The estimated duration of construction work is approximately 6 months.

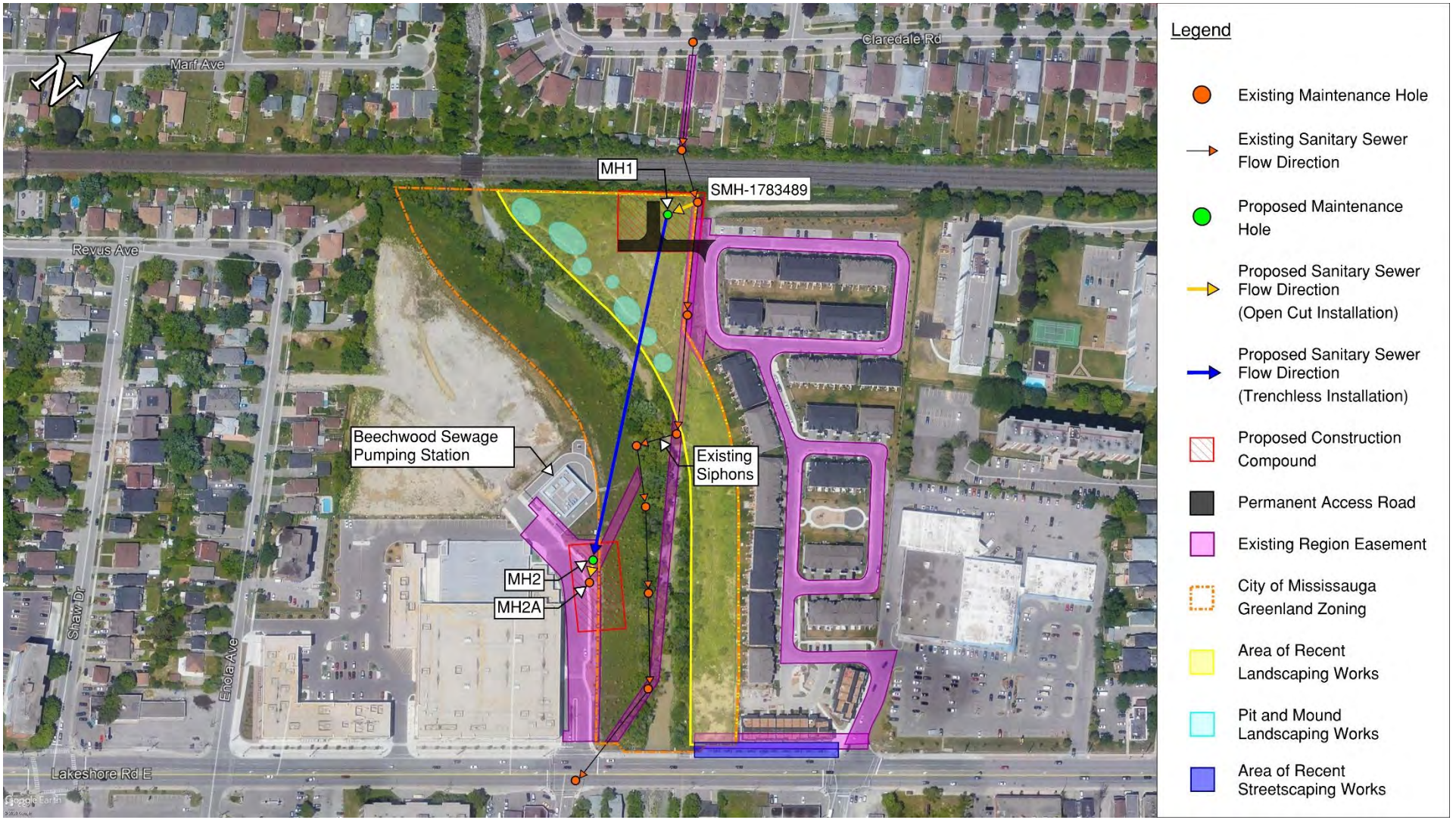


Figure 5-1: Alternative 3A – Key Plan

5.1.2 ALTERNATIVE 3B

5.1.2.1 GENERAL

Alternative 3B involves rerouting flows from the Claredale Road sanitary catchment via a new 300 mm gravity sewer which connects to existing maintenance hole SMH-1783490 and travels southwards discharging into a new maintenance hole which will connect to the future Lakeshore Road East sewer. The future Lakeshore Road East sewer, to be completed under a separate Region project, will extend from Aviation Road to Beechwood Avenue, requiring a crossing at Cooksville Creek.

A permanent access road to MH1 will be installed for maintenance purposes. The access road will be comprised of permeable pavers suitable for flushing and CCTV truck loading.

A key plan of the proposed sanitary sewer alignment is shown in Figure 5-2. As shown on the key plan, there will be sufficient clearance between the proposed sewer and the existing siphon, allowing the existing sewers to remain operational during construction.

To connect the Claredale sewer network to the future Lakeshore Road East sewer via the new 300 mm gravity sewer, two new maintenance holes will be constructed:

- One maintenance hole adjacent to existing SMH 1783490; and,
- One maintenance hole along Lakeshore Road East, east of Cooksville Creek.

The depth of the proposed sewer will be approximately 7 to 9 metres below grade.

Maintenance hole MH2 is to be constructed as part of a separate Region project. As such, implementation of this alternative is constrained by completion of the new gravity sewer on Lakeshore Road East from Aviation Road to Beechwood Avenue.

5.1.2.2 CONSTRUCTION METHODOLOGY

To limit disruption to existing at-grade infrastructure, microtunneling is proposed to be used to install the new gravity sewer. A MTBM with a minimum inside pipe diameter of 900 mm will be required to complete the proposed tunnel drive length. As the proposed sewer will be travelling adjacent to, but not crossing Cooksville Creek, construction complexity will be reduced.

As the microtunnel entry compound has additional spatial and equipment-related requirements compared to the exit compound, it is proposed that MH1 be used as the entry shaft and MH2 for the exit shaft.

Site access and egress to the construction compound for the entry shaft will be via Beachcomber Road and a newly constructed access road extending off Beachcomber Road.

Since the proposed infrastructure will only convey flows from the Claredale Road catchment, the sewer on Claredale Road can remain live until final connections of the proposed sewer are completed. Sanitary bypass pumping will be required for the final connection.

The proposed compound for MH2 along Lakeshore Road East will be accessible via Lakeshore Road East. A section of the north side of Lakeshore Road East proximate to the construction compound will likely have to be closed for the duration of construction, estimated at 6 months.

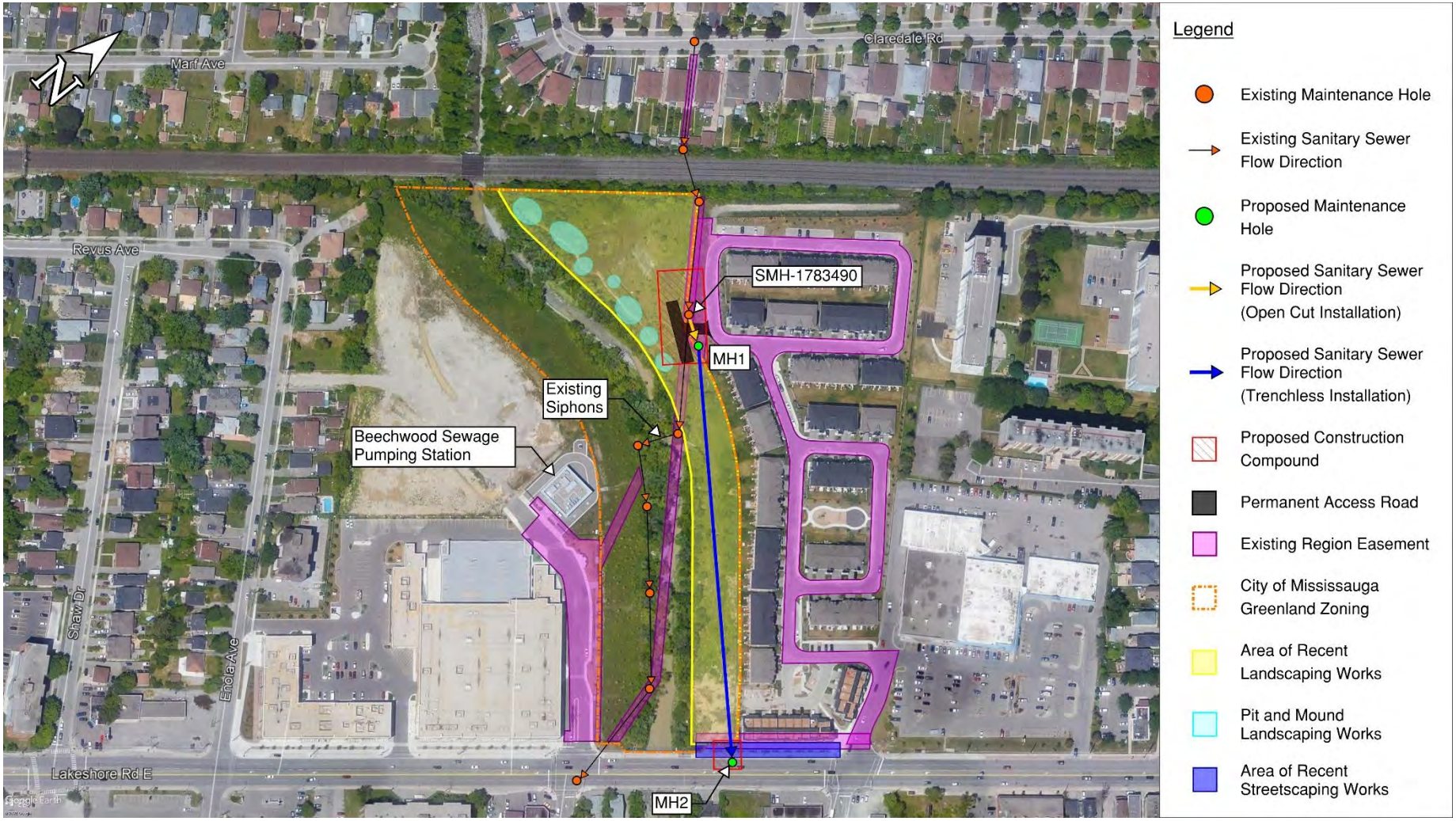


Figure 5-2: Alternative 3B – Key Plan

5.2 COMPARATIVE EVALUATION OF ALTERNATIVE SOLUTIONS

The following sub-sections describe the evaluation process that was used to select the preferred alternative. Also included is an overview of how each alternative solution was evaluated, including a summary of the advantages, disadvantages or key considerations for each alternative solution.

5.2.1 APPROACH TO EVALUATION OF ALTERNATIVE SOLUTIONS

The objective of the evaluation process is to identify and recommend a preferred solution. The preferred solution is the alternative that best satisfies the Problem Statement based on the evaluation criteria. The evaluation of the alternatives was documented in Technical Memorandum 2 – Analysis of Alternatives for the Claredale EA Project (WSP, 2020) and can be referred to Appendix C-3.

A set of evaluation criteria were identified based on various technical inputs, and grouped under four main categories as follows:

Table 5–2 Evaluation Criteria Descriptions

EVALUATION CRITERIA	DESCRIPTION
Technical	Component that considers the technical suitability and other engineering aspects of the sanitary system.
Natural Environment	Component having regard for protecting the natural and physical components of the environment (i.e., air, land, water and biota), including natural heritage and environmentally sensitive areas.
Social / Cultural	Component that evaluates potential effects on residents, neighbourhoods, businesses, community character, social cohesion, community features and historical/archaeological and heritage components.
Economic / Financial	Component that compares the potential financial costs.

Under each of the four main categories, specific criterion were developed. A list of criterion and corresponding definitions is provided in Table 5–3.

Each criterion was assigned a weighting relative to its importance to the project. A criterion with a higher weighting was considered to have greater importance to the project.

Based on an assessment of expected impacts and existing studies, the alternatives were then comparatively evaluated. Under each criterion, the alternatives were assigned a numerical score, ranging from one (1) to three (3). An alternative assigned a score of 1 is least preferred, while a score of 3 is most preferred.

Table 5–4 shows the colour-coded evaluation legend for the evaluation matrix in Table 5–5.

Under each criterion, the weighted score was calculated as the product of the assigned weighting and score. The final score for each alternative was calculated as the sum of all weighted scores. The alternative with the higher final score was determined to be the preferred solution.

Table 5–3 Criteria for Evaluating Alternative Solution

EVALUATION CRITERIA	DEFINITION
Natural Environment Considerations	
Proximity to Environmentally Sensitive Areas including Impact to Species at Risk	Means potential for adverse impact(s) to features and areas, which may include significant wetlands, fish habitat, significant woodlands, habitat of endangered species and threatened species, wildlife habitat, and significant areas of natural and scientific interest, which are important for their environmental and social value as a legacy of the natural landscape area (adopted from PPS, 2014). Means potential for adverse impact(s) to features and land forms which include the habitat for species identified as at risk by the Province, in accordance with O. Reg. 230/08.
Impact to Watercourses	Means potential for adverse impact(s) to watercourses and associated tributaries, including ground water and surface water features, to ensure hydrologic functions and linkages are maintained.
Impact to Shrubbery and Other Vegetation	Means the potential for disruption or removal of shrubbery and other vegetation to accommodate the proposed works.
Potential for Contamination	Means the potential for contamination for each alternative.
GHG Emissions & Carbon Footprint	Means the potential for greenhouse gas emissions and overall carbon footprint of the work.
Social & Cultural Environment Considerations	
Impact to Cultural Heritage Resources	Means the potential for adverse impacts identified as having cultural heritage value or interest by a community, including an Indigenous community. The area may involve features such as structures, spaces, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association (adapted from PPS, 2014).
Land Use / Zoning Compliance	Means the compliance with Provincial, Regional, Municipal, and other agency policies, plans, and regulations. This framework controls the use of land and directs development to appropriate locations. This criterion will also consider the extent of any required amendments to land use or zoning regulations.
Traffic Impacts during Construction	Means the severity of adverse construction impacts on adjacent land uses, specifically traffic congestion.
Noise Impacts during Construction	Means the severity of adverse construction impacts on adjacent land uses, specifically noise pollution.
Dust Impacts during Construction	Means the severity of adverse construction impacts on adjacent land uses, specifically dust.
Removal of Recreational Space (Private or Public)	Means the amount of private or public recreational space which will be removed for both the pumping station and forced main alignment.
Economic Considerations	
Capital Costs	Means the capital costs required to acquire land, obtain necessary approvals and permits, and construct each option.
Life Cycle (Maintenance) Costs	Means the project life cycle (maintenance) costs of each alternative including operational costs such as electricity usage.
Technical Considerations	
Constructability	Means challenges or risks associated with undertaking construction.
Impact to Existing Utilities	Means the impact of each alternative to existing utilities. An alignment within an existing road right-of-way will have a greater impact on existing utilities.
Permits and Approvals	Means the ability to obtain and number of required permits and approvals for the project (ex. – conservation authority, C.N. Rail).

Table 5–4 Evaluation Legend

SCORE	DEFINITION AND COLOUR-CODING
1	Least Preferred
2	Less Preferred
3	Most Preferred

Table 5–5 Evaluation Matrix

		ALTERNATIVE 3A			ALTERNATIVE 3B		
	WEIGHTING	**RATIONALE**	**SCORE**	**WEIGHTED SCORE**	**RATIONALE**	**SCORE**	**WEIGHTED SCORE**
Natural Environment Considerations							
Proximity to Environmentally Sensitive Areas including Impact to Species at Risk	3	Per City of Mississauga Zoning By-law 0225-2007, the proposed sewers will be installed on lands classified as G1: Greenlands – Natural Hazards Zone. SAR Screening identified 23 species at risk as known or having potential to occur within or adjacent to the site. Per the most recent City of Mississauga Natural Areas Survey (2016) and updated mapping (2019), several species of vegetation and wildlife were identified as having potential to occur within the site, including 2 locally rare species and 3 locally uncommon species of vegetation. The construction compounds are outside the FOD7-3 community and do not contain woodlands in excess of 5 ha in size, typically associated with Migratory Landbird SWH. Per CVC and MNRF records and mapping, several fish were documented within Cooksville Creek. As a majority of the new sewer will be installed using microtunneling, impact to vegetation and wildlife will be limited. In addition, as the sewer will cross Cooksville Creek using microtunneling with sufficient clearance below the creek bed, the watercourse will not be directly impacted by construction. Mitigation measures will be conducted during construction to minimize impacts the natural environment.	2	6	Per City of Mississauga Zoning By-law 0225-2007, the proposed sewers will be installed on lands classified as G1: Greenlands – Natural Hazards Zone. SAR Screening identified 23 species at risk as known or having potential to occur within or adjacent to the site. Per the most recent City of Mississauga Natural Areas Survey (2016) and updated mapping (2019), several species of vegetation and wildlife were identified as having potential to occur within the site, including 2 locally rare species and 3 locally uncommon species of vegetation. The construction compounds are outside the FOD7-3 community and do not contain woodlands in excess of 5 ha in size, typically associated with Migratory Landbird SWH. Per CVC and MNRF records and mapping, several fish were documented within Cooksville Creek. As a majority of the new sewer will be installed using microtunneling, impact to vegetation and wildlife will be limited. In addition, as the sewer will cross Cooksville Creek using microtunneling with sufficient clearance below the creek bed, the watercourse will not be directly impacted by construction. Mitigation measures will be conducted during construction to minimize impacts the natural environment.	2	6
Impact to Watercourses	3	The proposed sewer rerouting flows from the Claredale sanitary catchment will cross Cooksville Creek via microtunneling with sufficient clearance below the creek bed. The new Lakeshore Road East sewer (under separate Region project) will also cross Cooksville Creek. The watercourse will not be directly impacted by construction, however there will ultimately be 2 separate sewer crossing Cooksville Creek.	2	6	The proposed sewer will connect to a new Lakeshore Road East sewer (under separate Region project) which will cross Cooksville Creek via microtunneling with sufficient clearance below the creek bed. The watercourse will not be directly impacted by construction.	3	9
Impact to Shrubbery and other Vegetation	2	As a majority of the new sewer will be installed using microtunneling, impact to vegetation will be limited. Shrubbery and vegetation will be impacted by the construction compounds and open cut works at MH1 and MH2. Restoration works will be required after construction is complete.	2	4	As a majority of the new sewer will be installed using microtunneling, impact to vegetation will be limited. Shrubbery and vegetation will be impacted by the construction compounds and open cut works at MH1 and MH2. Restoration works will be required after construction is complete.	2	4
Potential for Contamination	2	There is an inherent potential for contamination associated with construction of a new sanitary sewer and decommissioning of existing sanitary sewers.	2	4	There is an inherent potential for contamination associated with construction of a new sanitary sewer and decommissioning of existing sanitary sewers.	2	4
GHG Emissions & Carbon Footprint	2	Greenhouse gases will be emitted by the operation of heavy construction vehicles throughout the duration of construction.	2	4	Greenhouse gases will be emitted by the operation of heavy construction vehicles throughout the duration of construction.	2	4
Sub-Total		**24**			**27**		
Social & Cultural Environment Considerations							
Impact to Cultural Heritage Resources	2	Per the City of Mississauga Natural Areas Survey (2008), the area surrounding the Creek is residential and industrial with no cultural heritage resources identified.	3	6	Per the City of Mississauga Natural Areas Survey (2008), the area surrounding the Creek is residential and industrial with no cultural heritage resources identified.	3	6
Land Use / Zoning Compliance	2	Per Section 2.1.1 of the City of Mississauga Zoning By-law 0225-2007, the proposed sewer construction works are generally exempt from the requirements of the By-law.	3	6	Per Section 2.1.1 of the City of Mississauga Zoning By-law 0225-2007, the proposed sewer construction works are generally exempt from the requirements of the By-law.	3	6
Traffic Impacts during Construction	3	There will be construction vehicle traffic through Beachcomber Road and Beechwood Avenue. As the entry shaft will be located off Beechwood Avenue, traffic impacts to Beachcomber Road will be reduced.	3	9	As the entry shaft will be located off Beachcomber Road, heavy vehicle traffic through Beachcomber Road will be greater than Alternative 3A. There will be traffic disruptions along Lakeshore Road East as MH2 is located in the westbound lanes. A section of the Lakeshore Road East westbound lanes will be closed for the duration of construction, estimated at 6 months. Impacts will require mitigation through scheduling and traffic management.	1	3
Noise Impacts during Construction	3	The entry shaft location has additional spatial and equipment requirements compared to the exit shaft location. As the entry shaft will be located off of Beechwood Avenue, noise impacts to residents on Beachcomber Road will be reduced.	2	6	The entry shaft location has additional spatial and equipment requirements compared to the exit shaft location. As the entry shaft will be located off of Beachcomber Road, there will be greater noise impacts to residents on Beachcomber Road compared to Alternative 3A. In addition, there will be significant noise impacts to the businesses proximate to the construction works along Lakeshore Road East.	1	3
Dust Impacts during Construction	2	The entry shaft location has additional spatial and equipment requirements compared to the exit shaft location. As the entry shaft will be located off of Beechwood Avenue, dust impacts to residents on Beachcomber Road will be reduced.	2	4	The entry shaft location has additional spatial and equipment requirements compared to the exit shaft location. As the entry shaft will be located off of Beachcomber Road, there will be greater dust impacts to residents on Beachcomber Road compared to Alternative 3A. In addition, there will be significant dust impacts to the businesses proximate to the construction works along Lakeshore Road East.	1	2
Removal of Recreational Space (Private or Public)	2	No removal of recreational space, either private or public, is anticipated.	3	6	No removal of recreational space, either private or public, is anticipated.	3	6
Sub-Total		**37**			**26**		
Economic Considerations							

		ALTERNATIVE 3A			ALTERNATIVE 3B		
	WEIGHTING	**RATIONALE**	**SCORE**	**WEIGHTED SCORE**	**RATIONALE**	**SCORE**	**WEIGHTED SCORE**
Capital Costs	3	The high-level conceptual construction cost estimate for the proposed works, including permitting and traffic management is approximately $3,500,000.	3	9	The high-level conceptual construction cost estimate for the proposed works, including permitting and traffic management is approximately $4,000,000. Please note that this cost estimate does not include the cost of the new Lakeshore Road East sewer which will be completed as a separate project.	2	6
Life Cycle (Maintenance) Costs	2	As the design life of a gravity sewer is typically between 80 and 100 years, life cycle (maintenance) costs for a gravity sewer is negligible.	3	6	As the design life of a gravity sewer is typically between 80 and 100 years, life cycle (maintenance) costs for a gravity sewer is negligible.	3	6
Sub-Total		**15**			**12**		
Technical Considerations							
Constructability	3	By situating the entry shaft off of Beechwood Avenue, there will be sufficient space for the construction compound and site access will not be constrained.	3	9	The construction compound for MH2 will be located along Lakeshore Road East, resulting in spatial constraints for the construction compound and site access challenges. Construction of Alternative 3B will be delayed and coordination challenges are expected to occur as construction of this alternative is dependent upon completion of the new Lakeshore Road East sewer (under separate Region project).	1	3
Impact to Existing Utilities	2	Minimal impact to utilities due to a large portion of construction occurring on or close to the Beechwood SPS site.	3	6	Due to the proximity to Lake Shore East, there is a potential for impact to utilities such as existing communication cable.	2	4
Permits and Approvals	2	Permits and approvals will be required of the MECP for construction of a new sanitary sewer, City of Mississauga for an easement for construction in the Greenlands zone, and the CVC for works in the Cooksville Creek floodplain.	3	6	Permits and approvals will be required of the MECP for construction of a new sanitary sewer, City of Mississauga for road occupancy and an easement for construction in the Greenlands zone, and the CVC for works in the Cooksville Creek floodplain.	3	6
Sub-Total		**21**			**13**		
TOTAL		**97**			**78**		

6 EVALUATION SUMMARY

6.1 PREFERRED SOLUTION

Alternative 3A is more favourable socially and culturally with significantly less impacts to traffic, dust and noise during construction as compared to Alternative 3B. Alternative 3A was also slightly more favourable from a cost perspective as the total sewer length is shorter and the less traffic management is required than Alternative 3B. From a technical standpoint, Alternative 3A was also more favourable in terms of constructability and impact to existing utilities.

Based on the comparative analysis, Alternative 3A had an overall higher score than Alternative 3B. This preferred solution best addresses the Problem Statement based on available technical input and evaluation. Thus, Alternative 3A is the preferred alternative solution.

6.2 CONSTRUCTION COST ESTIMATE

A construction capital cost estimate was completed for the preferred solution. No land acquisition costs are expected for Alternative 3A, although a sewer easement will need to be arranged with the City of Mississauga for the works within the Greenlands zone. A high-level conceptual construction cost estimate is presented in Table 6-4 below. Permitting and traffic management costs are not included. Additionally, as the design life of a gravity sewer is typically between 80 and 100 years, life cycle (maintenance) cost for a gravity sewer is negligible.

Table 6–1 Construction Cost Estimate

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
Shaft/MH1	10	m (depth)	$60,000	$600,000
300mm Sewer MH1 to SMH-1783489 - open cut	10	m	$1,500	$15,000
300mm Sewer MH2 to MH1 - microtunnel	235	m	$9,000	$2,115,000
Shaft/MH2	10	m (depth)	$60,000	$600,000
			Total	**$3,330,000**

7 IMPACT MITIGATION MEASURES

A review of existing conditions and consultation with affected landowners identified potential impacts associated with the construction of the proposed sanitary sewer. The potential impacts and mitigation measures to be carried forward into detailed design and construction to eliminate or lessen the potential impacts is listed below.

Construction plans should be developed with consideration for the ecological sensitivities on site, including the features of the Natural Heritage System, fish habitat, and candidate SAR habitat.

Through application of the following mitigation measures and recommendations, impacts to the natural environment will be minimized.

Table 7–1 Mitigation Measures for Proposed Sanitary sewer

POTENTIAL IMPACTS	MITIGATION MEASURES
Impact to Watercourses	Microtunneling as opposed to open cut trench will be used to lay the new sewer below the creek. Sufficient clearance below the creek bed will also be provided to ensure no impact to the watercourse.
Impact to Wildlife	Wildlife encountered on the Site should remain undisturbed and be allowed to leave on their own. Photos for identification should be taken of animals observed onsite, if possible. If Threatened or Endangered species are discovered during construction, operations should stop, or be modified to avoid negative impacts to Species at Risk until further direction is provided by the MECP.
Contaminated Soil Disposal and Spills Prevention	Re-fueling of equipment and fuel storage should be conducted in designated areas (potentially off-site) with spill protection.
Traffic Management	A Traffic Management Plan should be developed to minimize interference with the flow of traffic due to construction activities. The plan may include advance public notice of routing, signage, scheduling operations affecting traffic for off-peak hours; providing a flag person to guide traffic properly and ensure safety at construction sites. The plan will be completed prior to construction, in accordance with the Highway Traffic Act 1990. Construction works impacting roadways will be minimized wherever possible.
Dust, Noise and Vibration	Temporary nuisance of noise during construction and other activities to be considered including hours of operation in accordance with City By-laws; use of vehicles/ machinery and equipment that are in good repair, equipped with emission controls, as applicable. Construction work hours will comply with the City of Mississauga noise by-law, limiting work from Monday to Saturday, between 7:00 a.m. to 7:00 p.m. Dust control measures may include wetting surfaces using a non-chloride-based compound to protect water quality.
Vegetation Impacts, including Tree Removal and Excavation Adjacent to Retained Trees	Vegetation removal should be limited as much as possible. Tree removal, vegetation clearing, and grubbing should be completed between October 1 to March 31 to prevent incidental impacts to roosting bats, and nesting migratory birds, which are protected under the Migratory Birds Convention Act (MBCA, 1994). If vegetation clearing / grubbing cannot be completed during this period, it must be preceded by nest sweeps conducted by a wildlife specialist within 48 hours (ideally 24 hours) prior to the work.

POTENTIAL IMPACTS	MITIGATION MEASURES
Erosion and/or Sedimentation Impacts	Soils will be stockpiled and conserved for reapplication during the rehabilitation phase as a substrate for plant growth. A native seed mix will be applied to disturbed areas in accordance with the supplier. An Erosion and Sedimentation Control (ESC) Plan will be developed for the proposed works. Exclusion fencing (e.g. erosion and sediment control (ESC) fencing) should be used to prevent access by turtles into the construction zone and stockpiling areas. The use of fencing with nylon mesh backing should be avoided to prevent the entanglement of snakes or other wildlife. The fencing should be placed between the watercourse and construction compounds. This fencing will also serve to capture debris and limit potential siltation impacts on the watercourse. Erosion control measures shall be installed to protect exposed surfaces, control run-off and minimize the deposition of silt or suspended sediments due to site clearly, stockpiling, excavation and general construction. Temporary mitigation measures will be installed prior to the commencement of any site clearing, grubbing, excavation, filling or grading works and will be maintained on a regular basis. All disturbed areas should be re-vegetated as soon as possible following disturbance to stabilize the area and minimize erosion potential. Disturbed areas within the Special Management Area (Figure 1), should be restored upon completion of the works. Restoration should include decompaction of soils, application of topsoil, and treatment with an approved seed mix that is appropriate for the site conditions. Permeable pavers should be considered for permanent access roads within the Special Management Area.
Aesthetic Impacts	Landscaping, vegetation and architectural features will be included in the design to restore to original condition.
Utility Relocation	Should utility relocations be required during construction of the sewer, it shall be coordinated with appropriate utility companies during detailed design.

In addition, the following measures should be a condition of construction:

- A site assessment completed by a qualified individual to ensure that the areas to be disturbed and associated 50 m buffer be surveyed for Butternut trees and trees which have potential to support roosting bats. Where either are detected, MECP should be contacted to determine if additional assessments or authorizations under the Endangered Species Act may be required.
- Locally rare and uncommon species, including Cockspur Hawthorn, Foxglove Beardtongue, Canada Plum, Mountain Ash and Down Willow Herb may occur within the area of the construction compounds and access road. It is recommended that a qualified botanist survey the area to be disturbed during the appropriate season to confirm the presence or absence of these species. If confirmed present, further consultation should be undertaken with the CVC to confirm the next actions, such as transplanting.
- Any in-water crossing whether crossing through, over or under a watercourse warrants further consideration to confirm compliance with the Fisheries Act. Detailed design should consider measures to protect fish and fish habitat.

8 PUBLIC AND AGENCY INPUT

8.1 AGENCY INPUT ON INITIAL FINDINGS

The following Table 8–1 summarizes input received from agencies during project initiation. The complete meeting notes and comment logs can be referred to in Appendix A-1.

Table 8–1 Summary of Input on Initial Findings

SOURCE OF INPUT	INPUT RECEIVED
Meeting Notes, Credit Valley Conservation August 13, 2019	- Preferably, the maintenance holes should be situated outside of the frequent flooding area (25-year storm) - Preferably, the sewer should cross perpendicular to Cooksville Creek - The existing maintenance hole on the east bank of Cooksville Creek and existing siphons under Cooksville Creek shall be decommissioned. - Fish habitat information is likely not required as the proposed sewer will not disrupt the watercourse.
Meeting Notes, City of Mississauga December 5, 2019	- The Greenlands zone east of Cooksville Creek is owned by the City of Mississauga, however the Beachcomber Road Condominium Corporation recently completed landscaping restoration works on these lands. The proposed construction works shall minimize impact to these landscaped lands, including the pit and mound feature proximate to Cooksville Creek. The landscaped lands shall be restored following completion of construction. - Environmental impacts to vegetation and trees within the Greenlands zone shall be further investigated. - New streetscaping was recently completed along Lakeshore Road East, fronting the Beachcomber Road condominiums. Impacts to these works shall be minimized or avoided if possible.
Meeting Notes, City of Mississauga April 27, 2020	- The initially proposed sewer routes starting north of the C.N. Rail tracks were screened out per the findings documented in Technical Memorandum: Hydraulic Modelling Analysis. The two sewer routes starting south of the C.N. Rail tracks were carried forward.
Meeting Notes and Comment Log, City of Mississauga December 2, 2020	- Upon review of the Project File Report, the City of Mississauga provided WSP with comments. The purpose of this meeting was to review WSP's responses to the City's comments.
Meeting Notes and Comment Log, Credit Valley Conservation December 2, 2020	- Upon review of the Project File Report, the CVC provided WSP with comments. The purpose of this meeting was to review WSP's responses to the CVC's comments.

8.2 PUBLIC CONSULTATION COMMENTS AND RESPONSES

The following summarizes input received during the online public consultation period. The complete record of public consultation comments can be referred to in Appendix A-5.

Table 8–2 Summary of Comments Received during Online Public Consultation

COMMENT	RESPONSE
Is an archaeological assessment anticipated to be part of the EA?	The proposed tunnel shaft locations have previously been disturbed by recent landscaping and construction works. Furthermore, the tunnel crossing under Cooksville Creek is at significant depth such that there will be no disturbance to the above soil. Thus, an archaeological assessment is not anticipated to be part of the EA.
Unable to access the public consultation presentation online.	Links to the notice and public consultation presentation were provided.
Per the Ministry of Heritage, Sport, Tourism and Culture Industries: Indigenous communities shall be further consulted to identify other cultural heritage resources Additional screening shall be completed using the MHSTCI to determine if an archaeological assessment is needed or cultural heritage resources may be impacted Advise the MHSTCI of any technical cultural heritage studies before issuing the Notice of Completion or commencing any work on site	This information will be further investigated during detailed design, prior to commencing any work on site.

9 IMPLEMENTATION

The following section identified the necessary permits and approvals required from various agencies during detailed design and prior to construction. These agencies include the MECP, CVC, and the City of Mississauga.

9.1 REVIEW AGENCY APPROVALS

9.1.1 MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS

Ministry of the Environment, Conservation and Parks (MECP) approvals will be required including:

- An Environmental Compliance Approval (ECA) is required as the proposed wastewater diversion sewer is considered a "substantial addition to the existing system."
- An application to MECP may be required for a Permit to Take Water during construction for dewatering purposes.

9.1.2 CREDIT VALLEY CONSERVATION

The CVC indicates that a permit may be required if development is within the vicinity of a:

- Watercourse;
- Floodplain;
- Valley Slope;
- Wetland;
- Lake Ontario; and/or,
- Hazardous Lands.

As the proposed works are within the Cooksville Creek floodplain, a permit from the CVC will be required prior to construction.

9.1.3 CITY OF MISSISSAUGA

As the proposed works will be conducted within the City of Mississauga lands, classified as a Greenlands zone, an easement agreement will be required.

9.2 SITE SPECIFIC PERMITS AND APPROVAL

A review of site-specific permits and approvals will be dependent on the final design of the project works and should be reviewed during detailed design. Below is a list of probable permits and approvals to be considered.

Table 9–1 Permits and Approvals

ORGANIZATION	PERMIT / APPROVAL
Ministry of the Environment, Conservation and Parks (MECP)	✓ Sanitary sewer ECA ✓ Environmental Activity Sector Registration for construction dewatering activities OR - ✓ Permit To Take Water – during construction
City of Mississauga – Planning and Building Department	✓ N/A
Credit Valley Conservation	✓ Notification of Project Start ✓ Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Permit – for work adjacent to Cooksville Creek
Electrical Safety Authority (ESA)	N/A
Occupational Health and Safety Act	✓ Pre-Start Health and Safety Review (PSR)
Region of Peel / City of Mississauga	✓ Public Utilities Coordination Committees (PUCC) ✓ Easement agreement for construction in the Greenlands zone
Beachcomber Road Condominium Corporation	✓ Modification to easement agreement to allow for construction access

9.3 PROPERTY REQUIREMENTS

The preferred gravity sewer alignment and the potential construction compounds and shaft locations have been identified and are located either within City of Mississauga lands or lands under which the Region has a pre-existing easement in place, thus eliminating the need for acquisition of easements on private property. This will facilitate the detailed design phase and reduce the risk of delays to the detailed design and construction schedules. The City of Mississauga has been involved throughout the project and has provided input for the sewer alignment alternatives. This will facilitate negotiations for the easements required in City of Mississauga property.

10 CONCLUSIONS

This Municipal Class EA Project File Report has been prepared to confirm that the proposed Claredale Road to Beechwood Pumping Station Diversion project meets the requirements of the Environmental Assessment Act.

The preferred solution involves rerouting flows from the Claredale Road sanitary catchment via a new 300 mm gravity sewer which connects to existing maintenance hole SMH-1783489 and crosses under Cooksville Creek, discharging into existing MH-2A, located southeast of Beechwood SPS. To connect the Claredale sewer network to MH-2A via the new 300 mm gravity sewer, two new maintenance holes will be constructed: one maintenance hole within the open space south of the C.N. Rail tracks, east of Cooksville Creek; and one maintenance hole immediately upstream of MH-2A, west of Cooksville Creek.

11 NEXT STEPS

If no Part II Order requests are received, the detailed design of the proposed works as presented within this Project File will proceed. During detailed design, the following will be completed:

- Plan and profile design drawings for the proposed linear infrastructure works, including contract specifications
- Decommissioning strategy for the abandoned siphons and maintenance holes
- Review of the expected disturbance footprint and if required, tree inventory and preservation plan
- Construction management drawing package with support for Natural Areas for all areas of work, including a staging plan, access routes, removals plan, preservation/protection plan, and complete landscape restoration documenting restoration of the disturbed natural area, including a plan for restoring any required removals and impacts to the creek edge/bed
    - Following submission of the construction management package, a site inspection shall be completed with the City of Mississauga Park Planning and Forestry, CVC, and Region of Peel present for the review of impacts and necessary restoration
- Review of the size and extent of the permanent access road to reduce the footprint of the works
- Inform City of Mississauga Community Services of the project schedule and phases

12 BIBLIOGRAPHY

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APPENDIX

A CONSULTATION

APPENDIX

A-1 STAKEHOLDER MEETING MINUTES AND COMMENTS

MEETING NOTES

JOB TITLE	Claredale EA		
PROJECT NUMBER	19M-00593-00	**DATE**	August 13, 2019
TIME	9:00am – 10:00am	**VENUE**	10 Peel Centre Drive, Suite B, 4th Floor, Room 830
SUBJECT	Introductory Meeting with CVC and DFO		
CLIENT	Region of Peel (Region)		

ATTENDEES

Name	Company	Phone	Email
Lyle Ledrew	Region of Peel (Region)	905-791-7800 x7836	Lyle.Ledrew@peelregion.ca
Jakub Kilis	CVC	905-670-1615	Jakub.Kilis@cvc.ca
Rebecca Stewart	CVC	905-670-1615	Rebecca.Stewart@cvc.ca
Sarah Labrie	CVC	905-670-1615	Sarah.Labrie@cvc.ca
Michelle Albert	WSP	289-982-4016	Michelle.Albert@wsp.com
Robin LeCraw	WSP	519-904-1788	Robin.LeCraw@wsp.com
Robert Rappolt	WSP	289-982-4374	Robert.Rappolt@wsp.com
Jonathan Nishio	WSP	289-982-4331	Jonathan.Nishio@wsp.com

ADDITIONAL DISTRIBUTION

Name	Company	Phone	Email
Andrea Pitura	Region of Peel	905-791-7800 x3524	Andrea.Pitura@peelregion.ca
Chris Smith	Region of Peel	905-791-7800 x2119	Chris.Smith@peelregion.ca
Chad Stephen	WSP	289-982-4517	Chad.Stephen@wsp.com
James Jarrett	WSP	613-690-1115	James.Jarrett@wsp.com
Christine Furtado	WSP	416-644-0422	Christine.Furtado@wsp.com

MATTERS ARISING		ACTION
1.0	**INTRODUCTIONS**	
2.0	**BACKGROUND AND PROJECT OVERVIEW**	
2.1	WSP to send Powerpoint presentation shown in the meeting to CVC.	WSP
2.2	CVC to provide WSP with an updated regulated area and floodplain map.	CVC
2.3	The area along Cawthra Road and Lakeshore Road East is not a CVC regulated area (there is no longer a watercourse there)	Information
2.4	Maintenance hole locations — Do not need to be situated outside of the floodline, but it is preferred by the CVC — Should be situated outside of the frequent flooding area (25-year storm)	Information

MEETING NOTES

2.5	It is preferable for the sewer to cross perpendicular to Cooksville Creek	Information
2.6	As part of the EA, WSP to include decommissioning of the existing maintenance hole on the east bank of the Creek and existing siphon under the Creek. In deciding whether to remove / protect / grout the existing infrastructure, consider the risk of exposure. Note that if the siphon is to be removed, open cut methods may be required.	WSP
3.0	**EXISTING STUDIES AND INFORMATION**	
3.1	WSP to send Geomorphic Assessment of Cooksville Creek Report to CVC for review to determine if there is sufficient data for WSP to move forward.	WSP/CVC
3.2	CVC to review ecological work done for the development area along Beachcomber Road to determine if there is sufficient ecological background information and if supplemental information is required (only terrestrial data for maintenance holes and access may be required).	CVC
3.3	CVC to check for fish data, however there is probably no need for fishing / fish habitat information as the proposed sewer will not disrupt the Creek.	CVC
3.4	WSP to complete minimum desktop impact assessment — Consider construction methodology to reduce impact at-grade (ie. trenchless vs. open cut)	WSP
4.0	**CVC REQUIREMENTS**	
4.1	CVC to look into what information WSP needs to provide for tunneling under the Creek.	CVC
5.0	**NEXT STEPS**	
5.1	Prior to the PIC, WSP to either send a digital copy of the information being presented or meet with CVC for review purposes.	Information

These minutes are considered to be accurate recording of all items discussed. Written notice of discrepancies, errors or omission must be given within seven (7) days, otherwise the minutes will be accepted as written.

NEXT MEETING

An invitation will be issued if an additional meeting is required.

AGENDA

Job Title	Claredale EA		
Project Number	19M-00593-00	**Date**	December 5, 2019
Time	3:00PM	**Venue**	201 City Centre Drive, Mississauga, Ontario Room
Purpose	Introduction Meeting with City of Mississauga		

ATTENDEES			
Name	**Company**	**Phone**	**Email**
Lyle LeDrew	Region of Peel (Region)	905-791-7800 x7836 416-573-0263 (Cell)	Lyle.Ledrew@peelregion.ca
Rory O'Sullivan	City of Mississauga (City)	905-615-3200 x8813	Rory.OSullivan@mississauga.ca
Lin Rogers	City of Mississauga	905-615-3200	Lin.Rogers@mississauga.ca
Sally LePage	City of Mississauga	905-615-3200	Sally.Lepage@mississauga.ca
Muneef Ahmad	City of Mississauga	905-615-3200	Muneef.Ahmad@mississauga.ca
Michelle Albert	WSP	289-982-4016	Michelle.Albert@wsp.com
Jason Ahlberg	WSP	289-982-4391	Jason.Ahlberg@wsp.com
Jonathan Nishio	WSP	289-982-4331	Jonathan.Nishio@wsp.com

COPIES TO			
Name	**Company**	**Phone**	**Email**
Chad Stephen	WSP	289.982.4517	Chad.Stephen@wsp.com

MATTERS ARISING		**ACTION**
1.0	**INTRODUCTIONS**	
1.1	Rory O'Sullivan to be the main point of contact for the City of Mississauga	Information
2.0	**CLAREDALE EA SCOPE**	

100 Commerce Valley Drive West
Thornhill, ON
Canada L3T 0A1

T: +1 905 882-1100
F: +1 905 882-0055
wsp.com

2.1	Greenbelt Area (East of Cooksville Creek and South of the C.N. Rail Tracks) — The City of Mississauga owns these lands, however, the Trinity Development Group recently completed restoration works on these lands — The Trinity Development Group's restoration work is currently in its warranty period of 2 years — There is a "pit and mound" feature in the proposed construction compound area which will be impacted by the proposed works — The "pit and mound" area was regraded and vegetated, and was designed to work in conjunction with the floodplain for Cooksville Creek — City to provide WSP with background information (studies, design reports, restoration and grading plans, etc.) regarding the Greenbelt Area	City / Information
2.2	WSP to review problem statement with respect to preventing surcharging and basement flooding within the Claredale sanitary catchment area	WSP
3.0	**CLAREDALE EA PROCESS**	
4.0	**SEWER ROUTING ALTERNATIVES**	
4.1	All Alternatives (General) — Consider that there will be greater environmental impacts than to "a few trees" for the construction compound in the Greenbelt Area — WSP to complete hydraulic modelling to determine whether the proposed sewer shall start from Claredale Road or immediately south of the C.N. rail tracks	WSP
4.2	Alternative 2A / 2B — New streetscaping was recently completed along Lakeshore, fronting the Beachcomber Road condominiums — WSP to consider alternate construction compound locations to limit effect to new streetscaping	WSP
4.3	Alternative 3 — WSP to finalize compound locations — The current alignment goes from MH4 to MH5 within the condominium developer lands, then crosses the C.N. rail tracks to MH6 on the Caven Street right of way — WSP to consider alternate alignment from MH4, crossing the C.N. rail tracks to MH5 and then going east to MH6 on the Caven Street right of way; there may be space for MH5 in between the chainlink fence bordering the C.N. rail tracks and the acoustic fence (location to be confirmed) bordering the development properties	WSP
5.0	**ADDITIONAL DISCUSSION**	
5.1	Public Engagement — 2 points of contact are suggested as opposed to 1 — Ensure the website at the bottom of the Notice of Commencement is accessible when the Notice is issued to the public	Information
5.2	Future Meetings — Both CVC and City (Community Services and Transportation Works) to be present	Information
6.0	**NEXT STEPS**	
6.1	City to review the sewer routing alternatives and provide WSP with other potential options within the following 3 weeks	City
6.2	WSP to finalize details associated with Alternative 3 and circulate to the Region and City	WSP
6.3	WSP to organize meeting between CVC, City, Region, WSP in the new year to present updated alternatives	WSP
6.4	WSP / Region to set up a meeting with the Councillor to get his buy in — Update City on the outcome of the meeting.	WSP / Region
6.5	For scheduling purposes, WSP is looking to have the PIC in Spring 2020	Information

AGENDA

These minutes are considered to be accurate recording of all items discussed. Written notice of discrepancies, errors or omission must be given within seven (7) days, otherwise the minutes will be accepted as written.

NEXT MEETING

An invitation will be issued if an additional meeting is required.

Name	Contact Information	Comment	Region Response
Paul Tripodo	**Paul Tripodo, M.F.C.** Pronouns: he, him, his Natural Heritage Coordinator, Woodlands and Natural Areas T 905-615-3200 ext. 5180 paul.tripodo@mississauga.ca	1. I support the evaluation shown in Table 5-5 regarding the natural environment considerations; in that alternative 3-B appears to be more preferable than 3-A from the natural environment perspective, although 3-B did not turn out to be the preferred overall alternative. 3-B reduces the extent of disturbance and permanent alternation of the city's natural areas, and does not involve maintaining the sewer crossing of the creek. I would have thought therefore that the scores for 3-A and 3-B would be different under the 'potential for contamination' criterion given that 3-A maintains a crossing under the creek, and therefore has a higher potential for contamination than 3-B in the long term	Based upon the recommendation provided in the geomorphology report, the proposed sewer crossing Cooksville Creek shall be installed at a depth of 2 m below the channel bed, assuming a continued erosion rate of 0.01 m per year. The depth of the proposed sewer well exceeds the 100-year planning horizon. As such, it is not anticipated for there to an increased potential for contamination for Alternative 3-B, relative to Alternative 3-A. Furthermore, the sewer proposed under Alternative 3B involves connecting to a new Lakeshore Road East sewer. This sewer will extend along Lakeshore Road East from Aviation Road to Beechwood Avenue, requiring a crossing under Cooksville Creek. Note that the Lakeshore Road East sewer is to be constructed as part of a separate Region project. This information has been added to Section 5.1.2.1 Alternative 3B – General and is reflected in Table 5.5 - Evaluation Matrix under the criterion 'Impact to Watercourses'.
		2. The proposed construction access area shown in figure 5.1.a does not seem to take into consideration the full extent of the proposed access road near MH1. It appears that the extent of the disturbance will be larger than what is depicted on figure 5.1.a. At this stage I understand that the project is conceptual, but some level of certainty should be provided for how realistic the size of the construction compounds will be since they overlap and extend into the city's Natural Heritage System	Figure 5.1 has been revised accordingly to depict a larger proposed construction compound area.
		3. The EA does should contain reference/mention of the City's Natural Heritage System and associated policy objectives The area of the proposed access road is part of the city's natural heritage system, in particular a Special Management Area associated with the creek corridor (which is a Significant Natural Area). Special Management Areas are intended to managed or restored to enhance and support the adjacent features. Therefore, through detailed design options/configurations for reducing the size and extent of the permanent access road should be explored in order to reduce the footprint of the works and the amount of natural area permanently transformed for infrastructure	A paragraph under Section 4.6 Natural Environment has been provided describing the City's Natural Heritage System and associated policies as they apply to Special Management Areas and Significant Natural Areas. Figure 4-2 has been prepared to show the extent of these features within the study area. Recommendations to restore or reduce impacts to the Special Management Area have been provided under Section 7 Impact Mitigation Measures. Review of the size and extent of the permanent access road will be reviewed during detailed design - this information has been included under Section 11 – Next Steps.
		4. Table 5-5 indicates that the city's Natural Areas Survey (2008) was consulted and that several species were identified. This information would be helpful to include as part of the appendix in light of a full natural environment characterization not being conducted as part of the EA. Please note that the natural areas survey has been updated regularly since 2008 and newer information is available which indicates the presence of additional species not noted in the EA, 2 of which are rare in the city: Penstemon digitalis and Crataegus crus-galli; as well as 3 considered uncommon: Prunus nigra, Epilobium strictum and Sorbus americana. Please contact the city's Natural Heritage Coordinator for the updated information: paul.tripodo@mississauga.ca	Table 5-5 has been updated accordingly. Section 4.6 Natural Environment has also been updated to detail the results of the most recent Natural Areas Survey (2016) and mapping update (2019). The Natural Areas Survey fact sheet and data received from Paul Tripodo has been added to Appendix B-3.
		5. A detailed landscape/restoration plan will be required to document how the natural area will be restored	Noted. A detailed landscape/restoration plan will be developed during detailed design. This information has been included under Section 11 – Next Steps.
		6. A tree inventory and preservation plan may also be required depending on the footprint of any disturbance.	Noted. Dependent upon the expected footprint of disturbance, a tree inventory and preservation plan may be developed during detailed design. This information has been included under Section 11 – Next Steps.

Name	Contact Information	Comment	Region Response
		7. More information on what 'decommissioning' of the old line would entail	The abandoned siphons and maintenance holes at risk of exposure will be decommissioned. Following the recommendation of the Geomorphic Assessment report, WSP believes that the existing siphons and maintenance holes should not be removed to reduce environmental impacts to Cooksville Creek. The following text has been added to Section 5.1 Identification of Alternative Options: *Both alternatives involve decommissioning the existing siphons. As the existing siphons cross under Cooksville Creek, removal of the siphons would result in significant environmental impacts to Cooksville Creek. Furthermore, based on the findings of the Geomorphic Assessment, the siphons are estimated to become exposed within the next 50 years, representing a low risk of exposure within the near future. Rather than remove the siphons, the siphons shall be decommissioned by means of filling the entire length of pipe with grout and then plugging or capping the pipe ends. The decommissioning strategy for the siphons will be reviewed further during detailed design.* *Both alternatives will also involve decommissioning of the existing maintenance holes along the existing sewer alignment. Removal of the existing maintenance holes proximate to the banks of Cooksville Creek would result in significant environmental impacts to Cooksville Creek. During detailed design, the existing maintenance holes will be reviewed with respect to their risk of exposure and the maintenance holes deemed to be a high risk of exposure will be decommissioned. In particular, the maintenance hole on the east bank of Cooksville Creek was identified in the Geomorphic Assessment as being at risk for exposure within the next 10 to 15 years and will certainly require decommissioning. Generally, the maintenance holes will be decommissioned by means of filling the maintenance hole with grout, removing the top riser sections and burying the maintenance hole. The decommissioning strategy for the maintenance holes will be reviewed further during detailed design.*
Katie Henley	**Katie Henley | BLA** Landscape Architectural Designer T 905-615-3200 ext. 3748 katie.henley@mississauga.ca	1. A full construction/management drawing package with support for Natural Areas must be submitted for all areas of work including a staging and access routes, removals plan, preservation/protection plan (for work near both street/parkland trees and Cooksville Creek), complete restoration plan identifying replacements for any required removals and or impacts to the creek edge/bed;	Noted. A construction management package will be developed during detailed design. This information has been included under Section 11 – Next Steps.
		2. Circulate to the conservation authority (CVC) of the proposed works for the purposes of necessary permits/approvals for any impacts and restoration of the natural features;	The draft project file was circulated to the CVC for their comments. The CVC's comments have been addressed accordingly.
		3. Advise/identify if all proposed works will be within the existing easements or if there will be any works outside the existing easements;	With reference to Figure 5-1, the proposed works described under Alternative 3A will require new easements from the CVC/City of Mississauga/developer for the connection between SMH-1783489 and MH1 and the sewer crossing under Cooksville creek from MH1 to MH2. An easement may also be required from the owners of the commercial building at 501 Lakeshore Road.
		4. Advise if new easements will be a requirement for the improvements proposed;	*(Same answer to Comment 3 above.)* With reference to Figure 5-1, the proposed works described under Alternative 3A will require new easements from the CVC/City of Mississauga/developer for the connection between SMH-1783489 and MH1 and the sewer crossing under Cooksville creek from MH1 to MH2. An easement may also be required from the owners of the commercial building at 501 Lakeshore Road.

Name	Contact Information	Comment	Region Response
		5. Inform Community Services of the project schedule and phases once information is available	Noted. Community Services will be notified once detailed design starts. This information has been included under Section 11 – Next Steps.
		6. Be advised once a construction/management package is submitted it may be recommended a site inspection be completed with Park Planning, Forestry, CVC and the Region of Peel present for the review of impacts and necessary restoration	Noted. To be discussed during detailed design. This information has been included under Section 11 – Next Steps.

Claredale Environmental Assessement - Project File Report Comment Log

Date: February 3, 2021

Comment #	Category	CVC Comment	WSP Response
1	General	Please identify the fate of the abandoned siphon. It is our understanding from previous discussions that the existing siphon will be removed after the new sewer is put into operation. Removal of the siphon and associated sewer/maintenance hole infrastructure may have impacts on Cooksville Creek including creek banks. Please discuss this further and clarify if it should be clearly included in the EA component of this project.	The abandoned siphons and maintenance holes at risk of exposure will be decommissioned. Following the recommendation of the Geomorphic Assessment report, WSP believes that the existing siphons and maintenance holes should not be removed to reduce environmental impacts to Cooksville Creek. The following text has been added to Section 5.1 Identification of Alternative Options: *Both alternatives involve decommissioning the existing siphons. As the existing siphons cross under Cooksville Creek, removal of the siphons would result in significant environmental impacts to Cooksville Creek. Furthermore, based on the findings of the Geomorphic Assessment, the siphons are estimated to become exposed within the next 50 years, representing a low risk of exposure within the near future. Rather than remove the siphons, the siphons shall be decommissioned by means of filling the entire length of pipe with grout and then plugging or capping the pipe ends. The decommissioning strategy for the siphons will be reviewed further during detailed design.* *Both alternatives will also involve decommissioning of the existing maintenance holes along the existing sewer alignment. Removal of the existing maintenance holes proximate to the banks of Cooksville Creek would result in significant environmental impacts to Cooksville Creek. During detailed design, the existing maintenance holes will be reviewed with respect to their risk of exposure and the maintenance holes deemed to be a high risk of exposure will be decommissioned. In particular, the maintenance hole on the east bank of Cooksville Creek was identified in the Geomorphic Assessment as being at risk for exposure within the next 10 to 15 years and will certainly require decommissioning. Generally, the maintenance holes will be decommissioned by means of filling the maintenance hole with grout, removing the top riser sections and burying the maintenance hole. The decommissioning strategy for the maintenance holes will be reviewed further during detailed design.* The following text has been added under Section 11 Next Steps: *If no Part II Order requests are received, the detailed design of the proposed works as presented within this Project File will proceed. During detailed design, the following will be completed:* *•Decommissioning strategy for the abandoned siphons and maintenance holes* The following text has been noted under Section 4.7 Geomorphology: *Erosion along the bed was estimated at a maximum of 1.14 m to a minimum of 0.43 m over the course of 50 years. Changes in bed erosion indicate that there is a high likelihood that the siphons become exposed within the next 50 years, assuming a conservative erosion rate of 0.01 m per year.*
2	General	Please document the anticipated duration of the works under each scenario, as project duration seemed to be heavily weighted in the analysis of alternatives.	While the anticipated duration of work will be similar (approx. 6 months) between the two alternatives, the construction start date will be significantly delayed for Alternative 3B. As Alternative 3B must connect to a sewer along Lakeshore Road East that has not yet been constructed, its construction start date is constrained by the completion of a separate Region project for the construction of the new Lakeshore Road East sewer. This information is documented under 5.1.2.1 Alternative 3B - General. Furthermore, while the anticipated duration of work is similar between the two alternatives, the work along Lakeshore Road East (as it is a major road with high traffic) will incur significant traffic, noice and dust impacts, as well as constructability issues and utility impacts. The estimated duration of work of 6 months has been added to Sections 5.1.2.1 Alternative 3A - Construction Methodology and 5.1.2.2 Alternative 3B - Construction Methodology.
3	Engineering	Both Alternatives propose a depth of sewer of between 7 and 10m below grade. This terminology isn't clear as to what the depth below the invert of Cooksville Creek would be with this proposed design alternative. When reviewing the hydraulic model associated with Cooksville Creek, the depth of the overall cross section geometry reaches up to 6m. Please clarify whether the identified sewer depth below grade refers to the existing surface grade or the bottom invert of the creek. Clarification on this depth will assist with confirming that the geomorphology's recommendation of a sewer depth of 2m below the creek invert, is achieved.	The proposed sewer depth of 7 to 10 m below grade refers to the depth of the sewer below the existing surface grade. The obvert of the proposed sewer crossing under Cooksville Creek will be installed at a minimum of 2 m below the invert of Cooksville Creek, per recommendation of the Geomorphic Assessment report. The following text has been revised under Section 5.1.1 Alternative 3A: *The depth of the proposed sewer will be approximately 8 to 10 metres below the existing surface grade, ensuring the obvert of the proposed sewer crossing Cooksville Creek is greater than 2 m below the invert of Cooksville Creek at the location of crossing.*
4	Ecology	A description of the existing conditions of the study area should include both the terrestrial and the aquatic environment. Please note that CVC has current fisheries data and ELC, SWH, and NAS data that may prove useful for the inclusion of a summary piece on the natural environment on top of already available information from any previous studies available to the Region. "Given the recent works disturbing the proposed constructio locations and the expected minimal impact of the proposed construction works, a Natural Environment Study is not expected to be required for this project" should not result in the natural environment not being mentioned at all. The report seems to have come to a conclusion of 'insignificant impact' without providing any documentation or compelling argument leading up to that conclusion. The pathway to this decision is missing. At minimum, a short summary piece should be pulled together from existing data and information such that the existing conditions are described (terrestrial and aquatic) and their sensitivity to further impacts is documented. This description is fundamental to the evaluation of alternatives later in the report (Table 5.5). For example, Table 5.5 strangely mentions common wildlife species in a section on SAR, and makes no reference to a formal SAR screening. Overall, Table 5.5 appears to make a number of orphaned statements. There was no mention of fish community, nor its significance or resilience.	A description of terrestrial and aquatic conditions within the site has been provided using information made available to WSP for this purpose. A SAR Screening has also been included to assess the potential for SAR on and adjacent to the site, based on a review of aerial imagery. Refer to the revised Section 4.6 Natural Environment and Table 5.5.
5	Ecology	If Species at Risk are being discussed, contact should be made with MECP to conduct a Species at Risk screening on the project site.	A request for information was submitted to the MECP, but a response has not been received to date. This correspondence has been documented in Appendix A-1.
6	Ecology	The City of Mississauga and CVC have identified Significant Wildlife Habitat within the project area within the FOD community.	The description of the site under Section 4.6 Natural Environment includes mention of the identified Significant Wildlife Habitat values flagged by the City and CVC.
7	Ecology	Please clearly summarize anticipated environmental alteration e.g. bank works? (in general terms, as the EIS can flesh out impact and mitigation specifics prior to permitting).	It is proposed to decommission the maintenance holes rather than remove them to limit environmental impact to the bank. The following text detailing the decommissioning strategy has been added to Section 5.1 Identification of Alternative Options: *Both alternatives will also involve decommissioning of the existing maintenance holes along the existing sewer alignment. Removal of the existing maintenance holes proximate to the banks of Cooksville Creek would result in significant environmental impacts to Cooksville Creek. During detailed design, the existing maintenance holes will be reviewed with respect to their risk of exposure and the maintenance holes deemed to be a high risk of exposure will be decommissioned. In particular, the maintenance hole on the east bank of Cooksville Creek was identified in the Geomorphic Assessment as being at risk for exposure within the next 10 to 15 years and will certainly require decommissioning. Generally, the maintenance holes will be decommissioned by means of filling the maintenance hole with grout, removing the top riser sections and burying the maintenance hole. The decommissioning strategy for the maintenance holes will be reviewed further during detailed design.*

APPENDIX

A-2 *STUDY CONTACT LIST*

Title	First Name	Last Name	Group	Company/Organization	Department	Job Title	Business Street	Business City	Province	PostalCode	Business Phone	Business Fax	Email Address
Mr.	Hohahes Leroy	Hill	Aboriginal Community	Haudenosaunee Confederacy		Chiefs Council Secretary	16 Sunrise Court, Suite 600	Ohsweken	ON	N0A 1M0	519-717-7326		hdi2@bellnet.ca
Chief	R. Stacey	LaForme	Aboriginal Community	Mississaugas of the New Credit First Nation		Chief	2789 Mississauga Road, RR#6	Hagersville	ON	N0A 1H0	905-768-1133		stacey.laforme@mncfn.ca
Chief	Mark B.	Hill	Aboriginal Community	Six Nations of the Grand River		Chief	1695 Chiefswood Road., P.O. Box 5000	Ohsweken	ON	N0A 1M0	519-445-2201		markhill@sixnations.ca
Mr.	Lonny	Bomberry	Aboriginal Community	Six Nations of the Grand River		Senior Administrator Officer	1695 Chiefswood Road., P.O. Box 5000	Ohsweken	ON	N0A 1M0	519-445-2201	519-445-4208	lbomberry@sixnations.ca
Ms.	Caron	Smith	Aboriginal Community	Six Nations of the Grand River	Lands & Resources	Land Use Officer	1695 Chiefswood Road., P.O. Box 5000	Ohsweken	ON	N0A 1M0	519-753-0665 x. 5433		csmith@sixnations.ca
Mr.	Maxime	Picard	Aboriginal Community	Nation Huronne-Wendat		Project Coordinator, Ontario	255 Place Chef Michel Laveau	Wendake	QC	G0A 4V0	418-843-3767	418-842-1108	maxime.picard@cnhw.qc.ca
Ms.	Tina	Durand	Aboriginal Community	Nation Huronne-Wendat	Gestion de projets	Chiefs Council Secretary	255 Place Chef Michel Laveau	Wendake	QC	G0A 4V0	418-843-3767 x. 2102		tina.durand@cnhw.qc.ca
Mr.	Stephen	Dasko	City of Mississauga	City of Mississauga		Councillor Ward 1	300 City Centre Drive	Mississauga	ON	L5B 2G6	905-896-5100		stephen.dasko@mississauga.ca
Mr.	Rory	O'Sullivan	City of Mississauga	City of Mississauga	Transportation & Works - Project Contact	Project Engineer	201 City Centre Drive	Mississauga	ON	L5B 2T4	905-615-3200 x8813		rory.osullivan@mississauga.ca
Ms.	Lyndsey	McNally	Condominium Corporation	Peel Condominium Corporation 1001: Malvern Condominium Property Management		Manager	9140 Leslie Street, Suite 205	Richmond Hill	ON	L4B 0A9	416-674-0001		info@malvern.ca
Mr.	Bruno	Nazzicone	Condominium Corporation	Kingsmen Group Inc.	Land Development	Vice-President	105B Winges Road	Woodbridge	ON	L4L 6C2	416-445-8552 x245		bnazzicone@thekingsmen.ca
Mr.	Lalique	Leung	Condominium Corporation	Kingsmen Group Inc.		Executive Assistant & Manager	105B Winges Road	Woodbridge	ON	L4L 6C2			lleung@thekingsmen.ca
Mr.	Jakub	Kilis	Conservation Authority	Credit Valley Conservation	Environmental Assessment - Project Contact	Planner	1255 Old Derry Road	Mississauga	ON	L5N 6R4	905-670-1615 x287	905-670-2210	jakub.kilis@cvc.ca
-	-	-	Fisheries and Oceans	Fisheries and Oceans Canada	Fish and Fish Habitat Protection Program		867 Lakeshore Rd	Burlington	ON	L7S 1A1	1-855-852-8320		FisheriesProtection@dfo-mpo.gc.ca
-	-	-	Health	Peel Public Health			7120 Hurontario St., P.O. Box 667, RPO Streetsville	Mississauga	ON	L5M 2C2	(905) 791-7800	(905) 564-2683	peelhealth@peelregion.ca
Ms.	Karla	Barboza	Ontario Ministry	Ministry of Heritage, Sport, Tourism and Cultural Industries	Heritage Planning Unit Programs and Services Branch	Team Lead	401 Bay Street, Suite 1700	Toronto	ON	M7A 0A7	416-314 7120		karla.barboza@ontario.ca
Ms.	Carol	Oitment	Ontario Ministry	Ministry of Heritage, Sport, Tourism and Cultural Industries	Sport, Recreation and Community Programs Division Policy Branch	Policy Advisor	777 Bay Street, 18th Floor	Toronto	ON	M7A 1S5	416-314-7205		carol.oitment@ontario.ca
Mr.	Aldo	Ingraldi	Ontario Ministry	Ministry of Municipal Affairs and Housing	Community Planning and Development (West) Central Municipal Services Office	Manager	777 Bay Street, 13th Floor	Toronto	ON	M5G 2E5	416-585-6048	416-585-6882	aldo.ingraldi@ontario.ca
Mr.	Steven	Strong	Ontario Ministry	Ministry of Natural Resources and Forestry	Aurora District	Planner	50 Bloomington Road	Aurora	ON	L4G 0L8	905-713-7366	905-713-7360	steven.strong@ontario.ca
Mr.	Jason	White	Ontario Ministry	Ministry of Transportation	Engineering Office - Central Region	Manager	159 Sir William Hearst Ave., 5th Floor, Building D	Toronto	ON	M3M 0B7	416-235-5575	416-235-3436	jason.white@ontario.ca
Ms.	Shannon	McNeill	Transit	GO Transit and Metrolinx	Environmental Programs and Assessment	Director	10 Bay Street	Toronto	ON	M5J 2W3	416-202-4895		shannon.mcneill@metrolinx.com
Mr.	Michael	Vallins	Transit	CN Rail	Public Works	Manager	1 Administration Road	Concord	ON	L4K 1B9	905-669-3264		michael.vallins@cn.ca
-	-	-	Utilities	Alectra Utilities			2185 Derry Road West	Mississauga	ON	L5N 7A6			customerservice@alectrautilities.com

APPENDIX

A-3 *NOTICE OF STUDY COMMENCEMENT*

Public Notice

Region of Peel
working with you

Environmental Assessment Study

NOTICE OF STUDY COMMENCEMENT AND ONLINE PUBLIC ENGAGEMENT- SCHEDULE B

Claredale Rd. to Beechwood Pumping Station

The Study

The Region of Peel has identified the need to replace the siphon under Cooksville Creek, which will involve redirecting wastewater flows from the Claredale Rd. area to the Beechwood Pumping Station. As a result, a Schedule 'B' Class Environmental Assessment (EA) has been initiated to identify a solution for this infrastructure need. The *map* below shows the area that may be directly impacted by the proposed construction.

Claredale EA: Area of Focus Map

The Study Process will include:

- Public and stakeholder consultations;
- An evaluation of alternative solutions;
- An assessment of proposed alternatives; and,
- Identification of methods to lessen the adverse impacts to the community.

How to Get Involved

As part of the Study, online public engagement has been arranged to allow interested members of the public an opportunity to review and comment on the alternatives, including the preferred alternative, the evaluation process, and next steps in the Study process.

Display boards will be made available to the public on **peelregion.ca/public-works/environmental-assessments** starting **July 2, 2020**.

Please submit any comments or concerns by **July 24, 2020.** Any input received by that date will be incorporated into the Project File Report, which will be available for public review when the study is completed.

Contact

To provide comments or request additional information about this project, please contact:

Lyle LeDrew
Project Manager, Water & Wastewater
905-791-7800 ext. 7836
Lyle.ledrew@peelregion.ca

This Notice was first issued on **July 2, 2020.**

With the exception of personal information, all comments will become part of the public record of the study. The study is being conducted according to the requirements of the Municipal Class Environmental Assessment, which is a planning process approved under Ontario's *Environmental Assessment Act*.

APPENDIX

A-4 *MECP AND NHIC CONSULTATION RECORD*

Rappolt, Robert

From: Rappolt, Robert
Sent: Wednesday, August 28, 2019 2:04 PM
To: eanotification.cregion@ontario.ca
Cc: LeDrew, Lyle; Albert, Michelle; Furtado, Christine; Jarrett, James
Subject: Peel Region, Schedule B EA, Claredale EA (City of Mississauga)
Attachments: Claredale EA_MECP Streamlined EA Project Information Form.xlsx; Claredale EA_Draft NoC.doc

Dear MECP,

On behalf of our client, Peel Region, we would like to commence a Schedule B EA located in the City of Mississauga. The MECP Project Information Form and draft Notice of Commencement are attached.

Please confirm receipt of this email by replying to all those copied. We also kindly request that Indigenous community contacts be confirmed as per Duty to Consult.

If you require clarification or have questions, please contact me directly at the below noted.

Thank you,
Rob

Robert Rappolt, MA
Project Planner
Planning, Landscape Architecture and Urban Design

T +1 289 982 4374
E + Robert.Rappolt@wsp.com

100 Commerce Valley Drive West
Thornhill, Ontario
L3T 0A1 Canada

wsp.com

Ministry of the Environment, Conservation and Parks
Central Region
5775 Yonge Street, 8th Floor
North York ON M2M 4J1
Phone: 416.326.6700
Fax: 416.325.6345

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Région du Centre
8e étage, 5775, rue Yonge
North York ON M2M 4J1
Tél : 416 326-6700
Téléc : 416 325-6345

Ontario

September 27, 2019 File No.: EA 01-06-03

Lyle LeDrew
Project Manager, Water & Wastewater
Region of Peel
10 Peel Centre Drive, 4th Floor, Suite A
Brampton, ON L6T 4B9
lyle.ledrew@peelregion.ca

BY EMAIL ONLY

Re: **Claredale Wastewater Flow Redirection**
Region of Peel
Schedule B Municipal Class EA
Response to Notice of Commencement

Dear Mr. LeDrew,

This letter is in response to the Notice of Commencement for the above noted project. The Ministry of the Environment, Conservation and Parks (MECP) acknowledges that the Region of Peel has indicated that the study is following the approved environmental planning process for a Schedule B project under the Municipal Engineers Association's Municipal Class Environmental Assessment (Class EA).

The attached "Areas of Interest" document provides guidance regarding the Ministry's interests with respect to the Class EA process. Please identify the areas of interest which are applicable to the project and ensure they are addressed. Proponents who address all the applicable areas of interest can minimize potential delays to the project schedule.

The Crown has a legal duty to consult Aboriginal communities when it has knowledge, real or constructive, of the existence or potential existence of an Aboriginal or treaty right and contemplates conduct that may adversely impact that right. Before authorizing this project, the Crown must ensure that its duty to consult has been fulfilled, where such a duty is triggered. Although the duty to consult with Aboriginal peoples is a duty of the Crown, the Crown may delegate procedural aspects of this duty to project proponents while retaining oversight of the consultation process.

The proposed project may have the potential to affect Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982. Where the Crown's duty to consult is triggered in relation to the proposed project**, the MOECC is delegating the procedural aspects of rights-based consultation to the proponent through this letter.** The Crown intends to rely on the delegated consultation process in discharging its duty to consult and maintains the right to participate in the consultation process as it sees fit.

Based on information provided to date and the Crown`s preliminary assessment the proponent is required to consult with the following communities who have been identified as potentially affected by the proposed

project:

- Mississaugas of the Credit First Nation;
- Six Nations of the Grand River;
- Haudenosaunee Confederacy Chiefs Council; and
- Huron-Wendat Nation (if there is potential to impact archeological resources)

Nothing in the above guidance should prevent the proponent from reaching out to share information on the project with other Indigenous communities and organizations. Please be aware that the above community list may change as new information becomes available on project impacts and/or communities' areas of interest. This is an interest-based assessment completed based on the limited information provided to date.

Steps that the proponent may need to take in relation to Aboriginal consultation for the proposed project are outlined in the "Code of Practice for Consultation in Ontario's Environmental Assessment Process" which can be found at the following link: https://www.ontario.ca/document/consultation-ontarios-environmental-assessment-process

Additional information related to Ontario's Environmental Assessment Act is available online at: www.ontario.ca/environmentalassessments

Please also refer to the attached document "A Proponent's Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities" for further information.

The proponent must contact the Director of Environmental Assessment and Permissions Branch under the following circumstances subsequent to initial discussions with the communities identified by MECP:

- Aboriginal or treaty rights impacts are identified to the proponent by the communities
- The proponent has reason to believe that the proposed project may adversely affect an Aboriginal or treaty right
- Consultation has reached an impasse
- A Part II Order request or elevation request is expected

The Director of the Environmental Assessment and Permissions Branch can be notified either by email with the subject line "Potential Duty to Consult" to enviropermissions@ontario.ca or by mail or fax at the address provided below:

Email:	enviropermissions@ontario.ca Subject: Potential Duty to Consult
Fax:	416-314-8452
Address:	Environmental Assessment and Permissions Branch 135 St. Clair Avenue West, 1st Floor Toronto, ON, M4V 1P5

The MECP will then assess the extent of any Crown duty to consult for the circumstances and will consider whether additional steps should be taken, including what role the proponent will be asked to play in them.

A Part II Order Request Form must be used to request a Part II Order. The Part II Order Request Form is available online on the Forms Repository website (http://www.forms.ssb.gov.on.ca) by searching "Part II Order" or "012-2206E" (the form ID number). **Please include reference to this in the Notice of Completion for this project**.

A draft copy of the Project File Report (PFR) should be sent to this office prior to the filing of the final report, allowing a minimum of 30 days for the ministry's technical reviewers to provide comments. Please also forward the Notice of Completion and final PFR to me when completed.

Should you or any members of your project team have any questions regarding the material above, please contact me at trevor.bell@ontario.ca or 416-326-3577.

Sincerely,

Trevor Bell, B.Sc., M.Env.
Regional Environmental Assessment Coordinator
Air, Pesticides and Environmental Planning

cc: Paul Martin, Supervisor, Technical Support Section, MECP
Tina Dufresne, Manager, Halton Peel District Office, MECP
Robert Rappolt, Project Planner, WSP
Christine Furtado, Senior Planner, WSP
Central Region EA File
A & P File

Attach: Areas of Interest
A Proponent's Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities

AREAS OF INTEREST

It is suggested that you check off each applicable area after you have considered / addressed it.

☐ **Species at Risk**

- The Ministry of the Environment, Conservation and Parks has now assumed responsibility of Ontario's Species at Risk program. For any questions related to subsequent permit requirements, please contact SAROntario@ontario.ca.

☐ **Planning and Policy**

- Ontario has released "A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019)" which replaces the "Growth Plan for the Greater Golden Horseshoe (2017)". More information, including the Plan, is found here: https://www.placestogrow.ca.

- Parts of the study area may be subject to the A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019), Oak Ridges Moraine Conservation Plan (2017), Niagara Escarpment Plan (2017), Greenbelt Plan (2017) or Lake Simcoe Protection Plan (2014). Applicable policies should be referenced in the PFR, and the proponent should describe how the proposed project adheres to the relevant policies in these plans.

- The Provincial Policy Statement (2014) contains policies that protect Ontario's natural heritage and water resources. Applicable policies should be referenced in the PFR, and the proponent should describe how this proposed project is consistent with these policies.

☐ **Source Water Protection (all projects)**

The Clean Water Act, 2006 (CWA) aims to protect existing and future sources of drinking water. To achieve this, several types of vulnerable areas have been delineated around surface water intakes and wellheads for every municipal residential drinking water system that is located in a source protection area. These vulnerable areas are known as a Wellhead Protection Areas (WHPAs) and surface water Intake Protection Zones (IPZs). Other vulnerable areas that have been delineated under the CWA include Highly Vulnerable Aquifers (HVAs), Significant Groundwater Recharge Areas (SGRAs), Event-based modelling areas (EBAs), and Issues Contributing Areas (ICAs). Source protection plans have been developed that include policies to address existing and future risks to sources of municipal drinking water within these vulnerable areas.

Projects that are subject to the Environmental Assessment Act that fall under a Class EA, or one of the Regulations, have the potential to impact sources of drinking water if they occur in designated vulnerable areas or near other at-risk drinking water systems (i.e. systems that are not municipal residential systems). MEA Class EA projects may include activities that, if located in a vulnerable area, could be a threat to sources of drinking water (i.e. have the potential to adversely affect the quality or quantity of drinking water sources) and the activity could therefore be subject to policies in a source protection plan. Where an activity poses a risk to drinking water, policies in the local source protection plan may impact how or where that activity is undertaken. Policies may prohibit certain activities, or they may require risk management measures for these activities. Municipal Official Plans, planning decisions, Class EA projects (where the project includes an activity that is a threat to drinking water) and prescribed instruments must conform with policies that address significant risks to drinking water and must have regard for policies that address moderate or low risks.

- As you may be aware, in October 2015, the MEA Parent Class EA document was amended to include reference to the Clean Water Act (Section A.2.10.6) and indicates that proponents undertaking a Municipal Class EA project must identify early in their process whether a project is or could potentially be occurring with a vulnerable area. **Given this requirement, please include a section in the PFR on source water protection.**

- The proponent should identify the source protection area and should clearly document how the proximity of the project to sources of drinking water (municipal or other) and any delineated vulnerable areas was considered and assessed. Specifically, the report should discuss whether or not the project is located in a vulnerable area and provide applicable details about the area.

- If located in a vulnerable area, proponents should document whether any project activities are prescribed drinking water threats and thus pose a risk to drinking water (this should be consulted on with the appropriate Source Protection Authority). Where an activity poses a risk to drinking water, the proponent must document and discuss in the PFR how the project adheres to or has regard to applicable policies in the local source protection plan. This section should then be used to inform and be reflected in other sections of the report, such as the identification of net positive/negative effects of alternatives, mitigation measures, evaluation of alternatives etc.

- While most source protection plans focused on including policies for significant drinking water threats in the WHPAs and IPZs it should be noted that even though source protection plan policies may not apply in HVAs, these are areas where aquifers are sensitive and at risk to impacts and within these areas, activities may impact the quality of sources of drinking water for systems other than municipal residential systems.

- In order to determine if this project is occurring within a vulnerable area, proponents can use this mapping tool: http://www.applications.ene.gov.on.ca/swp/en/index.php.The mapping tool will also provide a link to the appropriate source protection plan in order to identify what policies may be applicable in the vulnerable area.

- For further information on the maps or source protection plan policies which may relate to their project, proponents must contact the appropriate source protection authority. **Please consult with the local source protection authority to discuss potential impacts on drinking water. The contact for this project is Jennifer Stephens at 416-661-6600 ext. 5568 or jstephens@trca.on.ca. Please document the results of that consultation within the Report and include all communication documents/correspondence.**

More Information
For more information on the Clean Water Act, source protection areas and plans, including specific information on the vulnerable areas and drinking water threats, please refer to Conservation Ontario's website where you will also find links to the local source protection plan/assessment report.

A list of the prescribed drinking water threats can be found in section 1.1 of Ontario Regulation 287/07 made under the Clean Water Act. In addition to prescribed drinking water threats, some source protection plans may include policies to address additional "local" threat activities, as approved by the MECP.

Climate Change

Ontario is leading the fight against climate change through the Climate Change Action Plan. Recently released, the plan lays out the specific actions Ontario will take in the next five years to meet its 2020 greenhouse gas reduction targets and establishes the framework necessary to meet its long-term targets. As a commitment of the action plan, **the province has now finalized a guide, "Considering Climate Change in the Environmental Assessment Process" (Guide), which is found online at: www.ontario.ca/page/considering-climate-change-environmental-assessment-process**

The Guide is now a part of the Environmental Assessment program's Guides and Codes of Practice. The Guide sets out the MECP's expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA. **Proponents should review this Guide in detail.**

- The MECP expects proponents to:

1. Consider during the assessment of alternative solutions and alternative designs, the following:
    a. the project's expected production of greenhouse gas emissions and impacts on carbon sinks (climate change mitigation); and
    b. resilience or vulnerability of the undertaking to changing climatic conditions (climate change adaptation).
2. Include a discrete section in the PFR detailing how climate change was considered in the EA.

How climate change is considered can be qualitative or quantitative in nature and should be scaled to the project's level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered. **Please ensure climate change is considered in the report.**

- The MECP has also prepared another guide to support provincial land use planning direction related to the completion of energy and emission plans. The "Community Emissions Reduction Planning: A Guide for Municipalities" document is designed to educate stakeholders on the municipal opportunities to reduce energy and greenhouse gas emissions, and to provide guidance on methods and techniques to incorporate consideration of energy and greenhouse gas emissions into municipal activities of all types. We encourage you to review the Guide for information.

Air Quality, Dust and Noise

- If there are sensitive receptors in the surrounding area of this project, an air quality/odour impact assessment will be useful to evaluate alternatives, determine impacts and identify appropriate mitigation measures. The scope of the assessment can be determined based on the potential effects of the proposed alternatives, and typically includes source and receptor characterization and a quantification of local air quality impacts on the sensitive receptors and the environment in the study area. The assessment will compare to all applicable standards or guidelines for all contaminants of concern. **Please contact this office for further consultation on the level of Air Quality Impact Assessment required for this project if not already advised.**

- **If a full Air Quality Impact Assessment is not required for the project, the PFR should still contain:**
    - A discussion of local air quality including existing activities/sources that significantly impact local air quality and how the project may impact existing conditions;
    - A discussion of the nearby sensitive receptors and the project's potential air quality impacts on present and future sensitive receptors;
    - A discussion of local air quality impacts that could arise from this project during both construction and operation; and
    - A discussion of potential mitigation measures.

- As a common practice, "air quality" should be used an evaluation criterion for all road projects.

- Dust and noise control measures should be addressed and included in the construction plans to ensure that nearby residential and other sensitive land uses within the study area are not adversely affected during construction activities.

- The MECP recommends that non-chloride dust-suppressants be applied. For a comprehensive list of fugitive dust prevention and control measures that could be applied, refer to *Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities.* Report prepared for Environment Canada. March 2005.http://www.bv.transports.gouv.qc.ca/mono/1173259.pdf

- The PFR should consider the potential impacts of increased noise levels during the operation of the completed project. The proponent should explore all potential measures to mitigate significant noise impacts during the assessment of alternatives.

Ecosystem Protection and Restoration

- Any impacts to ecosystem form and function must be avoided where possible. The PFR should describe any proposed mitigation measures and how project planning will protect and enhance the local ecosystem.

- All natural heritage features should be identified and described in detail to assess potential impacts and to develop appropriate mitigation measures. The following sensitive environmental features may be located within or adjacent to the study area:

    - Areas of Natural and Scientific Interest (ANSIs)
    - Rare Species of flora or fauna
    - Watercourses
    - Wetlands
    - Woodlots

We recommend consulting with the Ministry of Natural Resources and Forestry (MNRF), Fisheries and Oceans Canada (DFO) and your local conservation authority to determine if special measures or additional studies will be necessary to preserve and protect these sensitive features. In addition, you may consider the provisions of the Rouge Park Management Plan if applicable.

Surface Water

- The PFR must include a sufficient level of information to demonstrate that there will be no negative impacts on the natural features or ecological functions of any watercourses within the study area. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g. spills, erosion, pollution) are mitigated as part of the proposed undertaking.

- Additional stormwater runoff from new pavement can impact receiving watercourses and flood conditions. Quality and quantity control measures to treat stormwater runoff should be considered for all new impervious areas and, where possible, existing surfaces. The ministry's Stormwater Management Planning and Design Manual (2003) should be referenced in the PFR and utilized when designing stormwater control methods. **A Stormwater Management Plan should be prepared as part of the Class EA process** that includes:

    - Strategies to address potential water quantity and erosion impacts related to stormwater draining into streams or other sensitive environmental features, and to ensure that adequate (enhanced) water quality is maintained
    - Watershed information, drainage conditions, and other relevant background information
    - Future drainage conditions, stormwater management options, information on erosion and sediment control during construction, and other details of the proposed works
    - Information on maintenance and monitoring commitments.

- Ontario Regulation 60/08 under the Ontario Water Resources Act (OWRA) applies to the Lake Simcoe Basin, which encompasses Lake Simcoe and the lands from which surface water drains into Lake Simcoe. If the proposed sewage treatment plant is listed in Table 1 of the regulation, the PFR should describe how the proposed project and its mitigation measures are consistent with the requirements of this regulation and the OWRA.

- Any potential approval requirements for surface water taking or discharge should be identified in the PFR. In particular, a Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, with the exception of certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information. Additionally, an Environmental Compliance Approval under the OWRA is required for municipal stormwater management works.

Groundwater

- The status of, and potential impacts to any well water supplies should be addressed. If the project involves groundwater takings or changes to drainage patterns, the quantity and quality of groundwater may be affected due to drawdown effects or the redirection of existing contamination flows. In addition, project activities may infringe on existing wells such that they must be reconstructed or sealed and abandoned. Appropriate information to define existing groundwater conditions should be included in the PFR.

- If the potential construction or decommissioning of water wells is identified as an issue, the PFR should refer to Ontario Regulation 903, Wells, under the OWRA.

- Potential impacts to groundwater-dependent natural features should be addressed. Any changes to groundwater flow or quality from groundwater taking may interfere with the ecological processes of streams, wetlands or other surficial features. In addition, discharging contaminated or high volumes of groundwater to these features may have direct impacts on their function. Any potential effects should be identified, and appropriate mitigation measures should be recommended. The level of detail required will be dependent on the significance of the potential impacts.

- Any potential approval requirements for groundwater taking or discharge should be identified in the PFR. In particular, a Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, with the exception of certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information.

Contaminated Soils

- Since the removal or movement of soils may be required, appropriate tests to determine contaminant levels from previous land uses or dumping should be undertaken. If the soils are contaminated, you must determine how and where they are to be disposed of, consistent with *Part XV.1 of the Environmental Protection Act* (EPA) and Ontario Regulation 153/04, Records of Site Condition, which details the new requirements related to site assessment and clean up. Please contact the ministry's District Offices for further consultation if contaminated sites are present.

- Any current or historical waste disposal sites should be identified in the PFR. The status of these sites should be determined to confirm whether approval pursuant to Section 46 of the EPA may be required for land uses on former disposal sites.

- The location of any underground storage tanks should be investigated in the PFR. Measures should be identified to ensure the integrity of these tanks and to ensure an appropriate response in the event of a spill. The ministry's Spills Action Centre must be contacted in such an event.

- The PFR should identify any underground transmission lines in the study area. The owners should be consulted to avoid impacts to this infrastructure, including potential spills.

Excess Materials Management

- Activities involving the management of excess soil should be completed in accordance with the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014) available online (http://www.ontario.ca/document/management-excess-soil-guide-best-management-practices).

- All waste generated during construction must be disposed of in accordance with ministry requirements.

Servicing and Facilities

- Any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste must have an Environmental Compliance Approval (ECA) before it can operate lawfully. Please consult with the Environmental Approvals Access and Service Integration Branch (EAASIB) to determine whether a new or amended ECA will be required for any proposed infrastructure.

- We recommend referring to the ministry's "D-Series" guidelines – Land Use Compatibility to ensure that any potential land use conflicts are considered when planning for any infrastructure or facilities related to wastewater, pipelines, landfills or industrial uses.

Mitigation and Monitoring

Contractors must be made aware of all environmental considerations so that all environmental standards and commitments for both construction and operation are met. Mitigation measures should be clearly referenced in the PFR and regularly monitored during the construction stage of the project. In addition, we encourage proponents to conduct post-construction monitoring to ensure all mitigation measures have been effective and are functioning properly.

- Design and construction reports and plans should be based on a best management approach that centres on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas.

- The proponent's construction and post-construction monitoring plans must be documented in the PFR, as outlined in Section A.2.5 and A.4.1 of the MEA Class EA parent document.

Consultation

- The PFR must demonstrate how the consultation provisions of the Class EA have been fulfilled, including documentation of all stakeholder consultation efforts undertaken during the planning process. This includes a discussion in the PFR that identifies concerns that were raised and **describes how they have been addressed by the proponent** throughout the planning process. The Class EA also directs proponents to include copies of comments submitted on the project by interested stakeholders, and the proponent's responses to these comments.

Class EA Process

- The PFR should provide clear and complete documentation of the planning process in order to allow for transparency in decision-making.

- If this project is a Master Plan: there are several different approaches that can be used to conduct a Master Plan, examples of which are outlined in Appendix 4 of the Class EA. The Master Plan should clearly indicate the selected approach for conducting the plan, in particular by identifying whether the levels of assessment, consultation and documentation are sufficient to fulfill the requirements for Schedule B or C projects. Please note that any Schedule B or C projects identified in the plan would be subject to Part II Order Requests under the *Environmental Assessment Act* (EAA), although the plan itself would not be.

- The Class EA requires the consideration of the effects of each alternative on all aspects of the environment. The PFR should include a level of detail (e.g. hydrogeological investigations, terrestrial and aquatic assessments) such that all potential impacts can be identified and appropriate mitigation measures can be developed. Any supporting studies conducted during the Class EA process should be referenced and included as part of the PFR.

- Please include in the PFR a list of all subsequent permits or approvals that may be required for the implementation of the preferred alternative, including but not limited to, MECP's PTTW, EASR

Registrations and ECAs, conservation authority permits, species at risk permits, and approvals under the *Canadian Environmental Assessment Act* (CEAA).

- Ministry guidelines and other information related to the issues above are available at http://www.ontario.ca/environment-and-energy/environment-and-energy. We encourage you to review all the available guides and to reference any relevant information in the PFR.

DEFINITIONS

The following definitions are specific to this document and may not apply in other contexts:

Aboriginal communities – the First Nation or Métis communities identified by the Crown for the purpose of consultation.

Consultation – the Crown's legal obligation to consult when the Crown has knowledge of an established or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. This is the type of consultation required pursuant to s. 35 of the *Constitution Act, 1982*. Note that this definition does not include consultation with Aboriginal communities for other reasons, such as regulatory requirements.

Crown – the Ontario Crown, acting through a particular ministry or ministries.

Procedural aspects of consultation – those portions of consultation related to the process of consultation, such as notifying an Aboriginal community about a project, providing information about the potential impacts of a project, responding to concerns raised by an Aboriginal community and proposing changes to the project to avoid negative impacts.

Proponent – the person or entity that wants to undertake a project and requires an Ontario Crown decision or approval for the project.

I. PURPOSE

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that may adversely impact that right. In outlining a framework for the duty to consult, the Supreme Court of Canada has stated that the Crown may delegate procedural aspects of consultation to third parties. This document provides general information about the Ontario Crown's approach to delegation of the procedural aspects of consultation to proponents.

This document is not intended to instruct a proponent about an individual project, and it does not constitute legal advice.

II. WHY IS IT NECESSARY TO CONSULT WITH ABORIGINAL COMMUNITIES?

The objective of the modern law of Aboriginal and treaty rights is the *reconciliation* of Aboriginal peoples and non-Aboriginal peoples and their respective rights, claims and interests. Consultation is an important component of the reconciliation process.

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. For example, the Crown's duty to consult is triggered when it considers issuing

a permit, authorization or approval for a project which has the potential to adversely impact an Aboriginal right, such as the right to hunt, fish, or trap in a particular area.

The scope of consultation required in particular circumstances ranges across a spectrum depending on both the nature of the asserted or established right and the seriousness of the potential adverse impacts on that right.

Depending on the particular circumstances, the Crown may also need to take steps to accommodate the potentially impacted Aboriginal or treaty right. For example, the Crown may be required to avoid or minimize the potential adverse impacts of the project.

III. THE CROWN'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

The Crown has the responsibility for ensuring that the duty to consult, and accommodate where appropriate, is met. However, the Crown may delegate the procedural aspects of consultation to a proponent.

There are different ways in which the Crown may delegate the procedural aspects of consultation to a proponent, including through a letter, a memorandum of understanding, legislation, regulation, policy and codes of practice.

If the Crown decides to delegate procedural aspects of consultation, the Crown will generally:

- Ensure that the delegation of procedural aspects of consultation and the responsibilities of the proponent are clearly communicated to the proponent;
- Identify which Aboriginal communities must be consulted;
- Provide contact information for the Aboriginal communities;
- Revise, as necessary, the list of Aboriginal communities to be consulted as new information becomes available and is assessed by the Crown;
- Assess the scope of consultation owed to the Aboriginal communities;
- Maintain appropriate oversight of the actions taken by the proponent in fulfilling the procedural aspects of consultation;
- Assess the adequacy of consultation that is undertaken and any accommodation that may be required;
- Provide a contact within any responsible ministry in case issues arise that require direction from the Crown; and
- Participate in the consultation process as necessary and as determined by the Crown.

IV. THE PROPONENT'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

Where aspects of the consultation process have been delegated to a proponent, the Crown, in meeting its duty to consult, will rely on the proponent's consultation activities and documentation of those activities. The consultation process informs the Crown's decision of whether or not to approve a proposed project or activity.

A proponent's role and responsibilities will vary depending on a variety of factors including the extent of consultation required in the circumstance and the procedural aspects of consultation the

Crown has delegated to it. Proponents are often in a better position than the Crown to discuss a project and its potential impacts with Aboriginal communities and to determine ways to avoid or minimize the adverse impacts of a project.

A proponent can raise issues or questions with the Crown at any time during the consultation process. If issues or concerns arise during the consultation that cannot be addressed by the proponent, the proponent should contact the Crown.

a) What might a proponent be required to do in carrying out the procedural aspects of consultation?

Where the Crown delegates procedural aspects of consultation, it is often the proponent's responsibility to provide notice of the proposed project to the identified Aboriginal communities. The notice should indicate that the Crown has delegated the procedural aspects of consultation to the proponent and should include the following information:

- a description of the proposed project or activity;
- mapping;
- proposed timelines;
- details regarding anticipated environmental and other impacts;
- details regarding opportunities to comment; and
- any changes to the proposed project that have been made for seasonal conditions or other factors, where relevant.

Proponents should provide enough information and time to allow Aboriginal communities to provide meaningful feedback regarding the potential impacts of the project. Depending on the nature of consultation required for a project, a proponent also may be required to:

- provide the Crown with copies of any consultation plans prepared and an opportunity to review and comment;
- ensure that any necessary follow-up discussions with Aboriginal communities take place in a timely manner, including to confirm receipt of information, share and update information and to address questions or concerns that may arise;
- as appropriate, discuss with Aboriginal communities potential mitigation measures and/or changes to the project in response to concerns raised by Aboriginal communities;
- use language that is accessible and not overly technical, and translate material into Aboriginal languages where requested or appropriate;
- bear the reasonable costs associated with the consultation process such as, but not limited to, meeting hall rental, meal costs, document translation(s), or to address technical & capacity issues;
- provide the Crown with all the details about potential impacts on established or asserted Aboriginal or treaty rights, how these concerns have been considered and addressed by the proponent and the Aboriginal communities and any steps taken to mitigate the potential impacts;
- provide the Crown with complete and accurate documentation from these meetings and communications; and
- notify the Crown immediately if an Aboriginal community not identified by the Crown approaches the proponent seeking consultation opportunities.

b) What documentation and reporting does the Crown need from the proponent?

Proponents should keep records of all communications with the Aboriginal communities involved in the consultation process and any information provided to these Aboriginal communities.

As the Crown is required to assess the adequacy of consultation, it needs documentation to satisfy itself that the proponent has fulfilled the procedural aspects of consultation delegated to it. The documentation required would typically include:

- the date of meetings, the agendas, any materials distributed, those in attendance and copies of any minutes prepared;
- the description of the proposed project that was shared at the meeting;
- any and all concerns or other feedback provided by the communities;
- any information that was shared by a community in relation to its asserted or established Aboriginal or treaty rights and any potential adverse impacts of the proposed activity, approval or disposition on such rights;
- any proposed project changes or mitigation measures that were discussed, and feedback from Aboriginal communities about the proposed changes and measures;
- any commitments made by the proponent in response to any concerns raised, and feedback from Aboriginal communities on those commitments;
- copies of correspondence to or from Aboriginal communities, and any materials distributed electronically or by mail;
- information regarding any financial assistance provided by the proponent to enable participation by Aboriginal communities in the consultation;
- periodic consultation progress reports or copies of meeting notes if requested by the Crown;
- a summary of how the delegated aspects of consultation were carried out and the results; and
- a summary of issues raised by the Aboriginal communities, how the issues were addressed and any outstanding issues.

In certain circumstances, the Crown may share and discuss the proponent's consultation record with an Aboriginal community to ensure that it is an accurate reflection of the consultation process.

c) Will the Crown require a proponent to provide information about its commercial arrangements with Aboriginal communities?

The Crown may require a proponent to share information about aspects of commercial arrangements between the proponent and Aboriginal communities where the arrangements:

- include elements that are directed at mitigating or otherwise addressing impacts of the project;
- include securing an Aboriginal community's support for the project; or
- may potentially affect the obligations of the Crown to the Aboriginal communities.

The proponent should make every reasonable effort to exempt the Crown from confidentiality provisions in commercial arrangements with Aboriginal communities to the extent necessary to allow this information to be shared with the Crown.

The Crown cannot guarantee that information shared with the Crown will remain confidential. Confidential commercial information should not be provided to the Crown as part of the consultation record if it is not relevant to the duty to consult or otherwise required to be submitted to the Crown as part of the regulatory process.

V. WHAT ARE THE ROLES AND RESPONSIBILITIES OF ABORIGINAL COMMUNITIES' IN THE CONSULTATION PROCESS?

Like the Crown, Aboriginal communities are expected to engage in consultation in good faith. This includes:

- responding to the consultation notice;
- engaging in the proposed consultation process;
- providing relevant documentation;
- clearly articulating the potential impacts of the proposed project on Aboriginal or treaty rights; and
- discussing ways to mitigates any adverse impacts.

Some Aboriginal communities have developed tools, such as consultation protocols, policies or processes that provide guidance on how they would prefer to be consulted. Although not legally binding, proponents are encouraged to respect these community processes where it is reasonable to do so. Please note that there is no obligation for a proponent to pay a fee to an Aboriginal community in order to enter into a consultation process.

To ensure that the Crown is aware of existing community consultation protocols, proponents should contact the relevant Crown ministry when presented with a consultation protocol by an Aboriginal community or anyone purporting to be a representative of an Aboriginal community.

VI. WHAT IF MORE THAN ONE PROVINCIAL CROWN MINISTRY IS INVOLVED IN APPROVING A PROPONENT'S PROJECT?

Depending on the project and the required permits or approvals, one or more ministries may delegate procedural aspects of the Crown's duty to consult to the proponent. The proponent may contact individual ministries for guidance related to the delegation of procedural aspects of consultation for ministry-specific permits/approvals required for the project in question. Proponents are encouraged to seek input from all involved Crown ministries sooner rather than later.

Rodo, Jaclyn

From: Rodo, Jaclyn
Sent: January 14, 2021 9:59 AM
To: NHIC-Requests (MNRF)
Subject: RE: City of Mississauga - Claredale Site Screening

Hi Tim,

Yes, you are correct! Thank you for catching that any making the adjustment to the search results.

Thanks!

Jaclyn Rodo
Ecologist

M 705 761 7792

From: NHIC-Requests (MNRF) [mailto:nhicrequests@ontario.ca]
Sent: January 14, 2021 9:19 AM
To: Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>
Subject: RE: City of Mississauga - Claredale Site Screening

Hello Jaclyn,

I think you may have meant squares (17PJ1425, 17PJ1525, 17PJ1424, and 17PJ1524)

should be ->

In my queries of the NHIC database I assumed this correction.

The NHIC database contains records for the species listed below that intersect with the squares you are interested in:

ATLAS_NAD83	SPECIES_ELEMENT_ID	SCIENTIFIC_NAME	ENGLISH_COMMON_NAME	FRENCH_COMMON_NAME	RESTRICTED_
17PJ1425	44012	Juglans cinerea	Butternut	noyer cendré	N

ATLAS_NAD83	SPECIES_ELEMENT_ID	SCIENTIFIC_NAME	ENGLISH_COMMON_NAME	FRENCH_COMMON_NAME	RESTRICTED_
17PJ1425	180001	Ambystoma jeffersonianum	Jefferson Salamander	Salamandre de Jefferson	N
17PJ1424	180323	Hirundo rustica	Barn Swallow	Hirondelle rustique	N
17PJ1425	180323	Hirundo rustica	Barn Swallow	Hirondelle rustique	N
17PJ1525	180323	Hirundo rustica	Barn Swallow	Hirondelle rustique	N
17PJ1524	180323	Hirundo rustica	Barn Swallow	Hirondelle rustique	N
17PJ1524	180329	Corvus ossifragus	Fish Crow	Corneille de rivage	N
17PJ1425	180455	Ammodramus henslowii	Henslow's Sparrow	Bruant de Henslow	N
17PJ1424	180455	Ammodramus henslowii	Henslow's Sparrow	Bruant de Henslow	N
17PJ1525	180455	Ammodramus henslowii	Henslow's Sparrow	Bruant de Henslow	N
17PJ1524	180455	Ammodramus henslowii	Henslow's Sparrow	Bruant de Henslow	N
17PJ1525	180471	Dolichonyx oryzivorus	Bobolink	Goglu des prés	N
17PJ1424	180745	Chelydra serpentina	Snapping Turtle	Tortue serpentine	N
17PJ1525	180749	Chrysemys picta marginata	Midland Painted Turtle	Turtue peinte du centre	N
17PJ1425	180749	Chrysemys picta marginata	Midland Painted Turtle	Turtue peinte du centre	N
17PJ1424	180749	Chrysemys picta marginata	Midland Painted Turtle	Turtue peinte du centre	N
17PJ1424	180753	Graptemys geographica	Northern Map Turtle	Tortue géographique	N
17PJ1525	180758	Sternotherus odoratus	Eastern Musk Turtle	Tortue musquée	N
17PJ1425	180758	Sternotherus odoratus	Eastern Musk Turtle	Tortue musquée	N
17PJ1524	193996	Falco peregrinus	Peregrine Falcon	Faucon pèlerin	N

Let me know if you have any further questions

Thank you,

Tim

Tim Haan
NHIC Information Analyst
Natural Heritage Information Centre
Ontario Ministry of Natural Resources and Forestry
Peterborough Ontario

From: Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>
Sent: January 12, 2021 5:35 PM
To: Species at Risk (MECP) <SAROntario@ontario.ca>; NHIC-Requests (MNRF) <nhicrequests@ontario.ca>
Subject: [WARNING: UNSCANNABLE EXTRACTION FAILED]City of Mississauga - Claredale Site Screening

Good afternoon,

WSP Canada (WSP) would like to request information related to a project site within the City of Mississauga. The site is located northwest of the Beachwood Ave. and Lakeshore Road E intersection. I've attached a figure and associated KMZ layer.

We are in the process of conducting an ecological review of the site in order to develop a site-specific mitigation plan. As a preliminary step in our background review, WSP consulted the NHIC database (17PJ1423, 17PJ1525, 17PJ1424, and 17PJ1524) to determine if there are documented records of Species at Risk (SAR) within the area of the site. The following SAR were revealed: Henslow's Sparrow, Jefferson Salamander, Eastern Musk Turtle, Butternut, and Barn Swallow.

We understand that the ministry may have additional information for the site which is not currently available through the NHIC or other public databases. We would be appreciative of any additional SAR information your ministry may have.

If you have questions regarding this request email, please do not hesitate to contact me.

Thank you,

Jaclyn Rodo
Ecologist

T 705 270 0178
M 705 761 7792

294 Rink Street, Suite 103
Peterborough, Ontario K9J 2K2

APPENDIX

A-5 *PUBLIC CONSULTATION SUMMARY*

Nishio, Jonathan

From: LeDrew, Lyle <lyle.ledrew@peelregion.ca>
Sent: Friday, July 10, 2020 9:48 AM
To: [redacted]
Cc: Nishio, Jonathan; Albert, Michelle
Subject: RE: Class EA Public Notice - Redirecting Wastewater Flows from Claredale Road to Beechwood Pumping Station

[redacted]

Thank you for your email.

The proposed tunnel shaft locations have previously been disturbed by recent landscaping and construction works. Furthermore, the tunnel crossing under Cooksville Creek is at significant depth such that there will be no disturbance to the above soil.
Thus, an archaeological assessment is not anticipated to be part of the EA.

Please let me know if you have any questions or require additional information.

Regards,

Lyle LeDrew C.E.T.
Project Manager
Wastewater Capital Works
10 Peel Centre Dr., suite B, 4th Floor
Brampton, ON L6T 4B9
Office: 905-791-7800 x 7836
Mobile: 416-573-0263

Region of Peel
working with you

From: [redacted]
Sent: July 9, 2020 3:55 PM
To: LeDrew, Lyle <lyle.ledrew@peelregion.ca>
Cc: Nishio, Jonathan <Jonathan.Nishio@wsp.com>; Albert, Michelle <Michelle.Albert@wsp.com>
Subject: Re: Class EA Public Notice - Redirecting Wastewater Flows from Claredale Road to Beechwood Pumping Station

Good afternoon Lyle,

Thanks for your email and notice on the Redirecting Wastewater Flows from Claredale Road to Beechwood Pumping Station Project.

Could you please let us know if any archaeological assessment are anticipated as part of the EA ?

Thanks and best regards,

[redacted]

De: "LeDrew, Lyle" <lyle.ledrew@peelregion.ca>
À: "LeDrew, Lyle" <lyle.ledrew@peelregion.ca>
Cc: "Nishio, Jonathan" <Jonathan.Nishio@wsp.com>, "Albert, Michelle" <Michelle.Albert@wsp.com>
Envoyé: Jeudi 9 Juillet 2020 15:45:36
Objet: Class EA Public Notice - Redirecting Wastewater Flows from Claredale Road to Beechwood Pumping Station

Good Afternoon,

The Region of Peel, along with their Consultant (WSP), is undertaking a Schedule B under the Municipal Engineer's Association Class Environmental Association (EA) process related to replacement of the siphon under Cooksville Creek, which will involve redirecting wastewater flows from the Claredale Road area to the Beechwood Pumping Station located in the City of Mississauga. Replacement of the siphon will address aging infrastructure, reduce operating costs and mitigate flood potential in the study area.

An evaluation of alternative solutions has been completed and the recommended alternative is the construction of a new gravity sewer extending to the Beechwood Pumping Station from south of Claredale Road. The gravity sewer would remove the requirement for a siphon, eliminating the additional operational requirements of the siphon.

Due to the current restrictions for public meetings the Region is conducting online public engagement to replace the typical Public Information Centre and to address the Schedule B Class EA consultation requirement. The attached Public Notice provides information on the project and a link to the Online Public Engagement presentation. The Notice indicates that comments are due by July 24, 2020 and who to forward any comments to.

We thank you in advance for your participation in the project.

Lyle LeDrew C.E.T.
Project Manager
Wastewater Capital Works
10 Peel Centre Dr., suite B, 4th Floor
Brampton, ON L6T 4B9
Office: 905-791-7800 x 7836
Mobile: 416-573-0263

Region of Peel
working with you

Nishio, Jonathan

From: LeDrew, Lyle <lyle.ledrew@peelregion.ca>
Sent: Friday, July 17, 2020 3:12 PM
To: Nishio, Jonathan; Albert, Michelle
Subject: FW: Claredale EA

FYI,

Also, note that notices were received last week 😊

From: [redacted]
Sent: July 17, 2020 3:10 PM
To: LeDrew, Lyle <lyle.ledrew@peelregion.ca>
Subject: Re: Claredale EA

CAUTION: EXTERNAL MAIL. DO NOT CLICK ON LINKS OR OPEN ATTACHMENTS YOU DO NOT TRUST.

Thanks Lyle

I think we received the Notice at the beginning of last week (around July 6 or 7)

[redacted]

On Friday, July 17, 2020, 02:51:12 p.m. EDT, LeDrew, Lyle <lyle.ledrew@peelregion.ca> wrote:

Good Afternoon [redacted]

Sorry for the inconvenience. Please try these links below:

Link to the notice:

https://www.peelregion.ca/public-works/environmental-assessments/mississauga/beechwood-pumping-station.asp

And this link will take you directly to the project information boards:

https://www.peelregion.ca/public-works/environmental-assessments/_media/claredale-ea-public-consultation-presentation.pdf

Can I ask you a side question? When did you receive the notice? You're the first person to contact me regarding this project and curious how long it took for delivery.

Please let me know if you have any questions or require additional information.

Lyle LeDrew C.E.T.

Project Manager

Wastewater Capital Works

10 Peel Centre Dr., suite B, 4th Floor

Brampton, ON L6T 4B9

Office: 905-791-7800 x 7836

Mobile: 416-573-0263

Region of Peel
working with you

From: [redacted]
Sent: July 17, 2020 2:45 PM
To: LeDrew, Lyle <lyle.ledrew@peelregion.ca>
Subject: Claredale EA

Hi Lyle

[redacted] I recently received notice regarding the replacement of the siphon under Cooksville Creek. The Notice provided a link that would provide me with more information. I have not been succeful with the link.

Can you please forward me that link so that I can review the display boards?

Thanks

[redacted]

Nishio, Jonathan

From: LeDrew, Lyle <lyle.ledrew@peelregion.ca>
Sent: Friday, July 17, 2020 3:20 PM
To: Nishio, Jonathan; Albert, Michelle
Subject: FW: Redirecting Wastewater Flows from Claredale Road to Beechwood Pumping Station
Attachments: 2020-07-17_RedirectingWastewaterFlowsMHSTCI-Ltr.pdf

Comments on the Claredale EA for review and consideration.

Lyle

From: [redacted]
Sent: July 17, 2020 3:15 PM
To: LeDrew, Lyle <lyle.ledrew@peelregion.ca>
Cc: [redacted]
Subject: Redirecting Wastewater Flows from Claredale Road to Beechwood Pumping Station

CAUTION: EXTERNAL MAIL. DO NOT CLICK ON LINKS OR OPEN ATTACHMENTS YOU DO NOT TRUST.

Lyle Ledrew,

Please find attached MHSTCI's acknowledgement of receipt for the above referenced EA terms of reference. Contact [redacted] with any further questions or concerns.

[redacted]
On behalf of

[redacted]
Heritage Planner
Heritage Planning Unit
[redacted]

Ministry of Heritage, Sport, Tourism and Culture Industries

Programs and Services Branch
401 Bay Street, Suite 1700
Toronto, ON M7A 0A7
Tel: 416.314.7147

Ministère des Industries du Patrimoine, du Sport, du Tourisme et de la Culture

Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto, ON M7A 0A7
Tél: 416.314.7147

Ontario

July 17, 2020 EMAIL ONLY

Lyle LeDrew
Project Manager
Region of Peel
10 Peel Centre Drive, Suite B, 4th Fl.
Brampton, ON L6T 4B9
Lyle.ledrew@peelregion.ca

MHSTCI File	**:**	**0012714**
Proponent	**:**	**The Region of Peel**
Subject	**:**	**Notice of Study Commencement – Municipal Class EA**
Project	**:**	**Claredale Rd. to Beechwood Pumping Station**
Location	**:**	**The Region of Peel**

Dear Lyle LeDrew:

Thank you for providing the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) with the Notice of Study Commencement description for the above-referenced project. MHSTCI's interest in this Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- Archaeological resources, including land and marine;
- Built heritage resources, including bridges and monuments; and,
- Cultural heritage landscapes.

Under the EA process, the proponent is required to determine a project's potential impact on cultural heritage resources.

Project Summary
The Region of Peel has identified the need to replace the siphon under Cooksville Creek, which will involve redirecting wastewater flows from the Claredale Rd. area to the Beechwood Pumping Station. As a result, a Schedule 'B' Class Environmental Assessment (EA) has been initiated to identify a solution for this infrastructure need.

Identifying Cultural Heritage Resources
While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation. Indigenous communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Indigenous communities includes a discussion about known or potential cultural heritage resources that are of value to these communities. Municipal heritage committees, historical societies and other local heritage organizations may also have knowledge that contributes to the identification of cultural heritage resources.

Archaeological Resources
This EA project may impact archaeological resources and should be screened using the MHSTCI *Criteria for Evaluating Archaeological Potential* to determine if an archaeological assessment is needed. MHSTCI archaeological sites data are available at *archaeology@ontario.ca*. If the EA project area exhibits archaeological potential, then an archaeological assessment (AA) should be undertaken by an archaeologist licenced under the *OHA*, who is responsible for submitting the report directly to MHSTCI for review.

Built Heritage and Cultural Heritage Landscapes
The MHSTCI *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* should be completed to help determine whether this EA project may impact cultural heritage resources. If potential or known heritage resources exist, MHSTCI recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, should be completed to assess potential project impacts. Our Ministry's *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* outlines the scope of HIAs. Please send the HIA to MHSTCI for review, and make it available to local organizations or individuals who have expressed interest in review.

Environmental Assessment Reporting
All technical cultural heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MHSTCI whether any technical cultural heritage studies will be completed for this EA project, and provide them to MHSTCI before issuing a Notice of Completion or commencing any work on the site. If screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Thank you for consulting MHSTCI on this project and please continue to do so throughout the EA process. If you have any questions or require clarification, do not hesitate to contact [redacted]

Sincerely,

[redacted]
On behalf of

[redacted]
Heritage Planner
Heritage Planning Unit
[redacted]

Nishio, Jonathan

From: LeDrew, Lyle <lyle.ledrew@peelregion.ca>
Sent: Friday, July 31, 2020 1:46 PM
To: Nishio, Jonathan; Albert, Michelle
Subject: FW: Claredale Rd. to Beechwood Pumping Station
Attachments: 2932_001.pdf

FYI and Action.

Claredale EA

Lyle

From: [redacted]
Sent: July 28, 2020 10:54 AM
To: LeDrew, Lyle <lyle.ledrew@peelregion.ca>
Subject: Claredale Rd. to Beechwood Pumping Station

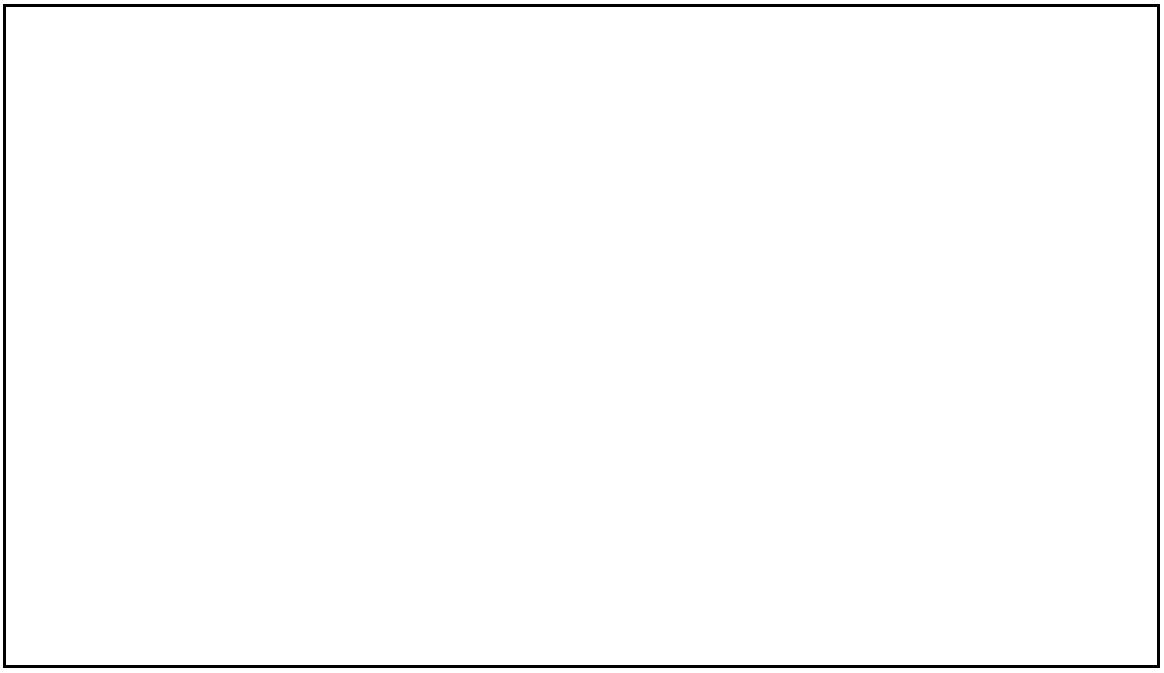
Good morning,

This is to acknowledge reception of the attached notice on the Claredale Rd. to Beechwood Pumping Station EA.

Could you please let us know if any archaeological assessment is anticipated as part of the EA ?

Thanks and best regards,

[redacted]



De: [redacted]
À: [redacted]
Envoyé: Lundi 27 Juillet 2020 13:19:20
Objet: Suivi Courrier

De : [redacted]
Envoyé : 27 juillet 2020 12:44
À : [redacted]
Objet : Fichier Joint

Public Notice

Region of Peel
working with you

Environmental Assessment Study

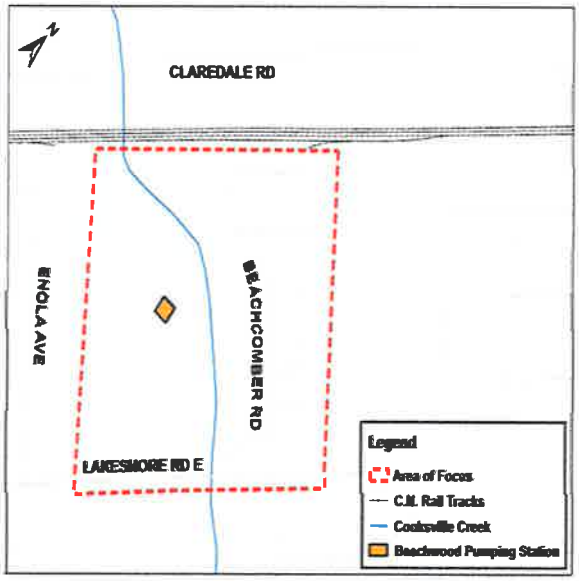
NOTICE OF STUDY COMMENCEMENT AND ONLINE PUBLIC ENGAGEMENT- SCHEDULE B

Claredale Rd. to Beechwood Pumping Station

The Study

The Region of Peel has identified the need to replace the siphon under Cooksville Creek, which will involve redirecting wastewater flows from the Claredale Rd. area to the Beechwood Pumping Station. As a result, a Schedule 'B' Class Environmental Assessment (EA) has been initiated to identify a solution for this infrastructure need. The *map* below shows the area that may be directly impacted by the proposed construction.

Claredale EA: Area of Focus Map



The Study Process will include:

- Public and stakeholder consultations;
- An evaluation of alternative solutions;
- An assessment of proposed alternatives; and,
- Identification of methods to lessen the adverse impacts to the community.

How to Get Involved

As part of the Study, online public engagement has been arranged to allow interested members of the public an opportunity to review and comment on the alternatives, including the preferred alternative, the evaluation process, and next steps in the Study process.

Display boards will be made available to the public on **peelregion.ca/public-works/environmental-assessments** starting **July 2, 2020.**

Please submit any comments or concerns by **July 24, 2020.** *Any input received by that date will be* incorporated into the Project File Report, which will be available for public review when the study is completed.

Contact

To provide comments or request additional information about this project, please contact:

Lyle LeDrew
Project Manager, Water & Wastewater
905-791-7800 ext. 7836
Lyle.ledrew@peelregion.ca

This Notice was first issued on July 2, 2020.

With the exception of personal information, all comments will become part of the public record of the study. The study is being conducted according to the requirements of the Municipal Class Environmental Assessment, which is a planning process approved under Ontario's *Environmental Assessment Act.*

Claredale Environmental Assessment Project

Schedule ‘B’ Class Environmental Assessment

Public Consultation

Thursday, July 2, 2020

WSP

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Claredale Environmental Assessment

Why is the Claredale EA Project taking place?

The objective of the Claredale EA project is to determine the best solution that fully addresses the following problems:

1. The siphons crossing Cooksville Creek are old and do not meet Peel Region's current design standards.
2. The siphons are prone to frequent blockage, resulting in sewage backing up into basements.
3. Peel Region has experienced accessibility and maintenance challenges to unblock the siphons.
4. The sanitary maintenance hole on the north bank of Cooksville Creek is at risk of leaking, causing contamination into the Creek.

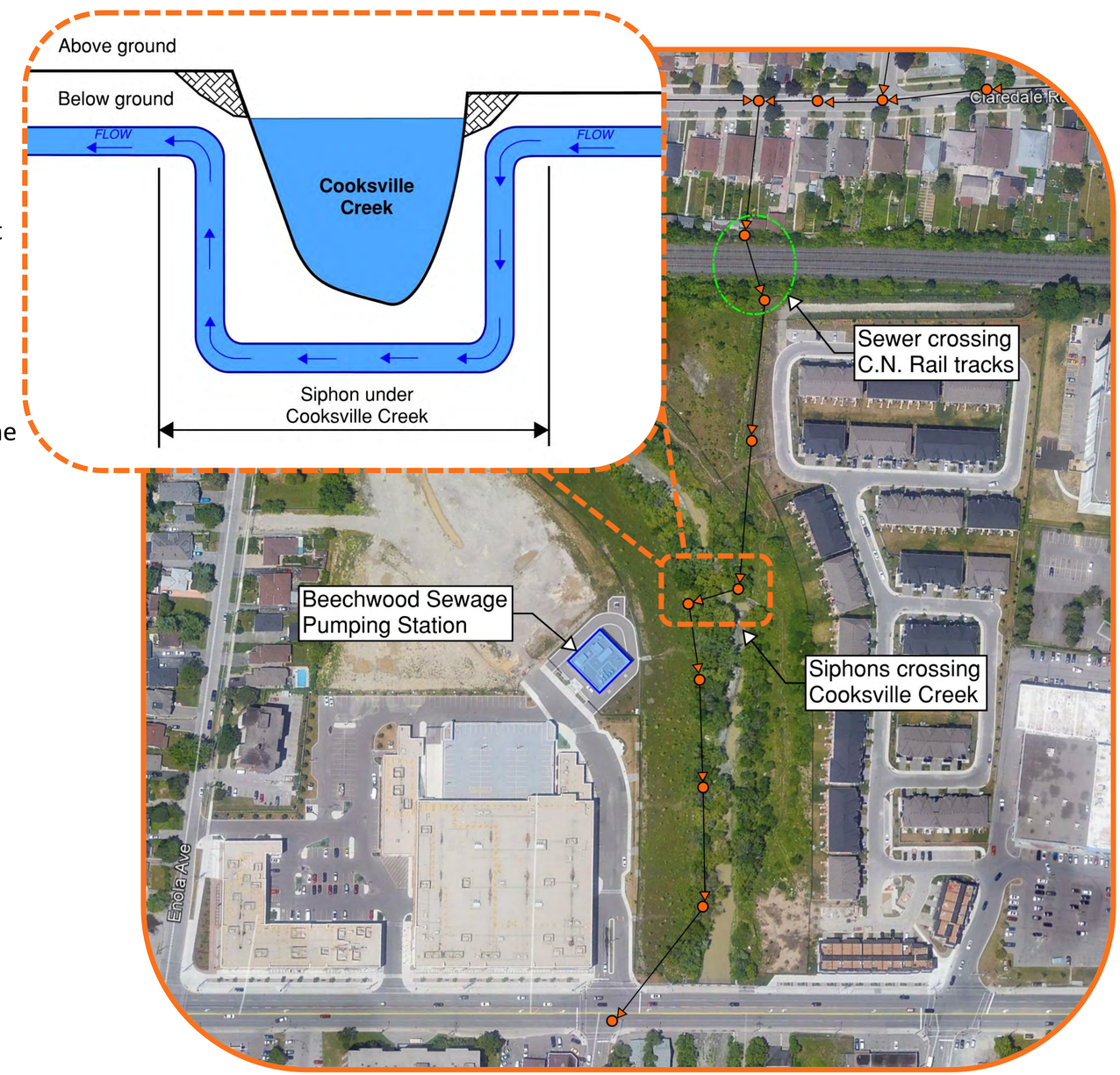
Purpose of Public Consultation

The purpose of this public consultation is to tell you about:

- The problem solving process being followed
- The preferred solution for rerouting flows to bypass the siphons

Background

Sanitary flows from the Claredale neighbourhood drain southwards, crossing the C.N. Rail tracks, then under Cooksville Creek by means of siphons. The flows eventually discharge to Beechwood Sewage Pumping Station.



Claredale Environmental Assessment

Problem Solving Process

Reasons to Replace the Siphons

There are 4 reasons why the siphons need to be replaced.

1. The siphons crossing Cooksville Creek are old and do not meet Peel Region's current design standards.
2. The siphons are prone to frequent blockage, resulting in sewage backing up into basements.
3. Peel Region has experienced accessibility and maintenance challenges to unblock the siphons.
4. The sanitary maintenance hole on the north bank of Cooksville Creek is at risk of leaking, causing contamination into the Creek.

Alternatives

Alternatives deemed to be feasible and practical were screened with respect to the 4 reasons for replacing the siphons.

1. Do Nothing

X **Does not address any of the 4 reasons**

2. Inflow and Infiltration Reduction

X **Does not address reasons 1, 3 and 4**

3. Rerouting of Flows from the Claredale Road Sanitary Catchment Area

✓ **Fully addresses all 4 reasons**

Evaluation

Each Alternative was evaluated based on the following criteria:

- Natural Environment
- Social & Cultural
- Technical
- Financial

Preferred Solution

Alternative 3A.

Installation of a new sewer crossing Cooksville Creek with connection to Beechwood Sewage Pumping Station

Public Consultation

To confirm the preferred solution and identify additional mitigating measures.

Want to know more about Environmental Assessments?

Check out our website at:
https://www.peelregion.ca/pw/environ-assess/ea.htm

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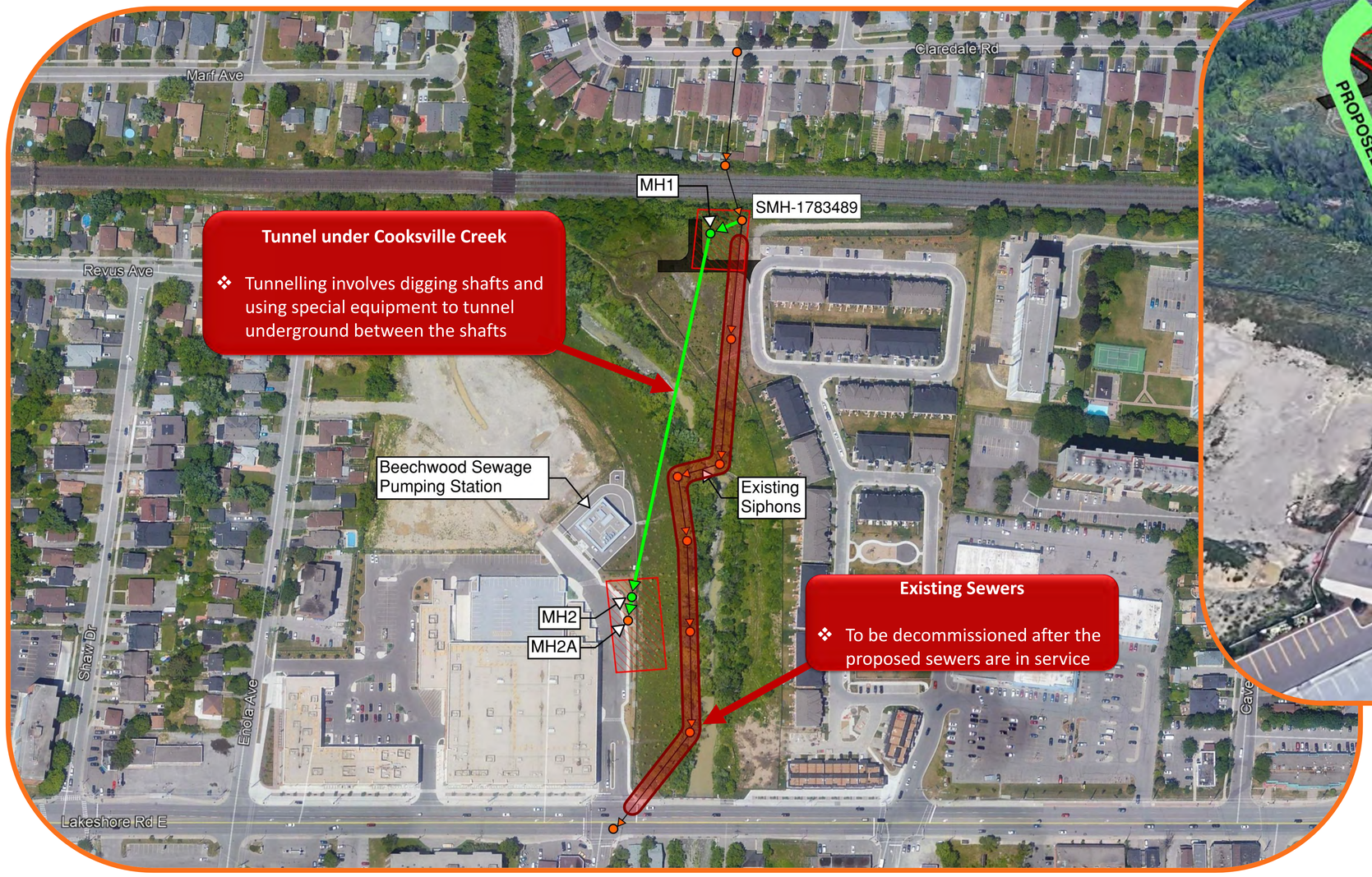
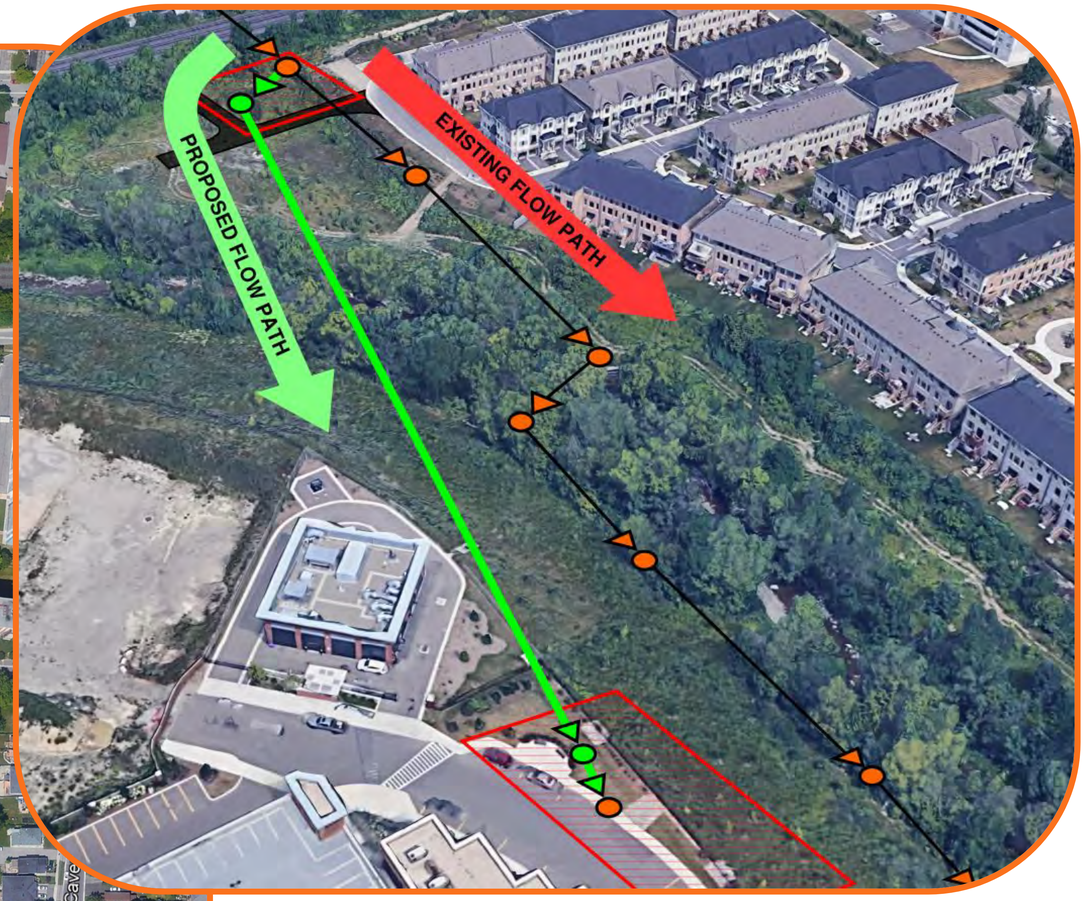
Claredale Environmental Assessment

Alternative 3A





Legend

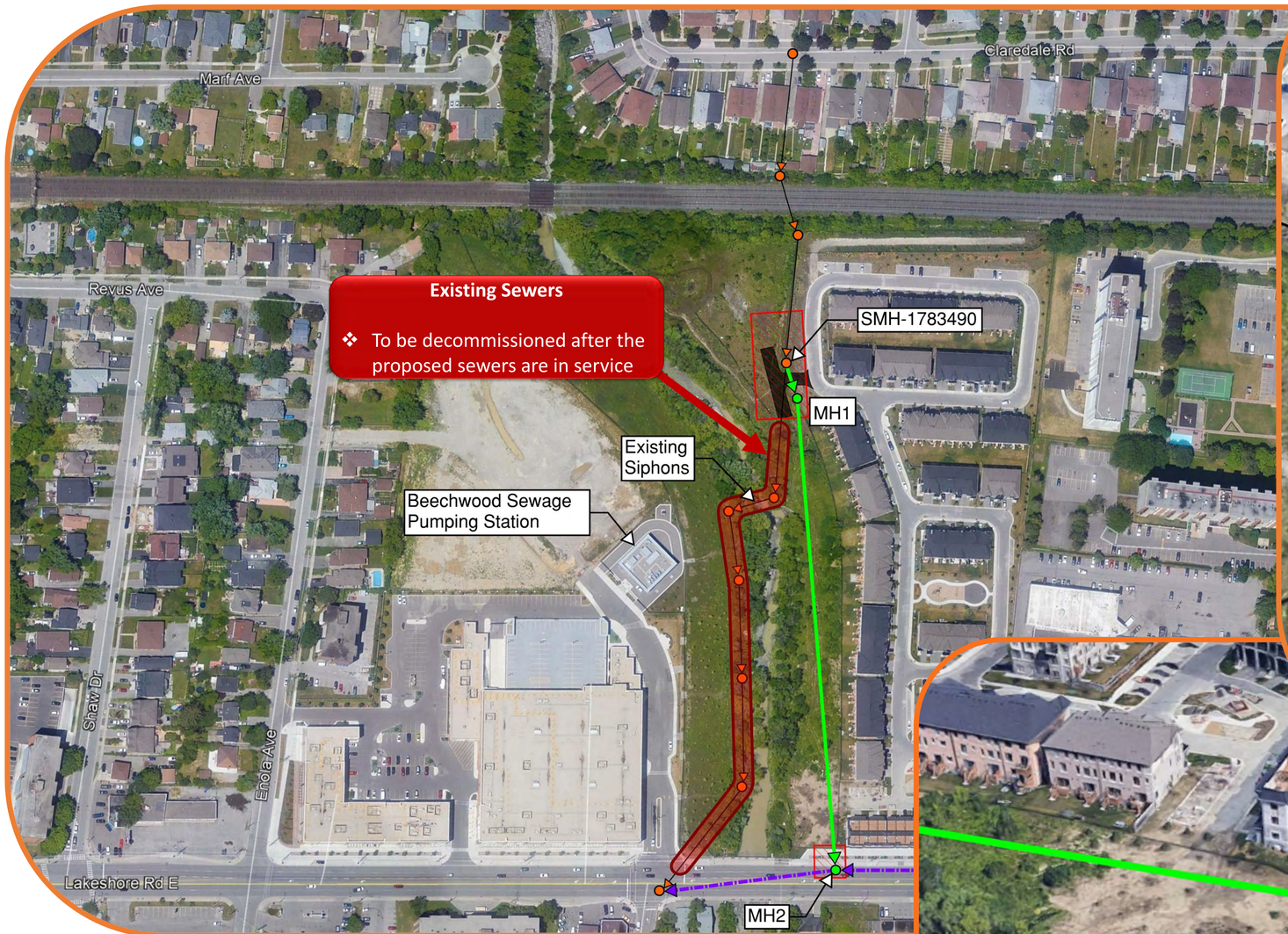
- Existing Maintenance Hole
- Existing Sanitary Sewer Flow Direction
- Proposed Maintenance Hole
- Proposed Sanitary Sewer Flow Direction
- Proposed Construction Compound
- Access Road

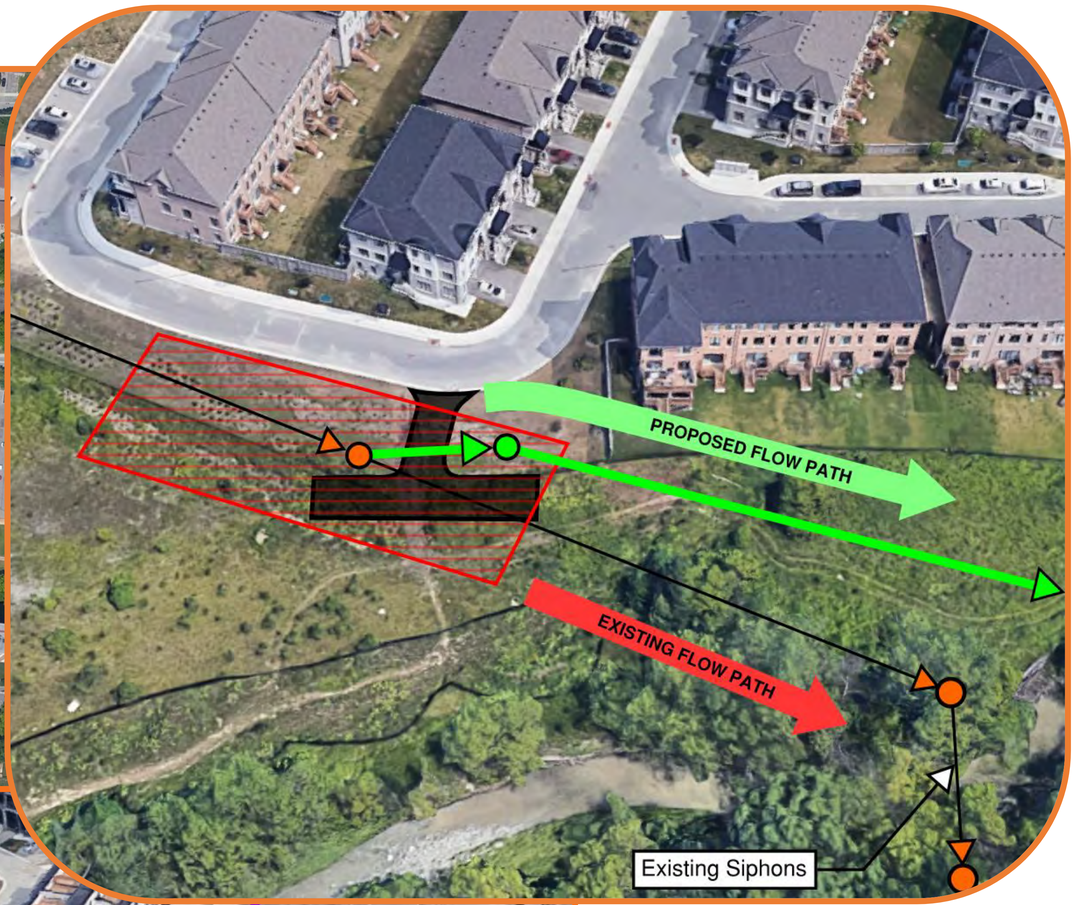
Technical Features

- All sanitary flows will be redirected to MH2A via the proposed sewers crossing Cooksville Creek.
- The sewer crossing Cooksville Creek will be installed using a tunnel to avoid any direct impacts to the watercourse.

Claredale Environmental Assessment

Alternative 3B





Legend

- Existing Maintenance Hole
- Existing Sanitary Sewer Flow Direction
- Proposed Maintenance Hole
- Proposed Sanitary Sewer Flow Direction
- Proposed Construction Compound
- Access Road
- Future Sanitary Sewer (Separate Peel Region Project)

Technical Features

All sanitary flows will be redirected to the proposed sewers, connecting to a future sewer along Lakeshore Road East.

Construction of the future sewer along Lakeshore Road East is not part of the Claredale EA project.

Claredale Environmental Assessment

Evaluation Criteria

EVALUATION METHODOLOGY

STEP 1
Determine Evaluation Criteria

STEP 2
Evaluate the Alternatives

STEP 3
Determine the Preferred Solution

NATURAL ENVIRONMENT

- Proximity to environmentally sensitive areas
- Impact to watercourses
- Impact to species at risk
- Tree removal
- Potential for contamination
- Greenhouse gas emissions & carbon footprint

SOCIAL & CULTURAL

- Impact to cultural heritage resources
- Land use / zoning compliance
- Traffic impacts during construction
- Noise impacts during construction
- Dust impacts during construction
- Removal of recreational space (private or public)

TECHNICAL

- Constructability
- Impact on existing utilities
- Permits and approvals

ECONOMIC

- Capital costs
- Lifecycle costs

Claredale Environmental Assessment

Evaluation Matrix

Preferred Solution

EVALUATION CRITERIA	Alternative 3A	Alternative 3B
Natural Environment	The construction site is within lands designated as Greenlands – Natural Hazards Zone.	The construction site is within lands designated as Greenlands – Natural Hazards Zone.
Social & Cultural	Locating the main construction compound at Beechwood Sewage Pumping Station will reduce traffic, noise, and dust impacts to residents along Beachcomber Road.	Construction on Lakeshore Road East will result in significant traffic impacts, as well as dust and noise impacts to nearby residents and businesses. The recently completed streetscaping works along Lakeshore Road East will need to be demolished and then rehabilitated.
Technical	There is some construction complexity involved in microtunneling under Cooksville Creek.	The major issue with this alternative is that it needs to connect to a sewer that has not yet been built. This new Lakeshore Road East sewer is to be constructed under a separate Peel Region project. Construction on Lakeshore Road East will introduce complexity with traffic control and tighter space constraints.
Economic	Construction costs for this alternative are lower than Alternative 3B.	Construction costs will be higher due to the longer sewer length and cost of traffic control for works along Lakeshore Road East.

EVALUATION COLOUR RATING SYSTEM

Most Preferred

Less Preferred

Least Preferred

Claredale Environmental Assessment

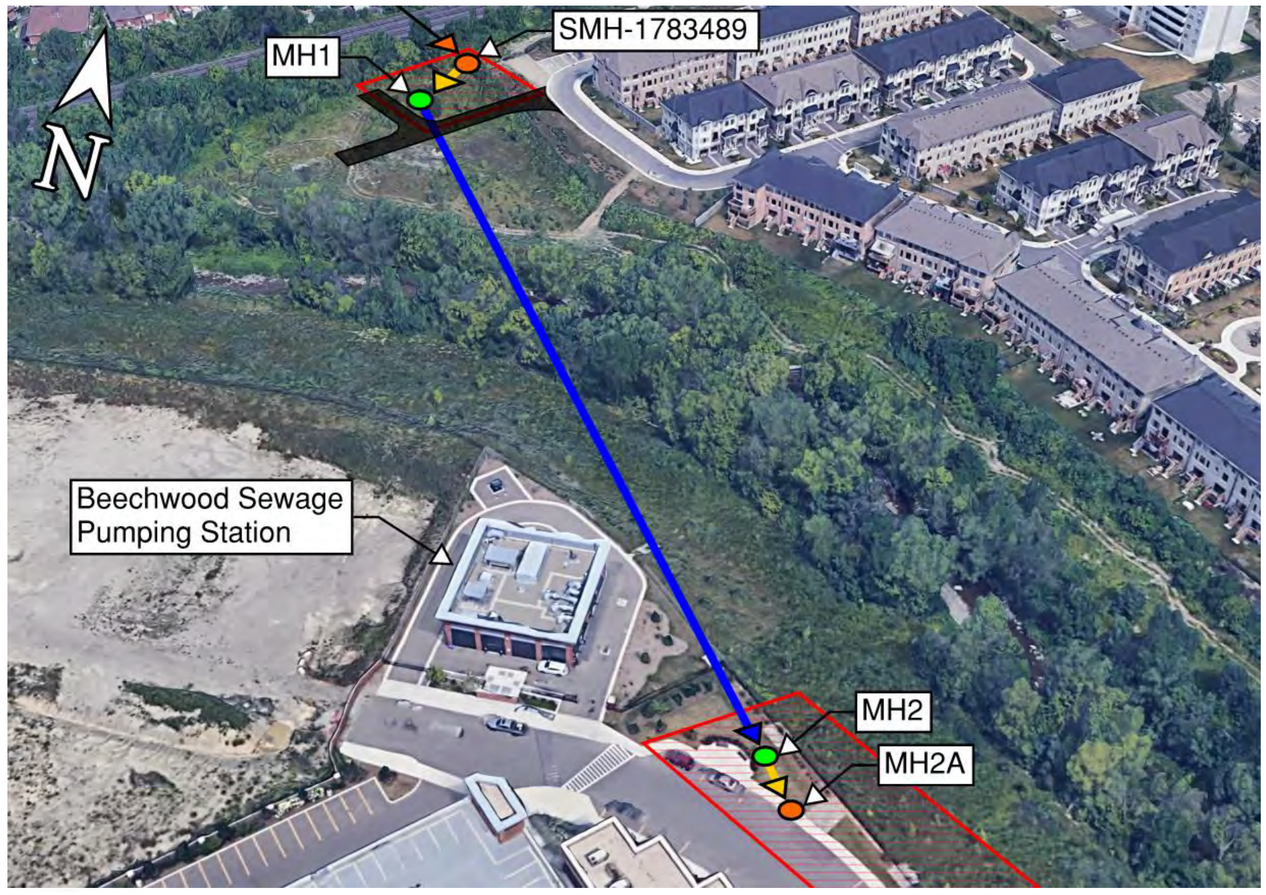
Preferred Solution

How will you be impacted?

- Estimated construction duration: 6 months
- Noise and dust from heavy machinery
- Construction traffic through Beachcomber Road to access MH1 and Beechwood Avenue to access MH2
- Once construction is complete, there will be no more dust, noise and traffic related construction impacts

How will we reduce the ways you are impacted?

- Construction work hours will comply with the City of Mississauga noise by-law, limiting work from Monday to Saturday, between 7:00 a.m. to 7:00 p.m.
- The main construction compound will be located near Beechwood Sewage Pumping Station, reducing impacts to the Beachcomber Road neighbourhood
- Trenchless construction methods will be used to limit traffic, noise and dust impacts



Claredale Environmental Assessment

Next Steps

Stay Informed

If you would like to submit your comments directly to the Study Team, please contact:

Lyle LeDrew
Project Manager, Water & Wastewater
Region of Peel
Phone: 905-791-7800 ext. 7836
Email: Lyle.ledrew@peelregion.ca

Please provide your feedback before July 24th, 2020.

Public Consultation

Opportunity for the public to provide feedback on the project.

Project File Report

Document findings of study.
Incorporate comments received from the public and review agencies.

Notice of Study Completion

File Class EA Project File Report.
Mandatory 30-day public review period.

Construction

Construction project estimated to begin in 2021

APPENDIX

A-6 *NOTICE OF STUDY COMPLETION*

Public Notice

Region of Peel
working with you

Environmental Assessment Study

NOTICE OF STUDY COMPLETION - SCHEDULE B

Claredale Road to Beechwood Pumping Station

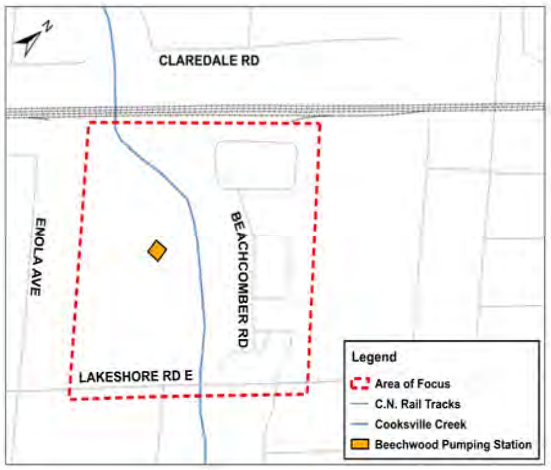
The Study:

The Region of Peel has identified the need to replace the siphon under Cooksville Creek, which will involve redirecting wastewater flows from the Claredale Road area to the Beechwood Pumping Station. The preferred solution includes construction of a new sewer which connects to existing maintenance hole south of the C.N. Rail Tracks and crosses under Cooksville Creek, discharging into Beechwood Pumping Station. *Figure A-1* shows the area that may be directly impacted by the proposed construction.

The Claredale Road to Beechwood Pumping Station project is being planned under Schedule B of the Municipal Class Environmental Assessment. Subject to comments received as a result of this Notice, and the receipt of necessary approvals, the Region of Peel intends to proceed with the design and construction of this project.

Project materials and other information are available at **peelregion.ca/public-works/environmental-assessments**.

Figure A-1: Claredale EA: Area of Focus Map



Contact:

To provide comments or request additional information about this project, please contact:

Lyle LeDrew
Project Manager, Water & Wastewater
905-791-7800 ext. 7836
Lyle.ledrew@peelregion.ca

For concerns that involve the prevention, mitigation or remediation of adverse impacts on constitutionally protected Aboriginal and treaty rights, a Part II order request may be made to the Ministry of the Environment, Conservation and Parks. Part II order requests on other grounds will not be considered.

Requests should specify what kind of order is being requested (request for additional conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate or remedy those potential adverse impacts, and any information in support of the statements in the request. Requests should also include the requester contact information. This will ensure that the Ministry is able to efficiently begin reviewing the request.

Requests must be sent by **March 31, 2021**. Requests should be sent in writing or by email to both:

Minister of the Environment, Conservation and Parks
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto ON M7A 2J3
minister.mecp@ontario.ca

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto ON, M4V 1P5
EABDirector@ontario.ca

This Notice was first issued on February 25, 2021.

The Region of Peel is committed to ensure that all Regional services, programs and facilities are inclusive and accessible for persons with disabilities. Please contact the Region of Peel Project Manager if you need any disability accommodations to provide comments or feedback for this study.

With the exception of personal information, all comments will become part of the public record of the study. The study is being conducted according to the requirements of the Municipal Class Environmental Assessment, which is a planning process approved under Ontario's *Environmental Assessment Act*.

APPENDIX

B EXISTING CONDITION REPORTS

APPENDIX

B-1 *COOKSVILLE CREEK GEOMORPHIC ASSESSMENT REPORT*

PARISH
aquatic services
A Division of Matrix Solutions Inc.

Report Prepared for:
WSP INC.

Prepared by:
PARISH AQUATIC SERVICES

April 2015
Mississauga, Ontario

Suite 200, 2500 Meadowpine Boulevard
Mississauga, Ontario, Canada L5N 6C4
Phone: 905.877.9531 Fax: 905.877.4143
www.parishgeomorphic.com

COOKSVILLE CREEK GEOMORPHIC ASSESSMENT

RECOMMENDATIONS REGARDING SANITARY SEWER WORKS

Report prepared for WSP Inc., April 2015

(digitally signed)
Jennifer Henshaw, M.Sc.
Junior Fluvial Geomorphologist

(digitally stamped)
John Parish, P.Geo
Principal, Fluvial Geomorphologist

DISCLAIMER

We certify that this report is accurate and complete and accords with the information available during the site investigation. Information obtained during the site investigation or provided by third parties is believed to be accurate but is not guaranteed. We have exercised reasonable skill, care and diligence in assessing the information obtained during the preparation of this report.

This report was prepared for WSP Inc. The report may not be relied upon by any other person or entity without our written consent and that of WSP Inc. Any uses of this report by a third party, or any reliance on decisions made based on it, are the responsibility of that party. We are not responsible for damages or injuries incurred by any third party, as a result of decisions made or actions taken based on this report.

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1 INTRODUCTION

PARISH Aquatic Services (PARISH), formerly PARISH Geomorphic, has been retained by WSP Inc., to provide fluvial geomorphic expertise and recommendations regarding the replacement of an existing sanitary infrastructure, which consists of siphon geometry to lower the infrastructure at the point of the watercourse crossing, with a gravity sewer under Cooksville Creek within the City of Mississauga (**Figure 1**).

Figure 1: Cooksville Creek Study Reach, Depicting Site Specific Information.

The Region of Peel has installed two 750 mm diameter sewage forcemains along the north side of Lakeshore Road bridge crossing between Beechwood Ave. and Hampton Cres., in Mississauga, ON. To successfully complete a proper installation, the sewage forcemains cross beneath the main channel of Cooksville Creek, near its confluence with Lake Ontario. The installation of new sanitary infrastructure will ultimately decommission the existing siphon sewer. The following assessment was initiated based upon queries of the Credit Valley Conservation Authority (CVC) who identified concerns regarding the timeline for exposure of the existing siphon sewer infrastructure as high risk to health and safety and

the environment. Due to the geomorphological characteristics of Cooksville Creek and concerns regarding future exposure of the new sewer infrastructure, the CVC has requested that a fluvial geomorphologist assess whether the proposed 2.0 m cover will be sufficient over a 100-year planning horizon. Recommendations for decommissioning the existing sewer for the protection of the overall environment are also provided.

2 BACKGROUND REVIEW

The geomorphic conditions of Cooksville Creek have been investigated through detailed field reconnaissance, as well as desktop study revealing historic conditions and anthropogenic manipulation. Site specific investigations built upon findings on the *Cooksville Creek at Lakeshore Road - Geomorphic Assessment (2005) as well as the Port Credit Sewage Forcemains Crossing of Lakeshore Road- Memo (2009) previously completed by PARISH*, where channel erosion and infrastructure were identified as at risk for potential exposure and in turn high risk to public health, safety and environment.

Cooksville Creek is a warm water tributary of Lake Ontario, with a watershed area of 33.9 km^2. Of the total drainage area, 60% is residential, 34% is industrial/commercial and 6% is open space. The creek has been channelized for 92% of its length and has significant erosion problems. Of the total length of the creek, 41% is trapezoidal and lined with grass; 24% is lined with gabion baskets; 16% is lined with armourstone; 11% is lined with concrete and 8% is natural, eroded channel. Much of the lower reach of the study site has been altered by past in stream works. A large portion of the channel bed is lined with gabion baskets, providing limited habitat diversity, particularly at the downstream end where the creek begins to encounter its outlet to Lake Ontario.

The bedrock geology of the Cooksville Creek drainage basin is composed of the Georgian Bay Formation, consisting of dark grey shale with interbeds of limestone (Johnson et al, 1992) which influences the rate of channel change (e.g. migration), the sediment input (i.e. amount and type), and channel geometry. Within the study area, lacustrine deposits composed of silt and clay overlay this bedrock, with thicknesses ranging up to 3 meters.

Cooksville Creek at Lakeshore Road - Geomorphic Assessment, 2005 (PARISH)

In 2005, a geomorphic assessment was conducted for a section of Cooksville Creek flowing under Lakeshore Road in Mississauga, Ontario. The work was completed in fulfillment of the Municipal Class Environmental Assessment for the proposed Lakeshore Road culvert enlargement/replacement intended to mitigate flood levels and associated risk to adjacent properties. Concluding the assessment, the culvert crossing at Lakeshore Road was recommended to be replaced by a single span bridge structure which incorporated bank and bed treatments as part of the design. As part of the following scour assessment, much of the information demonstrated in the Cooksville Creek at Lakeshore Road - Geomorphic Assessment, 2005 will be utilized to provide insight to whether the proposed 2.0 m cover over the sewage forcemains will be sufficient over a 100-year planning horizon.

Port Credit Sewage Forcemains Crossing of Lakeshore Road- Memo, 2009 (PARISH)

Further to the 2005 assessment, the 2009 memo provided a geomorphic assessment of Cooksville Creek study Reach to assess the long-term scour potential of the channel. A background review of relevant studies was conducted and identified historical conditions and detailed field work previously conducted within the study Reach. Due to the natural of the bedrock system, a scour depth analysis utilizing traditional equations and modelling was deemed inappropriate. In such case, it was deemed appropriate to investigate the historical information and the fluvial geomorphological conditions at the site area. Upon evaluating the available information, the proposed 2.0 m of cover was deemed appropriate and should ensure that enough cover is available for the new sanitary sewage infrastructure to remain subsurface over the proposed 100-year planning horizon.

3 PREVIOUS FIELD ASSESSMENTS (2005, 2009)

As part of the 2005 geomorphic assessment, a detailed field data collection was performed in the vicinity of the Lakeshore Road crossing. The data collection included cross-sectional information of the channel, surveying of the channel bed, and a description of the geomorphic conditions.

Results of the detailed field work indicated that bankfull width ranged from 16.5-28.7 meters, with an average of 22 meters for Cooksville Creek. Bankfull depths, meanwhile, averaged 0.44 meters, with a range 0.32-0.58 meters. Wetted width for the channel averaged 11.4 meters while water depth averaged 0.09 meters. The maximum pool depth for the site measured 1.8 meters. Bankfull gradient was 0.80% and the entrenchment ratio for the site was 1.87.

Riparian vegetation at the site consisted of short grasses, trees, shrubs and herbaceous species. Existing channel disturbances included a storm sewer outfall, the Lakeshore Road crossing and gabion basket bank protection. Field observations from the site included the presence of deposition in the overbank zone and the formation of mid-channel bars.

In October 2009, a field reconnaissance was conducted to verify the site conditions following the replacement of the Lakeshore Road culvert. As recommended in the 2005 report, the culvert crossing at Lakeshore Rd. had been upgraded to a single span bridge crossing. The installations of the recommended stone treatments along the bed and bank areas were also confirmed. A large depositional feature was present underneath the bridge which has formed due to the increased cross-sectional area associated with the revised bridge crossing.

4 EXISTING GEOMORPHIC CONDITIONS (JANUARY 2015)

Field reconnaissance was conducted in January 2015 by PARISH fluvial geomorphologists, a photographic inventory compiled from the site visit is displayed in **Appendix A**. Access to the study area was gained via Lakeshore Road East. At the Lakeshore Road East crossing location, banks are lined with an armourstone retaining wall, approximately 20 m upstream from the crossing the armourstone ends and the historical gabion bank treatments remains in place extending from approximately the toe-of-slope to the top-of-bank.

The channel valley corridor is approximately 35 m wide, extending for a couple metres into the floodplain beyond the top-of-bank. Bankfull widths measured across riffle sections during the site visit ranged from 12 m to 15 m wide. Bankfull widths measured are narrower then what has previously been recorded for the study area, however this should not be considered unusual as ice-cover across the channel limited the ability for measurements to be taken in a safe manner across wider sections of the channel. Bankfull depths measured ranged from 0.4 m to 0.55 m deep. Due to ice cover, pool depths were not measured.

The length of channel walked during the site visit extends from Lakeshore Road East, upstream approximately 400 m to the Rail crossing. At the Lakeshore crossing, a large depositional bar feature is present along the left bank and extends the length of the culvert and forcing the channel thalweg to flow along the right bank. This feature was present in the 2009 field reconnaissance after the culvert was widened.

Approximately 185 m upstream from the Lakeshore culvert, a storm outfall culvert is located along the right bank. The outfall is a double barrel concrete box culvert, with each box approximately 3.0 m x 2.0 m, and is elevated 1 m above the water surface. The outfall uses a gabion scour pad structure to dissipate energy prior to the confluence with the main channel. Much of the gabion has been undermined and failed, having detached from the banks and shifted as a large mass a few meters downstream. Since the gabion scour pad has detached from the gabion bank protection; the gabion along the bank (downstream) at this location has also become detached promoting increased bank erosion. This erosion has produced an undercut 0.4 m deep. Upstream the gabion protecting the bank is in the process of failing, once it fails a sewer manhole will become exposed. Since the outfall structure is located at the tail-end of an outside meander bend, the channel thalweg is actively forced against the gabion, further increasing the likelihood of failure. Along the left bank at this location, a large depositional bar feature is present spanning the entire length of the inside meander bend. Grain size along the bar ranges from an average of 10 cm diameter to a maximum 47 cm and is consistent with fractured shale.

Further upstream, 130 m from the storm outfall, a bridge crossing has been torn down leaving only the concrete abutments. The abutment along the left bank is in direct contact with active flow, however as the upstream side is protected with gabion basket retaining wall the abutment is not in danger of being

outflanked. The abutment along the left bank is situated 8 m into the bank, and is protected during low flows by a depositional bar that extends downstream from the rail crossing. Differing from other depositional features within the Reach, this bar has a veneer of fine to medium grain sand capping coarser material. Along the opposing bank, the slope is entirely protected with gabion retaining wall until the rail crossing.

4.1 Rapid Assessments

The RGA was designed by the Ontario Ministry of Environment (2003) to assess reaches in rural and urban channels. This qualitative technique documents indicators of channel instability. Observations are quantified using an index that identifies channel sensitivity based on the presence or absence of evidence of aggradation, degradation, channel widening, and planform adjustment. Overall the index produces values that indicate whether the channel is stable/ in regime (score ≤0.20), stressed/transitional (score 0.21-0.40), or adjusting (score ≥0.40) (**Table 1**).

Table 1: RGA Classification.

Factor Value	Classification	Interpretation
≤0.20	In Regime or Stable (Least Sensitive)	The channel morphology is within a range of variance for streams of similar hydrographic characteristics – evidence of instability is isolated or associated with normal river meander propagation processes
0.21-0.40	Transitional or Stressed (Moderately Sensitive)	Channel morphology is within the range of variance for streams of similar hydrographic characteristics but the evidence of instability is frequent
≥0.41	In Adjustment (Most Sensitive)	Channel morphology is not within the range of variance and evidence of instability is wide spread

The RSAT was developed by John Galli at the Metropolitan Washington Council of Governments (Galli, 1996). The RSAT provides a more qualitative and broader assessment of the overall health and functions of a reach. This system integrates visual estimates of channel conditions and numerical scoring of stream parameters using six categories:

- Channel Stability
- Erosion and Deposition
- In-stream Habitat
- Water Quality
- Riparian Conditions
- Biological Indicators

Once a condition has been assigned a score, these scores are totaled to produce an overall rating that is based on a 50 point scoring system, divided into three classes:

- <20 Low
- 20-35 Moderate
- >35 High

While the RSAT scores streams from a more biological and water quality perspective than the RGA, this information is also of relevance within a geomorphic context. This is based on the fundamental notion that, in general, the types of physical features that generate good fish habitat tend to represent good geomorphology as well (i.e. fish prefer a variety of physical conditions – pools provide resting areas while riffle provide feeding areas and contribute oxygen to the water – good riparian conditions provide shade and food – woody debris and overhanging banks provide shade). Additionally, the RSAT approach includes semi-quantitative measures of bankfull dimensions, type of substrate, vegetative cover, and channel disturbance.

4.1.1 Rapid Assessment Results

In an attempt to quantify the fluvial geomorphic form and function of Cooksville Creek between Lakeshore Road East and the rail line, the overall condition of channel stability and health were undertaken using two established reconnaissance techniques, the Rapid Geomorphic Assessment (RGA) and the Rapid Stream Assessment Technique (RSAT).

Results of the RGA conclude that the study Reach is in a transitional state with multiple indicators of aggradation and degradation. Accretion on point bars, poor sorting of bed materials and coarse materials embedded in riffles all indicate active aggradation while undermined gabion, scour pools and exposed bedrock are indicators of degradation.

Table 2: Summary of the RSAT Survey Results.

Study Reach	Factor Value						Overall Score	Condition
	Channel stability	Scour / deposition	In stream Habitat	Water Quality	Riparian Condition	Biological Indicators		
Max. Score	11	8	8	8	7	8	50	
Cooksville Creek	5	4	4	4	4	3	24	Moderate

Table 3: Summary of the RGA Survey Results.

Study Reach	Factor Value				Stability Index	Condition
	Aggradation	Degradation	Widening	Planimetric Adjustment		
Cooksville Creek	0.57	0.5	0.2	0.0	0.32	Transitional

5 RECOMMENDATIONS

As the project of installing a new sewer line beneath Cooksville Creek continues to move forward, additional queries brought forward by the CVC need to be addressed. The following discussion aims to address issues regarding the timeline for both existing pipe exposure along the bed and exposure of the existing manhole along the bank as well as the recommended depth of the new sanitary sewer beneath the channel.

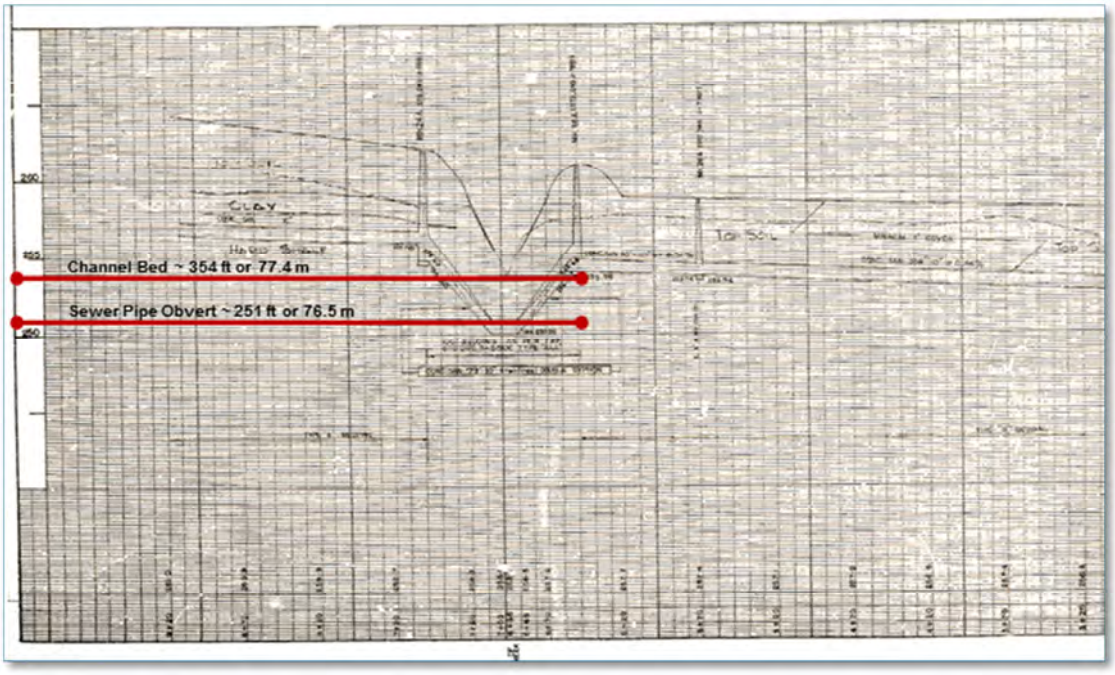
Timeline to Existing Pipe Exposure:

The existing sanitary sewer crossing was installed circa. 1965 (**Figure 2**). A cross section schematic shows the pipe obvert was placed at an approximate elevation of 76.5 masl below the channel bed with an approximate elevation of 77.4 masl, giving the pipe approximately 0.9 m of cover when it was installed. The pipe crosses the channel at a near parallel angel, from the manhole located along the right bank immediately upstream from the storm outfall and connects downstream to a manhole near the Lakeshore Road crossing on the left bank. The near parallel angle increases the length of pipe at risk due to channel down cutting significantly, with as much as 30 m of pipe below the channel.

A topographic survey of the study area was commissioned in 2014 in which the channel was extensively surveyed, including valley cross sections and channel centreline. Within the channel, along the approximate crossing location, the lowest bed elevation ranges from 76.96 masl to 76.25 masl. Based on the recently surveyed elevations, erosion along the bed can be estimated at a maximum of 1.14 m to a minimum of 0.43 m over the course of 50 years. While the existing sewer pipe has not yet been exposed, making the higher erosion value unlikely, it is noted that the location of maximum erosion is where the storm outfall scour pad has detached and formed a gabion mass which currently acts to protect the pipe under the bed. Changes in bed erosion due to the weathering of shale indicate the high likelihood the pipe will become exposed at some point within the next 50 years assuming a conservative erosion rate of 0.01 m or 1 cm per year.

In order to limit the disturbance to the highly sensitive channel bed, removal of the existing sewer pipe after decommissioning is not recommended.

Figure 2: Existing Sewer Detailed Design Drawings from 1965.



Timeline to Manhole Exposure:

The existing manhole at risk for exposure is located along the right bank, immediately upstream from the storm sewer outfall. Currently the manhole is situated approximately 1 m into the bank, and is protected by gabion baskets (**Figure 3**). The gabion in turn is further protected by a few mature trees located upstream along the bank. Due to the failing of gabion in the vicinity of the storm outfall, the gabion protecting the manhole is also at risk to fail. Since the manhole is located along the outer meander bend, flow and all associated erosive forces are directly in contacts with the manhole location. Erosion occurs when the hydraulic forces in the flow exceed the resisting forces of the channel boundary, which in this case is represented by gabion. If the gabion if functioning properly, it can be expected to with stand shear stress up to 475 N/m^2 and with an associated velocity that ranges from 4.3 m/sec to 5.8 m/sec (Fischenich, 2001). Prior assessments within the study Reach determined bankfull discharge to be approximately 11.5 m^3/sec, and that shear stress along the banks at bankfull stage ranges from 24.42 N/m^2 to 45.48 N/m^2 with an associated average bankfull velocity of 1.5 m/sec. While the recorded shear stress and velocity are well below the threshold for gabion erosion, even when the thresholds are not exceeded, erosion in select locations may occur (Fischenich, 2001). This is evident through failing gabion along the banks throughout the study Reach, both upstream and downstream from the manhole. Erosion can occur below the exceedance threshold depending on the duration of the flow, and upon the ability of the channel to transport the eroded sediments. Bankfull discharge noted in prior assessments is also significantly lower than the 2-year peak flow rate of 62 m^3/sec indicated in the *Cooksville Creek Rehabilitation Study (1996)* at the CN Rail crossing upstream from the manhole. This

indicates that erosion and undermining of the gabion has been taking place at relatively low return periods of 2-year to 5-year flows (62 m^3/sec – 81 m^3/sec).

Since partial failure and undermining of the gabion near the manhole has already occurred, it is expected to continue occurring. Based on the existing conditions of the gabion protecting the manhole, as well as expected flows within the channel, it is expected the manhole could become exposed within 10 to 15 years should current conditions continue.

Figure 3: Manhole Protected by Gabion along Right Bank of Cooksville Creek.

Depth of New Gravity Sewer:

It was previously determined in the 2009 memo, that due to the close proximity between the Lakeshore Road crossing and the Cooksville Creek outlet to Lake Ontario (approx. 500 m), scour depths may ultimately be dependent on the alternating water levels of Lake Ontario.; where the downstream lake levels act as a natural grade control measure that mitigates the degree of incision occurring within the creek as a result the urbanized flow regime, channel hardening practices, and exposed bedrock geology.

Increased Lake Ontario levels, causing backwater affects upstream along Cooksville Creek, submerge the channel bed and eliminate channel gradient, which would typically supply the necessary energy required for erosion to continue downstream. Therefore the extent at which backwater effects extend upstream will indicate the boundary at which erosion and scour will cease to occur. Following this thought process it was determined that the maximum scour depth of Cooksville Creek within the study Reach is 1.6 m below existing channel grade.

Assuming a continued erosion rate of 0.01 m per year, and disregarding the bed and bank treatments put in place at the Lakeshore crossing to control grade and limit scour, the timeline for this extent of bed erosion well exceeds the 100-year planning horizon. Following prior recommendations, the new

sanitary sewer pipe to be placed at a depth of 2 m below the channel bed. Upon evaluating the available information, it is concluded that is recommendations remains the same.

Protection of New Sewer Manhole (MH4A):

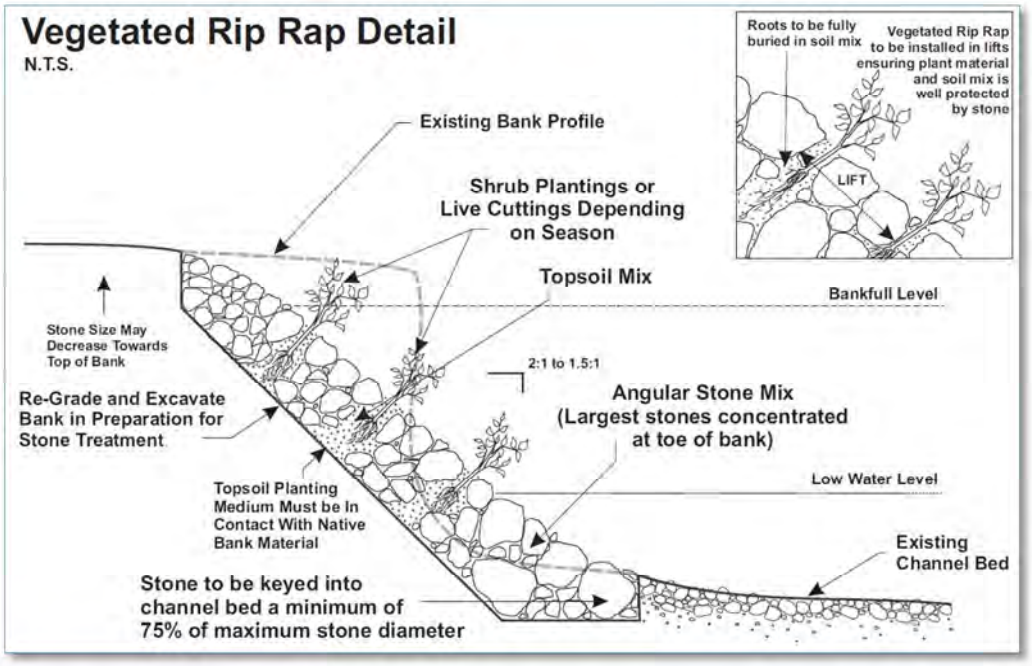
Due to the erodible nature of Cooksville Creek in the vicinity of the proposed pipeline works, as well as the degraded nature of existing gabion bank protection, it is necessary to recommend enhanced protection for the proposed manhole (MH4A).

In addition to the existing gabion bank protection, a second line of defence for mitigating risks to the proposed manhole can be recommended. The proposed manhole (MH4A) will be located approximately 6 m away from the existing top of bank, where based on existing erosion rates, if no additional stabilization measures are implemented, the bank can be expected to erode into the proposed manhole within the 100-year planning horizon. In order to protect the manhole from future erosion, a two-staged protection feature can be implemented around the manhole when it is constructed. An armourstone protection wall can be constructed around the manhole, and bridged over the sanitary pipe, with an additional apron of rip-rap extending to the toe of armourstone which will subsequently be buried with top soil and restored with restoration plantings. In the future, if the existing gabion fails and the channel erodes towards the manhole, the buried rip rap will be encountered first, offering time for additional mitigation measures to be installed.

The proposed works are not likely to adversely impact the stability of the east bank at the crossing location. Existing conditions at the time of the geomorphic field investigation concluded that while the gabion bank protection is at risk of failure, there are several mature deciduous trees located along the bank which provide additional protection and stabilization (**Figure 4**, background). It is recommended that these trees remain intact and undisturbed during construction so the root matrix continues to offer support to the gabion during and after construction. To add further protection to the proposed manhole, restabilising the failing gabion along the east bank is recommended within 10 to 15 years when the existing manhole is expected to become exposed. Re-stabilization can occur in areas where the gabion has become detached from the bank or undermined, the recommendation would be to place vegetated rep-rap below extent of failing gabion with additional plant cuttings being introduced to the gabion to offer further support (**Figure 5**). The stone for the bank treatment should be sized to adequately withstand bankfull flow conditions (11.5 m^3/sec). Restabilising the gabion is preferred to full replacement and channel works in order to limit disturbance to the highly erodible bedrock channel as well as to preserve the existing trees and the extensive root matrix that provides stability to the bank.

Figure 4: East Bank of Cooksville Creek at the Area of Proposed Works.

Figure 5: Vegetated Rip-Rap Detail (N.T.S).



Note: Due to the bedrock nature of Cooksville Creek, it is not recommended that stone be keyed into the channel bed. Instead, use the existing bed topography to place keystones at the toe.

6 SUMMARY

In order to provide geomorphic expertise regarding the replacement of sanitary sewer infrastructure within the Cooksville Creek valley corridor at the Lakeshore Road East crossing and address concerns brought forward by the CVC, a fluvial geomorphic assessment was conducted to assess long-term scour and erosion potential within the channel. From the assessment, recommendations are made regarding the timeline for the existing sanitary sewer infrastructure to become exposed along the channel bed and banks as well as recommendations to further solidify the depth of cover required for the proposed replacement infrastructure. Recommendations were also made to mitigate future bank erosion an exposure of the proposed manhole (MH4A).

REFERENCES

Galli, J., 1996. *Rapid stream assessment technique, field methods*. Metropolitan Washington Council of Governments. 36pp.

PARISH Geomorphic Ltd. 2005. *Cooksville Creek at Lakeshore Road – Geomorphic Assessment* Submitted to: Totten Sims and Hubicki Associates.

PARISH Geomorphic Ltd. 2008. Cooksville Creek Watershed Study and Impact Monitoring.

Cooksville Creek Watershed Study. Submitted to: Credit Valley Conservation Authority.

Tinkler, K.J. and Parish, J., 1998. Rivers Over Rock: Fluvial Process in Bedrock Channels. *Recent Adjustments to the Long Profile of Cooksville Creek, and Urbanized Bedrock Channel in Mississauga, Ontario*. American Geophysical Union.

APPENDIX A
SITE PHOTOGRAPHS

Notes:

Photographs are displayed in order starting from the Lakeshore Road crossing and working upstream to the CN Rail crossing.

Left bank and right bank are ALWAYS described as if the viewer is facing the downstream direction. I.e., if the photograph is “looking downstream” left bank will be to the left of the photo, however if the photograph is “looking upstream” left bank will be to the right of the photo.

2. Looking downstream underneath the Lakeshore Road crossing; large depositional feature along right bank while channel thalweg concentrated towards left bank armor stone treatment.

2. Looking upstream along Cooksville Creek; channel is concentrated along the right bank and slope where bank erosion is active, left bank is an area of deposition, with a moderate ~5 m wide floodplain before toe-of-slope.

3. Looking downstream towards Lakeshore Road Crossing. Valley slopes are populated with mature deciduous vegetation.

4. Looking upstream towards storm outfall culvert. Deposition of platy shale material forming lateral bar along right bank. Undercutting visible along left bank.

5. Looking across the channel towards the left bank, upstream from manhole and storm outfall; bank is significantly undercut.

Photograph taken by: J. Henshaw – Jan. 20, 2015

6. Example of gabion protecting the right valley slope at location of proposed sewer crossing.

Photograph taken by: J. Henshaw – Jan. 20, 2015

7. Left bank of channel immediately downstream from storm outfall; gabions have detached from bank and are at risk of full failure. Bank is undercut and tree roots are exposed.

Photograph taken by: J. Henshaw – Jan. 20, 2015

8. Looking across the channel towards storm outfall.

Photograph taken by: J. Henshaw – Jan. 20, 2015

9. Gabion scour pad failure downstream from storm outfall; exposed scour hole approx. 1 m deep. No indicator that buried sewer pipe is exposed.

10. Looking across the channel towards the left bank immediately upstream from the storm outfall. Gabion bank protection is in disrepair, manhole casing visible along bank.

11. Sanitary manhole on Left bank, upstream from storm outfall. Manhole is protected with gabion, trees along bank upstream further protect bank through rooting matrix.

12. Looking downstream along channel from right bank. Storm outfall confluence in background.

13. Gabion bank protection undermined along left bank (outer meander bend) upstream from sanitary sewer manhole.

Photograph taken by: J. Henshaw – Jan. 20, 2015

14. Looking upstream along channel from right bank. Extensive platy shale deposit along right bank.

Photograph taken by: J. Henshaw – Jan. 20, 2015

15. Historic bridge crossing abutment along left bank. Abutment is not in contact with channel during low flow and is situated within a sand veneer depositional bar.

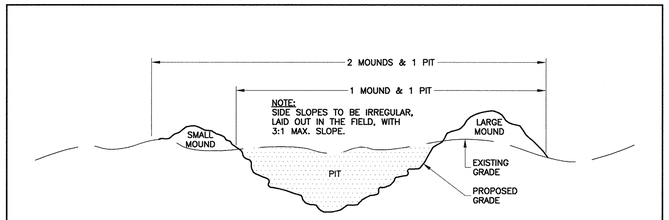
16. Historic bridge crossing abutment along right bank. Abutment is in direct contact with channel during low flow but is protected upstream by a gabion retaining wall structure.

17. Looking upstream along channel towards CN Rail crossing. Right bank is protected with gabion retaining wall, left bank is composed of platy shale depositional feature interspersed with sand deposition.

18. CN Rail crossing at upstream extent of study Reach. Sandy deposit along left bank immediately downstream from crossing.

APPENDIX

B-2 LANDSCAPING PLAN



PIT AND MOUND DETAIL

SCALE 1:100

TRUE NORTH

CONSTRUCTION NORTH

LIMIT OF WORK

PIT & MOUND
TOP OF SM.MOUND ELEV: 80.46
TOP OF LG.MOUND ELEV: 80.68
BOTTOM OF PIT ELEV: 79.33

PIT & MOUND
TOP OF MOUND ELEV: 80.40
BOTTOM OF PIT ELEV: 79.60

PIT & MOUND
TOP OF SM.MOUND ELEV: 80.24
TOP OF LG.MOUND ELEV: 80.41
BOTTOM OF PIT ELEV: 79.36

EXISTING BRIDGE TO BE REMOVED BY OTHERS

REMOVE EX.LIGHT STANDARDS (3 TOTAL)

PIT & MOUND
TOP OF MOUND ELEV: 80.27
BOTTOM OF PIT ELEV: 79.25

PIT & MOUND
TOP OF MOUND ELEV: 79.87
BOTTOM OF PIT ELEV: 79.07

PIT & MOUND
TOP OF MOUND ELEV: 80.40
BOTTOM OF PIT ELEV: 79.60

PIT & MOUND
TOP OF MOUND ELEV: 80.20
BOTTOM OF PIT ELEV: 79.40

PIT & MOUND
TOP OF SM.MOUND ELEV: 80.05
TOP OF LG.MOUND ELEV: 80.23
BOTTOM OF PIT ELEV: 79.00

REMOVE EX.HEADWALL AND RESTORE DISTURBED AREA AS INDICATED ON DRAWING CSA-60

LIMIT OF DISTURBED AREA

LIMIT OF WORK

REMOVE EX.GRANULAR WALKWAY AND RESTORE AREA AS PER LANDSCAPE PLANS

REMOVE EX. CHAIN LINK FENCE

PROPOSED ACCESS EASEMENT PART 9, PLAN 43R-_____

REMOVE EX.CHAIN LINK FENCE ALONG PROPERTY LINE AND REPLACE WITH 1.8m HIGH BLACK VINYL CHAIN LINK FENCE

REMOVE EXISTING TREES

PROPOSED PROPERTY LINE

LANDS CURRENTLY OWNED BY APPLICANT

FUTURE DEVELOPMENT

EXISTING PROPERTY LINE

C O O K S V I L L E C R E E K

E X I S T I N G O P E N S P A C E

L A K E S H O R E R O A D

C A N A D I A N N A T I O N A L R A I L W A Y

PART 3, PLAN 43R-888 · PART 2, PLAN 43R-888 · PART 1, PLAN 43R-888 · PART 4, PLAN 43R-888 · PART 5, PLAN 43R-888 · PART 6, PLAN 43R-888 · PART 7, PLAN 43R-888 · PART 8, PLAN 43R-888 · PART 9, PLAN 43R-888 · PART 10, PLAN 43R-888 · PART 11, PLAN 43R-888 · PART 12, PLAN 43R-888 · PART 13, PLAN 43R-888 · PART 14, PLAN 43R-888 · PART 15, PLAN 43R-888 · PART 16, PLAN 43R-888 · PART 17, PLAN 43R-888 · PART 18, PLAN 43R-888 · PART 19, PLAN 43R-888 · PART 20, PLAN 43R-888 · PART 21, PLAN 43R-888 · PART 22, PLAN 43R-888

LIMIT BETWEEN LOTS 11 AND 12, CONCESSION 2, SOUTH OF DUNDAS STREET

APPROX. LOCATION OF 200mm SAN

APPROX. LOCATION 200mm ABANDONED SAN

EDGE OF VEGETATION

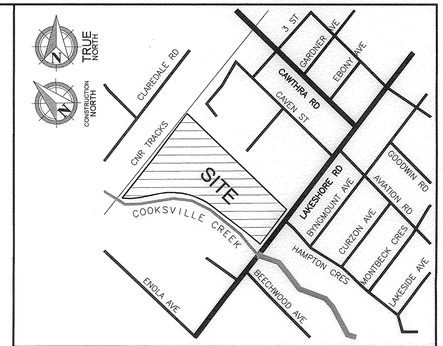
DRIP LINE

CHAIN LINK FENCE

200mm SAN

3000x1500mm TWIN BOX CULVERTS

2100x2100mm TWIN BOX CULVERTS



KEY PLAN

BENCHMARK

CITY OF MISSISSAUGA
BM No.: 756 ELEVATION = 78.596m

ON THE SOUTH FACE AT THE WEST CORNER OF THE BEIGE BRICK PUMPING STATION ON THE SOUTHEAST CORNER OF BEACH STREET AND AVIATION ROAD.

LEGAL

ALL LEGAL INFORMATION ARE IN REFERENCE TO PLAN 43-R35317 UNLESS OTHERWISE NOTED.

LEGEND

□	PROPOSED CB	□	EXISTING CB
○	PROPOSED STORM MH	○	EXISTING STORM MH
●	PROPOSED SANITARY MH	●	EXISTING SANITARY MH
◇	PROPOSED HYDRANT	◇	EXISTING HYDRANT
⊗	PROPOSED VALVE	⊗	EXISTING VALVE
83.35	PROPOSED SPOT ELEVATION	83.35	EXISTING SPOT ELEVATION
⇦	OVERLAND FLOW ROUTE		
x 83.35 (EX)	EX. GRADE TO BE MAINTAINED	STM	STORM SEWER
x 83.35 TW	PROPOSED TOP OF WALL GRADE	SAN	SAN SEWER
x 83.35 BW	PROPOSED BOTTOM OF WALL GRADE	WM	WATERMAIN
x 83.35 TC	PROPOSED TOP OF CURB GRADE	H	HYDRO LINES
x 83.35 BC	PROPOSED BOTTOM OF CURB GRADE	G	GAS LINES
x 83.35 TB	PROPOSED TOP OF BERM GRADE	B	BELL LINES
x 83.35 SW	PROPOSED SWALE GRADE	C	CABLE LINES
81.0	EXISTING CONTOUR		FUTURE WORKS
	PROPOSED GUARD RAIL	(B.O.)	BY OTHERS
	PROPOSED CHAIN LINK FENCE		LIMIT OF WORK
	PROPOSED TREE PROTECTION FENCE (02830-4)		DRAINAGE DIRECTION
		S F	SEDIMENT CONTROL FENCE (STD 2940.010)
	PROPOSED MOUND		
	PROPOSED PIT		

No.	By	Date	Revision	Chk'd
5.	K.R.	2015.05.20	ISSUED FOR APPROVAL	B.S.
4.	K.R.	2015.05.08	UTILITY CORRIDOR RELOCATED	B.S.
3.	K.R.	2015.02.06	REISSUED FOR PUCC APPROVAL	B.S.
2.	J.L.	2014.07.24	REVISED AS PER CITY COMMENTS – 3rd SUBMISSION	B.S.
1.	J.L.	2014.04.14	REVISED AS PER CITY COMMENTS	B.S.

LICENSED PROFESSIONAL ENGINEER B.E. SCHUKNECHT 90026713 PROVINCE OF ONTARIO

JSW+ associates
ENGINEERS LANDSCAPE ARCHITECTS PLANNERS
Tel: (905)889-8100 Fax: (905)889-6616 email: design@jsw.ca

LAKESHORE COUNTRY PROPERTIES LTD.

LAKESHORE VILLAGE CONDOMINIUM DEVELOPMENT

21T-6006M

565 LAKESHORE ROAD
MISSISSAUGA, ONTARIO

Title:

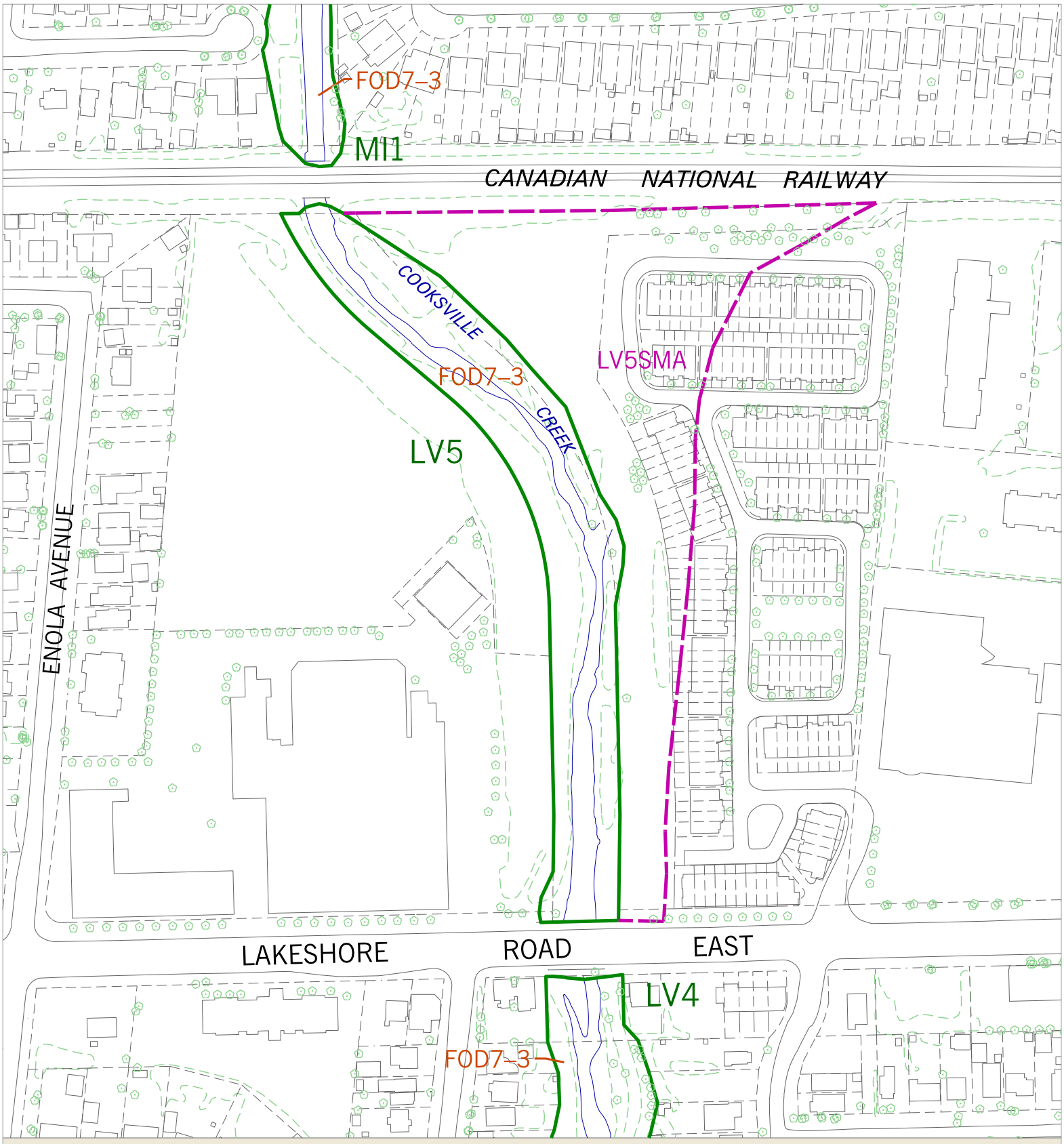
OPEN SPACE REHABILITATION

Drawn By	J.L.	Checked By	B.S.	Registered Plan Project No. 03-34	Sheet No. CSA-11
Designed By	B.S.	Checked By	B.S.		
Scale	1:600	Date Issued	OCT 2013		

C51111

APPENDIX

B-3 *NATURAL AREAS SURVEY FACT SHEET AND DATA*



Natural AREAS SYSTEM

2019 NATURAL AREAS UPDATE

SITE LV5

NATURAL AREAS SYSTEM CLASSIFICATION

- NATURAL AREAS
- VEGETATION COMMUNITIES
- SPECIAL MANAGEMENT AREAS
- LINKAGES

0 10 20 30 40
metres

MISSISSAUGA

City of Mississauga Natural Areas Survey (2016)

Natural Areas Fact Sheet

NATURAL AREA NAME	PLANNING DISTRICT	AREA (HA)	UTM GRID REFERENCE
LV5	Lakeview	1.39	6153 48247

1. **LOCATION**

North along Cooksville Creek from Lake Ontario to Lakeshore Road West. Throughout its length Cooksville Creek links a number of natural areas, including CC1, CV8, and LV5. The natural area LV3 is located within 500 m to the west.

2. **CLASSIFICATION**

Significant Natural Area

3. **DESCRIPTION**

A. **Physical Features**

This site is located in the floodplain of Cooksville Creek. The topography of this site is level. Soil is well drained Fox sand that developed within Lake Iroquois shallow water deposits. These deposits are underlain by bedrock geology consisting of the grey shales of the Georgian Bay Formation. An unconfined shallow sand aquifer is associated with the Lake Iroquois deposits. Cooksville Creek is engineered along a portion of this site.

B. **Biota**

There are 139 floral species and 17 faunal species which have been documented from this site. This site was not accessible for 2016 field work, thus, the vegetation community description is based on road side and aerial photograph interpretation. This site (see accompanying figure) is entirely composed of a fresh – moist willow lowland deciduous forest type (FOD7-3).

Fresh – Moist Willow Lowland Deciduous Forest Type (FOD7-3)

The canopy in this community is partly dominated by Hybrid Willow (*Salix x rubens*) and Manitoba Maple (*Acer negundo*) with a lesser abundance of Freeman's Maple (*Acer x freemanii*) and Balsam Poplar (*Populus balsamifera*). This layer ranges in height from 10-25 m and covers 25-60% of the community. The sub-canopy is mainly comprised of Manitoba Maple and Hybrid Willow with a lesser abundance of Siberian Elm (*Ulmus pumila*). The sub-canopy ranges from 2-10 m in height and covers 10-25% of the community. The understory is comprised of Wild Grape (*Vitis riparia*), Red-Osier Dogwood (*Cornus stolonifera*) and Tartarian Honeysuckle (*Lonicera tatarica*). The understory ranges in height from 0.5-1 m and covers 25-60% of the community. Ground Cover is partly dominated by Canada Goldenrod (*Solidago canadensis*) and Rough Cockle-bur (*Xanthium strumarium*) with a lesser abundance of European Stinging Nettle (*Urtica dioica ssp. dioica*) and Colts Foot (*Tussilago farfara*). The ground cover ranges in height from 0.2-0.5 m with a community cover of 25-60%.

Thirteen birds, 2 mammals, 1 butterfly species are documented from this site. Fauna typical of urban/suburban conditions are expected at this site. These include: Ring-billed Gull, American Robin, Coyote, Raccoon, Cabbage White. Cooksville Creek is classified as a type 2 fishery within this site.

4. **CONDITION**

This site is currently in poor condition. Disturbances include the channelization of Cooksville Creek and residential encroachment. Seventy-two introduced plant species are present at this site (representing 51.80% of the total number of species present, very high number of exotics). The native FQI is 26.79 and the native mean coefficient is 3.27[1], both low values. Both the native FQI and native mean coefficient

4. **CONDITION** continued...
have increased from 2008 values of 26.24 and 3.21, respectively. Surrounding land use is residential and industrial.

5. **SIGNIFICANCE**

- 2 plant species considered rare within the City (known from 3 or fewer locations): Foxglove Beardtongue (*Penstemon digitalis*) and Cockspur Hawthorn (*Crataegus crus-galli*).
- 3 plant species considered uncommon within the City (known from 4 to 10 locations): Canada plum (*Prunus nigra*), Downy Willow Herb (*Epilobium strictum*) and Mountain Ash (*Sorbus americana*).
- 19 Credit Valley Conservation flora Species of Conservation Concern (Tier 1-3).
- 6 Credit Valley Conservation fauna Species of Conservation Concern (Tier 1-3).
- Contributes to the linkage function of Cooksville Creek.
- Close proximity to natural area LV3 and LV4.
- Floodplain provides floodwater storage for Cooksville Creek.
- This site is linked to a number of natural areas by the Lake Ontario shoreline.

6. **MANAGEMENT NEEDS**

- Riparian vegetation along the creek should be restored and an unmanicured buffer established.
- Residential Development north of the site has the potential to encroach into the riparian area. Landowner contact programme to encourage management for natural values by landowners should be initiated.

7. **PRINCIPLE REFERENCES**
None noted

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1. Floristic quality is explained in the introduction.

cmbCentroid	cmbFloraType	cmbIntroduced	cmbSiteType	Scientific Name	Common_Name	Introduced	Reference_Code	Source	Historical
lv5			Natural Area	Acer negundo L.	Manitoba Maple	No	272, 226	SP/SPS 25/08/16, SS 20/09/16, SS 10/08/12, DF 26/10/05	FALSE
lv5			Natural Area	Acer platanoides L.	Norway Maple	Yes	272, 226		FALSE
lv5			Natural Area	Acer saccharinum L.	Silver Maple	No	272, 226	SP/SAH 25/08/16, DF 26/10/05	FALSE
lv5			Natural Area	Acer saccharum Marshall	Sugar Maple	No	226		FALSE
lv5			Natural Area	Acer x freemanii E. Murr.	Hybrid Soft Maple	No		SS 20/09/16, SS 10/08/12	FALSE
lv5			Natural Area	Achillea millefolium L. ssp. millefolium	Common Yarrow	Yes	226		FALSE
lv5			Natural Area	Agrimonia gryposepala Wallr.	Tall Hairy Groovebur	No	226		FALSE
lv5			Natural Area	Agrostis gigantea Roth	Red-top	Yes	226		FALSE
lv5			Natural Area	Agrostis stolonifera L.	Spreading Bentgrass	No	226		FALSE
lv5			Natural Area	Ailanthus altissima (Miller) Swingle	Tree-of-heaven	Yes		SP/SAH 25/08/16	FALSE
lv5			Natural Area	Alliaria petiolata (M. Bieb.) Cavara & Grande	Garlic Mustard	Yes	226		FALSE
lv5			Natural Area	Arctium minus (Hill) Bernh. ssp. minus	Common Burdock	Yes	226	SP/SAH 25/08/16, SS 10/08/12	FALSE
lv5			Natural Area	Aruncus dioicus (Walter) Fern.	Common Goatsbeard	Yes	226		FALSE
lv5			Natural Area	Asclepias syriaca L.	Common Milkweed	No	226		FALSE
lv5			Natural Area	Barbarea vulgaris R. Br.	Yellow Rocket	Yes		LL 12/06/12	FALSE
lv5			Natural Area	Betula papyrifera Marshall	White Birch	No	226		FALSE
lv5			Natural Area	Bidens frondosa L.	Devils Beggar-ticks	No		SP/SAH 25/08/16, SS 10/08/12	FALSE
lv5			Natural Area	Bromus inermis Leyss. ssp. inermis	Awnless Brome	Yes	226	DF 26/10/05	FALSE
lv5			Natural Area	Calystegia sepium (L.) R. Br. ssp. americanum (Sims) Brummitt	Hedge Bindweed	No	226	SS 10/08/12	FALSE
lv5			Natural Area	Campanula rapunculoides L.	Creeping Bellflower	Yes	226		FALSE
lv5			Natural Area	Carex lacustris Willd.	Lake-bank Sedge	No	226		FALSE
lv5			Natural Area	Chelidonium majus L.	Celandine	Yes	226		FALSE
lv5			Natural Area	Chenopodium album L. var. album	Lambs Quarters	Yes	226		FALSE
lv5			Natural Area	Chrysanthemum leucanthemum L.	Oxeye Daisy	Yes	226		FALSE
lv5			Natural Area	Cichorium intybus L.	Chicory	Yes	226	SP/SAH 25/08/16, SS 10/08/12, DF 26/10/05	FALSE
lv5			Natural Area	Cirsium arvense (L.) Scop.	Canada Thistle	Yes	226	SP/SAH 25/08/16	FALSE
lv5			Natural Area	Cirsium vulgare (Savi) Ten.	Bull Thistle	Yes	226		FALSE
lv5			Natural Area	Convolvulus arvensis L.	Field Bindweed	Yes	226	SP/SAH 25/08/16	FALSE
lv5			Natural Area	Cornus rugosa Lam.	Round-leaved Dogwood	No		DF 26/10/05	FALSE
lv5			Natural Area	Cornus stolonifera Michx.	Red-osier Dogwood	No	226	SS 20/09/16, SP/SAH 25/08/16, SS 10/08/12	FALSE
lv5			Natural Area	Crataegus crus-galli L.	Cockspur Hawthorn	No	226		FALSE
lv5			Natural Area	Cryptotaenia canadensis (L.) DC.	Canada Honewort	No	226		FALSE
lv5			Natural Area	Dactylis glomerata L.	Orchard Grass	Yes	226	SP/SAH 25/08/16	FALSE
lv5			Natural Area	Daucus carota L.	Wild Carrot	Yes	226	SP/SAH 25/08/16, SS 10/08/12	FALSE
lv5			Natural Area	Dipsacus fullonum L. ssp. sylvestris (Hudson) Clapham	Wild Teasel	Yes	226	SP/SAH 25/08/16, SS 10/08/12, DF 26/10/05	FALSE
lv5			Natural Area	Echinochloa crusgalli (L.) P. Beauv.	Barnyard Grass	Yes	226		FALSE
lv5			Natural Area	Echinocystis lobata (Michx.) Torr. & A. Gray	Wild Mock-cucumber	No	226	SP/SAH 25/08/16	FALSE
lv5			Natural Area	Echium vulgare L.	Common Vipers-bugloss	Yes	226		FALSE
lv5			Natural Area	Elaeagnus angustifolia L.	Russian Olive	Yes	272, 226		FALSE
lv5			Natural Area	Elymus virginicus L. var. virginicus	Virginia Wild Rye	No	226		FALSE
lv5			Natural Area	Epilobium strictum Muhelnb. Ex Spreng.	Downy Willow Herb	No	226		FALSE
lv5			Natural Area	Equisetum arvense L.	Field Horsetail	No	226		FALSE
lv5			Natural Area	Erigeron annuus (L.) Pers.	White-top Fleabane	No	226		FALSE
lv5			Natural Area	Euonymus europaea L.	European Spindle Tree	Yes	226		FALSE
lv5			Natural Area	Eurybia macrophylla (L.) Cass.	Large-leaved Aster	No	226		FALSE
lv5			Natural Area	Festuca arundinacea Schreb.	Kentucky Fescue	Yes	226		FALSE
lv5			Natural Area	Festuca rubra L. ssp. rubra	Red Fescue	No	226		FALSE
lv5			Natural Area	Fraxinus nigra Marshall	Black Ash	No	226		FALSE
lv5			Natural Area	Fraxinus pennsylvanica Marshall	Red Ash	No	226	SP/SAH 25/08/16	FALSE
lv5			Natural Area	Geum aleppicum Jacq.	Yellow Avens	No	226		FALSE
lv5			Natural Area	Glechoma hederacea L.	Ground Ivy	Yes	226		FALSE
lv5			Natural Area	Helianthus tuberosus L.	Jerusalem Artichoke	No	226	SP/SAH 25/08/16	FALSE
lv5			Natural Area	Hemerocallis fulva (L.) L.	Orange Daylily	Yes	226		FALSE
lv5			Natural Area	Heracleum maximum Bartr.	Cow-parsnip	No	226	SS 10/08/12	FALSE
lv5			Natural Area	Hesperis matronalis L.	Dames Rocket	Yes	226		FALSE
lv5			Natural Area	Hordeum jubatum L. ssp. jubatum	Foxtail Barley	Yes	226		FALSE
lv5			Natural Area	Hypericum perforatum L.	Common St. Johns-wort	Yes	226		FALSE
lv5			Natural Area	Impatiens capensis Meerb.	Spotted Jewel-weed	No	226	SP/SAH 25/08/16	FALSE
lv5			Natural Area	Juglans nigra L.	Black Walnut	No	226	SS 10/08/12, DF 26/10/05	FALSE
lv5			Natural Area	Lactuca serriola L.	Prickly Lettuce	Yes	226	SP/SAH 25/08/16, SS 10/08/12	FALSE
lv5			Natural Area	Leonurus cardiaca L. ssp. cardiaca	Motherwort	Yes	226		FALSE
lv5			Natural Area	Linaria vulgaris Miller	Butter-and-eggs	Yes	226		FALSE
lv5			Natural Area	Lithospermum officinale L.	European Gromwell	Yes	226		FALSE
lv5			Natural Area	Lolium perenne L.	Perennial Ryegrass	Yes	226		FALSE
lv5			Natural Area	Lonicera tatarica L.	Tartarian Honeysuckle	Yes		SS 20/09/16	FALSE
lv5			Natural Area	Lotus corniculatus L.	Birds-foot Trefoil	Yes	226		FALSE
lv5			Natural Area	Lysimachia ciliata L.	Fringed Loosestrife	No	226		FALSE
lv5			Natural Area	Lythrum salicaria L.	Purple Loosestrife	Yes	272, 226	SP/SAH 25/08/16, SS 10/08/12	FALSE
lv5			Natural Area	Malus pumila Miller	Common Crabapple	Yes	226		FALSE
lv5			Natural Area	Medicago lupulina L.	Black Medic	Yes	226		FALSE
lv5			Natural Area	Medicago sativa L. ssp. sativa	Alfalfa	Yes	226		FALSE
lv5			Natural Area	Melilotus alba Medik.	White Sweet Clover	Yes		SP/SAH 25/08/16	FALSE
lv5			Natural Area	Morus alba L.	White Mulberry	Yes		DF 26/10/05	FALSE
lv5			Natural Area	Myosotis laxa Lehm.	Small Forget-me-not	No	226		FALSE
lv5			Natural Area	Oenothera parviflora L.	Northen Evening-primrose	No	226		FALSE
lv5			Natural Area	Parthenocissus vitacea (Knerr) A.S. Hitchc.	Thicket Creeper	No	226		FALSE
lv5			Natural Area	Pastinaca sativa L.	Wild Parsnip	Yes	226	SP/SAH 25/08/16, DF 26/10/05	FALSE
lv5			Natural Area	Penstemon digitalis Nutt. ex Sims	Foxglove Beardtongue	No	272		FALSE
lv5			Natural Area	Persicaria maculosa Gray	Ladys Thumb	Yes		SS 10/08/12	FALSE
lv5			Natural Area	Phalaris arundinacea L.	Reed Canary Grass	No	226	SP/SAH 25/08/16, SS 10/08/12	FALSE
lv5			Natural Area	Phleum pratense L.	Meadow Timothy	Yes	226		FALSE
lv5			Natural Area	Plantago lanceolata L.	English Plantain	Yes	226		FALSE
lv5			Natural Area	Plantago major L.	Nipple-seed Plantain	Yes	226		FALSE
lv5			Natural Area	Polygonum aviculare L.	Prostrate Knotweed	Yes	226		FALSE
lv5			Natural Area	Populus balsamifera L. ssp. balsamifera	Balsam Poplar	No	226	SS 10/08/12	FALSE
lv5			Natural Area	Populus deltoides Bartr. ex Marsh.	Cottonwood	No		SS 20/09/16, SP/SAH 25/08/16	FALSE
lv5			Natural Area	Populus grandidentata Michx.	Large-tooth Aspen	No		DF 26/10/05	FALSE
lv5			Natural Area	Populus tremuloides Michx.	Trembling Aspen	No	226		FALSE
lv5			Natural Area	Populus x canadensis Moench	Carolina Poplar	Yes	226		FALSE
lv5			Natural Area	Potentilla simplex Michx.	Old-field Cinquefoil	No	226		FALSE
lv5			Natural Area	Prunella vulgaris L. ssp. lanceolata (W.C. Barton) Hultén	Heal-all	No	226		FALSE
lv5			Natural Area	Prunus nigra Aiton	Canada Plum	No		DF 26/10/05	FALSE
lv5			Natural Area	Prunus serotina Ehrh.	Black Cherry	No	226		FALSE
lv5			Natural Area	Quercus rubra L.	Northern Red Oak	No	226		FALSE
lv5			Natural Area	Ranunculus acris L.	Tall Butter-cup	Yes	226		FALSE
lv5			Natural Area	Raphanaus raphanistrum L.	Wild Radish	Yes	226		FALSE
lv5			Natural Area	Rhamnus cathartica L.	European Buckthorn	Yes	226		FALSE
lv5			Natural Area	Rhus typhina L.	Staghorn Sumac	No	226	DF 26/10/05	FALSE
lv5			Natural Area	Rosa blanda Aiton	Smooth Rose	No	226		FALSE
lv5			Natural Area	Rosa multiflora Thunb. ex Murray	Multiflora Rose	Yes		SP/SAH 25/08/16, SS 10/08/12	FALSE
lv5			Natural Area	Rubus idaeus L. ssp. melanolasius (Dieck) Focke	Red Raspberry	No	226		FALSE
lv5			Natural Area	Rudbeckia hirta L.	Black-eyed Susan	No		SP/SAH 25/08/16	FALSE
lv5			Natural Area	Rumex crispus L.	Curly Dock	Yes	226	SP/SAH 25/08/16	FALSE
lv5			Natural Area	Salix alba L.	White Willow	Yes		SP/SAH 25/08/16	FALSE
lv5			Natural Area	Salix bebbiana Sarg.	Beaked Willow	No	226		FALSE
lv5			Natural Area	Salix discolor Muhlenb.	Pussy Willow	No		SP/SAH 25/08/16	FALSE
lv5			Natural Area	Salix fragilis L.	Crack Willow	Yes	226	SP/SAH 25/08/16	FALSE

cmbCentroid	cmbFloraType	cmbIntroduced	cmbSiteType	Scientific Name	Common_Name	Introduced	Reference_Code	Source	Historical
lv5			Natural Area	Salix interior Rowlee	Sandbar Willow	No	226		FALSE
lv5			Natural Area	Salix x rubens Schrank	Hybrid Willow	Yes	272, 226, 257	SS 10/08/12	FALSE
lv5			Natural Area	Sambucus canadensis L.	Common Elderberry	No		SS 10/08/12	FALSE
lv5			Natural Area	Scirpus validus L.	Softstem Bulrush	No	272, 226		FALSE
lv5			Natural Area	Silene vulgaris (Moench) Garcke	Maidens Tears	Yes	226		FALSE
lv5			Natural Area	Solanum dulcamara L.	Bittersweet Nightshade	Yes	226	SP/SAH 25/08/16	FALSE
lv5			Natural Area	Solidago canadensis L.	Canada Goldenrod	No		SS 20/09/16, SP/SAH 25/08/16, SS 10/08/12	FALSE
lv5			Natural Area	Sonchus arvensis L. ssp. arvensis	Field Sow-thistle	Yes		SS 10/08/12	FALSE
lv5			Natural Area	Sorbus americana Marshall	Mountain Ash	No	226		FALSE
lv5			Natural Area	Symphoricarpos occidentalis Hook.	Northern Snowberry	Yes	272		FALSE
lv5			Natural Area	Symphyotrichum ericoides (L.) Nesom	White Heath Aster	No	226	SP/SAH 25/08/16	FALSE
lv5			Natural Area	Symphyotrichum novae-angliae (L.) Nesom	New England Aster	No	226		FALSE
lv5			Natural Area	Symphyotrichum puniceum (L.) A. & D. Love	Purple-stemmed Aster	No	226		FALSE
lv5			Natural Area	Taraxacum officinale G. Weber	Common Dandelion	Yes	226		FALSE
lv5			Natural Area	Thlaspi arvense L.	Field Penny-cress	Yes	226		FALSE
lv5			Natural Area	Thuja occidentalis L.	Eastern White Cedar	No	272	DF 26/10/05	FALSE
lv5			Natural Area	Tilia americana L.	American Basswood	No		SP/SAH 25/08/16	FALSE
lv5			Natural Area	Toxicodendron radicans var. rydbergii (Small ex Rydberg) Erskine	Western Poison-ivy	No	226		FALSE
lv5			Natural Area	Tragopogon pratensis L. ssp. pratensis	Meadow Goats-beard	Yes	226		FALSE
lv5			Natural Area	Trifolium hybridum L. ssp. elegans (Savi) Asch. & Graebn.	Alsike Clover	Yes	226		FALSE
lv5			Natural Area	Trifolium pratense L.	Red Clover	Yes	226		FALSE
lv5			Natural Area	Tussilago farfara L.	Colts Foot	Yes	226		FALSE
lv5			Natural Area	Typha angustifolia L.	Narrow-leaved Cattail	No	226		FALSE
lv5			Natural Area	Typha latifolia L.	Broad-leaf Cattail	No		SS 10/08/12	FALSE
lv5			Natural Area	Ulmus pumila L.	Siberian Elm	Yes	272, 226	SS 20/09/16, SP/SAH 25/08/16, SS 10/08/12	FALSE
lv5			Natural Area	Verbascum thapsus L.	Great Mullein	Yes	226		FALSE
lv5			Natural Area	Verbena hastata L.	Blue Vervain	No	226		FALSE
lv5			Natural Area	Viburnum trilobum Marshall	Highbush Cranberry	No	226		FALSE
lv5			Natural Area	Vicia cracca L.	Tufted Vetch	Yes		DF 26/10/05	FALSE
lv5			Natural Area	Vincetoxicum rossicum (Kleopov) Barbar.	European Swallow-wort	Yes	272, 226	DF 26/10/05	FALSE
lv5			Natural Area	Vitis riparia Michx.	Riverbank Grape	No	226	SS 20/09/16, SP/SAH 25/08/16, SS 10/08/12, DF 26/10/05	FALSE
lv5			Natural Area	Xanthium strumarium L.	Rough Cockle-bur	No	226	SS 20/09/16, SP/SAH 25/08/16, SS 10/08/12	FALSE

embCentroid	embFaunaType	embBreeding	embSiteType	Common_Name	Introduced	Reference_Code	Source	G_Rank	S_Rank	COSEWIC	MNR	CVC	Historical	CVC2010
Lv5			Natural Area	Ring-billed Gull	FALSE	272, 257		G5	S5B,S4N			FALSE	FALSE	2
Lv5			Natural Area	Mallard	FALSE		LL 12/06/12	G5	S5			FALSE	FALSE	4
Lv5			Natural Area	Spotted Sandpiper	FALSE		LL 12/06/12	G5	S5			FALSE	FALSE	3
Lv5			Natural Area	Willow Flycatcher	FALSE		LL 12/06/12	G5	S5B			FALSE	FALSE	3
Lv5			Natural Area	Eastern Kingbird	FALSE		LL 12/06/12	G5	S4B			TRUE	FALSE	3
Lv5			Natural Area	Red-winged Blackbird	FALSE		SP 1/6/16, LL 12/06/12	G5	S5			FALSE	FALSE	4
Lv5			Natural Area	American Goldfinch	FALSE		SAH/SP 25/08/16, SS 10/08/12, LL 12/06/12	G5	S5B			FALSE	FALSE	4
Lv5			Natural Area	Song Sparrow	FALSE		LL 12/06/12	G5	S5B			FALSE	FALSE	4
Lv5			Natural Area	Northern Cardinal	FALSE		SAH/SP 25/08/16, SS 10/08/12, LL 12/06/12	G5	S5			FALSE	FALSE	4
Lv5			Natural Area	House Sparrow	TRUE		SP 1/6/16, LL 12/06/12	G5	SNA			FALSE	FALSE	5
Lv5			Natural Area	Gray Catbird	FALSE		LL 12/06/12	G5	S4B			TRUE	FALSE	3
Lv5			Natural Area	Black-capped Chickadee	FALSE		SAH/SP 25/08/16	G5	S5			FALSE	FALSE	4
Lv5			Natural Area	American Robin	FALSE	272, 257	LL 12/06/12	G5	S5B			FALSE	FALSE	4
Lv5			Natural Area	Eastern Grey Squirrel	FALSE		SAH/SP 25/08/16	G5	S5			FALSE	FALSE	4
Lv5			Natural Area	Coyote	FALSE	272, 257		G5	S5			FALSE	FALSE	3
Lv5			Natural Area	Raccoon	FALSE	272, 257		G5	S5			FALSE	FALSE	4
Lv5			Natural Area	Cabbage White	TRUE		SAH/SP 25/08/16	G5	SNA			FALSE	FALSE	

APPENDIX

C TECHNICAL MEMORANDA

APPENDIX

C-1 *TM – HYDRAULIC MODELLING ANALYSIS*

TECHNICAL MEMORANDUM

TO: Region of Peel

FROM: WSP

SUBJECT: Claredale EA Project – Hydraulic Analysis

DATE: **March 10, 2020**

1 INTRODUCTION

WSP Canada (WSP) was retained by the Regional Municipality of Peel (Region) to complete a Schedule B Class Environmental Assessment (EA) involving the installation of a new sanitary sewer which connects the Claredale Road sanitary catchment area to Beechwood SPS.

Claredale Road is a residential street located in the City of Mississauga, west of Cawthra Road and between Atwater Avenue and the C.N. Rail tracks situated north of Lakeshore Road East. The Claredale Road sanitary sewer network collects flows from all sanitary lateral connections on Claredale Road, Ettridge Court, Raphael Avenue and Avonwood Drive, as well as a small portion of the lateral connections on Atwater Avenue and Northaven Drive. In addition, weeping tiles and homeowner sump pumps discharge to the Claredale Road sanitary sewer network.

Under existing conditions, the Claredale Road sanitary drainage area has a maximum flow of 29 L/s that is conveyed via a 250mm diameter gravity sewer south towards Lakeshore Road East. The existing sewer travels between houses 1116 and 1120 on Claredale Road, beneath the C.N. Rail tracks through a steel tunnel liner, crosses the Cooksville Creek by means of a double siphon, discharging to Beechwood Avenue and ultimately the newly constructed Beechwood SPS. A map of the existing Claredale Road sanitary catchment area is shown in Figure 1. All sewers and maintenance holes upstream of the siphons are coloured red.

Figure 1: Claredale Road Sanitary Catchment Area – Existing Layout

As part of the EA alternative development process, it is necessary to determine the limits of the existing sewer that requires upsizing to prevent basement flooding in the Claredale

neighbourhood. WSP modelled the existing Claredale sanitary sewer network and proposed sewer routing under the 5-year and 25-year SCS storm scenario to ensure compliance with the Region's design standards. Per the Region's design standards for local sanitary sewers: under a 5-year SCS storm with 2041 population flows, the flow depth relative to pipe diameter must be less than 85%; under a 25-year SCS storm, the hydraulic grade line (HGL) must be greater than 1.8 m below grade throughout the network. A depth of 1.8 m below grade is also the typically assumed basement depth; a hydraulic grade line less than 1.8 m below grade poses a risk for basement flooding. Additionally, the 100-year storm scenario was modelled to assess the risk of basement flooding for events exceeding the Region's standards. The purpose of this technical memorandum is to document the results of this hydraulic analysis.

2 HYDRAULIC ANALYSIS

The hydraulic analysis was completed using the latest version of the InfoWorks hydraulic model received from the Region on June 22, 2016. The Region's model has not yet been updated to reflect the sanitary system's connection to the new Beechwood SPS. As a result, upstream conditions as modelled by the hydraulic analysis may be affected.

WSP modelled the existing and proposed sewer alignments, described below:

1. Existing Sewer Alignment
   - Flows from the Claredale Road sanitary drainage area are conveyed via a 250mm diameter gravity sewer south between houses 1116 and 1120 on Claredale Road, beneath the C.N. Rail tracks through a steel tunnel liner, crossing the Cooksville Creek by means of a double siphon, discharging to Beechwood Avenue and ultimately Beechwood SPS (Refer to Figure 1)
2. Proposed Sewer Alignment
   - Flows from the Claredale Road sanitary drainage area are conveyed via the existing 250mm diameter gravity sewer south between houses 1116 and 1120 on Claredale Road, beneath the C.N. Rail tracks through a steel tunnel liner. Flows are then diverted via a new 300 mm sewer from existing maintenance hole SMH-1783489 to proposed MH2 CD, bypassing the existing siphon and ultimately discharging to Beechwood SPS (Refer to Figure 2)

Figure 2: Claredale Road Sanitary Catchment Area – Proposed Layout

For each of the existing and proposed sewer alignments, three (3) scenarios were modelled:

1. 5-year SCS storm (2041 population)
2. 25-year SCS storm
3. 100-year SCS storm

For discussion purposes, the Claredale sanitary sewer network has been divided into 3 separate branches. The existing alignment is comprised of Branches 1, 2, and 3A while the proposed alignment is comprised of Branches 1, 2, and 3B. Figure 3 shows the location of each branch.

Branch 1

- Includes the existing sewers on the west side of the Claredale sanitary catchment (SMH-1783318 to SMH-1783479)
- Branch 1 is highlighted in pink in Figure 4 below.

Branch 2

- Includes the existing sewers on the east side of the Claredale sanitary catchment (SMH-1783471 to SMH-1783479)
- Branch 2 is highlighted in purple in Figure 5 below.

Branch 3A

- Includes the existing sewers connecting the existing maintenance hole on Claredale Road (SMH-1783479) to the existing maintenance hole (SMH-1783094) connecting to Beechwood SPS
- Includes the existing double siphons under Cooksville Creek (SMH-1783491 to SMH-1783695)
- Branch 3A is highlighted in blue in Figure 6 below.

Branch 3B

- Includes the existing sewers connecting the existing maintenance hole on Claredale Road (SMH-1783479) to the existing maintenance hole south of the tracks (SMH-1783489)
- Includes the proposed sewers which bypass the existing double siphons, connecting the existing maintenance hole south of the tracks (SMH-1783489) to the proposed maintenance hole (MH2 CD) connecting to Beechwood SPS
- Branch 3B is highlighted in yellow in Figure 7 below.

Figure 3: Claredale Road Sanitary Catchment Area – Branch Map

Figure 4: Claredale Road Sanitary Catchment Area – Branch 1

Figure 5: Claredale Road Sanitary Catchment Area – Branch 2

Figure 6: Claredale Road Sanitary Catchment Area – Branch 3A

Figure 7: Claredale Road Sanitary Catchment Area – Branch 3B

2.1 EXISTING SEWER

2.1.1 5-YEAR SCS STORM RESULTS

Under the 5-year SCS storm scenario, surcharge conditions were experienced in the siphons crossing under Cooksville Creek. The siphons are located between maintenance holes SMH-1783491 and SMH-1783695. Surcharging is expected to occur as the invert of the siphons is below that of the sewers immediately downstream. Surcharging did not occur in any Branch 1 and Branch 2 sewers.

Under this scenario, all sewers except for the siphons have a flow depth relative to pipe diameter less than 85%. Thus, under the 5-year storm scenario, the existing sewer network complies with the Region's standards for sanitary sewer design.

The results for the existing sewer 5-year SCS storm scenario can be referred to in Attachment A-1. Details are provided below in Table 1 and Figure 8.

Table 1 – Surcharged Sewers - 5 Year SCS Storm (Existing Sewer Routing)

SEWER ID	U/S MH ID	D/S MH ID	SEWER DIA. (MM)	DEPTH TO WATER LEVEL[1]		SURCHARGE STATE
				U/S MH (M)	D/S MH (M)	
SIPHONS	SMH-1783491	SMH-1783695	250	2.225	2.049	The HGL slope is less than the pipe slope Downstream capacity constraints and backwater conditions are present)

[1] Depth to water level is measured from grade to the hydraulic grade line at a given maintenance hole.

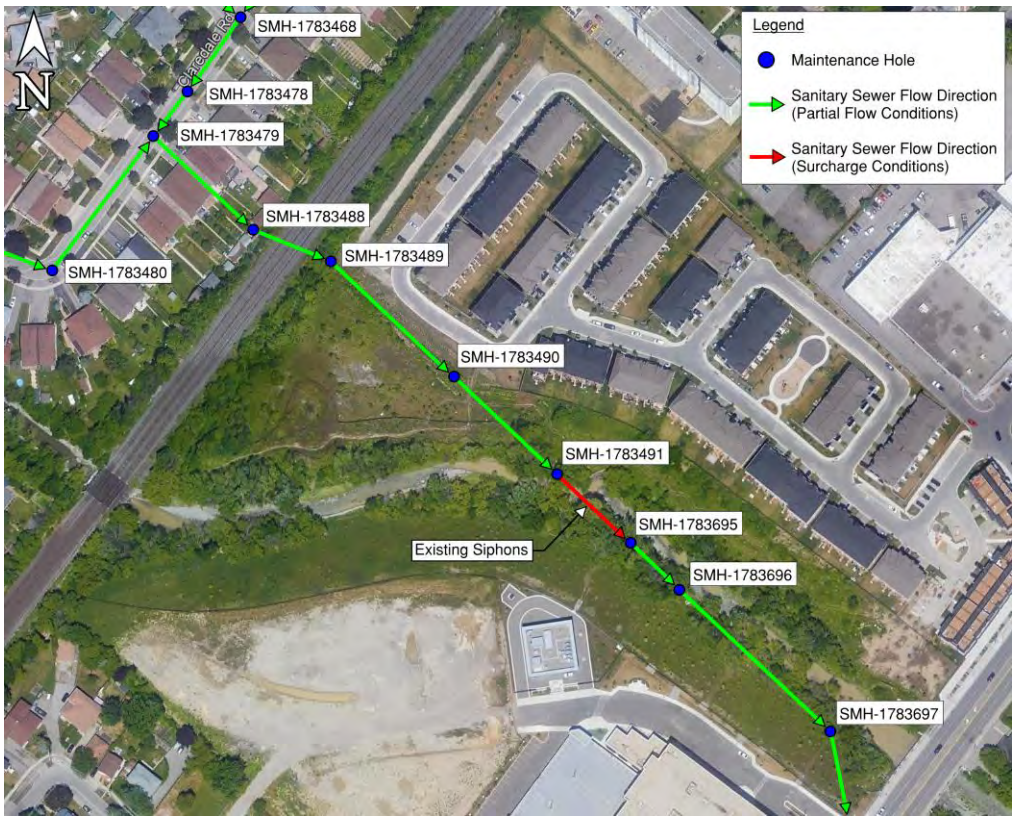


Figure 8: Surcharged Sewer Map - 5 Year SCS Storm (Existing Sewer Routing)

The hydraulic grade line was observed to be less than 1.8 m below grade at maintenance holes SMH-1783696 and SMH-1783697 (1.520 m and 1.635 m, respectively), both located downstream of the siphons. The location of these maintenance holes and associated sewer is shown in Figure 9.

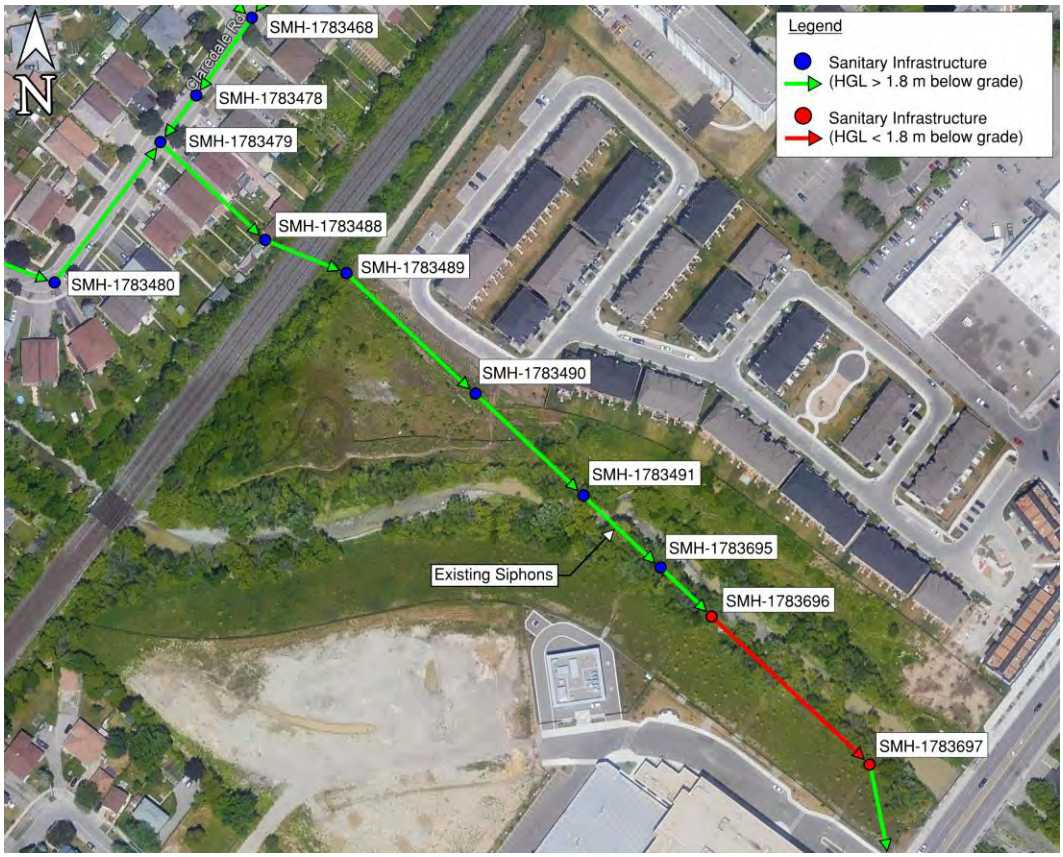


Figure 9: Location of Sanitary Infrastructure with HGL < 1.8 m below Grade – 5 Year SCS Storm (Existing Sewer Routing)

At SMH-1783309, the sewer invert is only 1.875 m below grade and the hydraulic grade line was observed to be 1.823 m below grade, providing only 0.023 m of freeboard to the assumed basement depth of 1.8 m. SMH-1783309 is located at the intersection of Claredale Road and Avonwood Drive, as shown in Figure 10.

Figure 10: Location of SMH-1783309 – 5 Year SCS Storm (Existing Sewer Routing)

At all other locations throughout the network, the hydraulic grade line remained a minimum of 0.9 m below a typical assumed basement depth of 1.8 m below grade.

On the basis that the hydraulic grade line is less than the assumed basement depth of 1.8 m below grade at maintenance holes SMH-1783696 and SMH-1783697, there is a a risk of basement flooding at this location. However, based on as-built information, this section of sewer does not appear to have any lateral service connections. Based on the available information, basement flooding is not expected to occur under the 5-year SCS storm scenario.

2.1.2 25-YEAR SCS STORM RESULTS

Under the 25-year SCS storm scenario, surcharge conditions were experienced in 7 reaches of sewer, including the siphons crossing under Cooksville Creek. The results for the existing sewer 25-year SCS storm scenario can be referred to in Attachment A-2. Details are provided below in Table 2 and Figure 11.

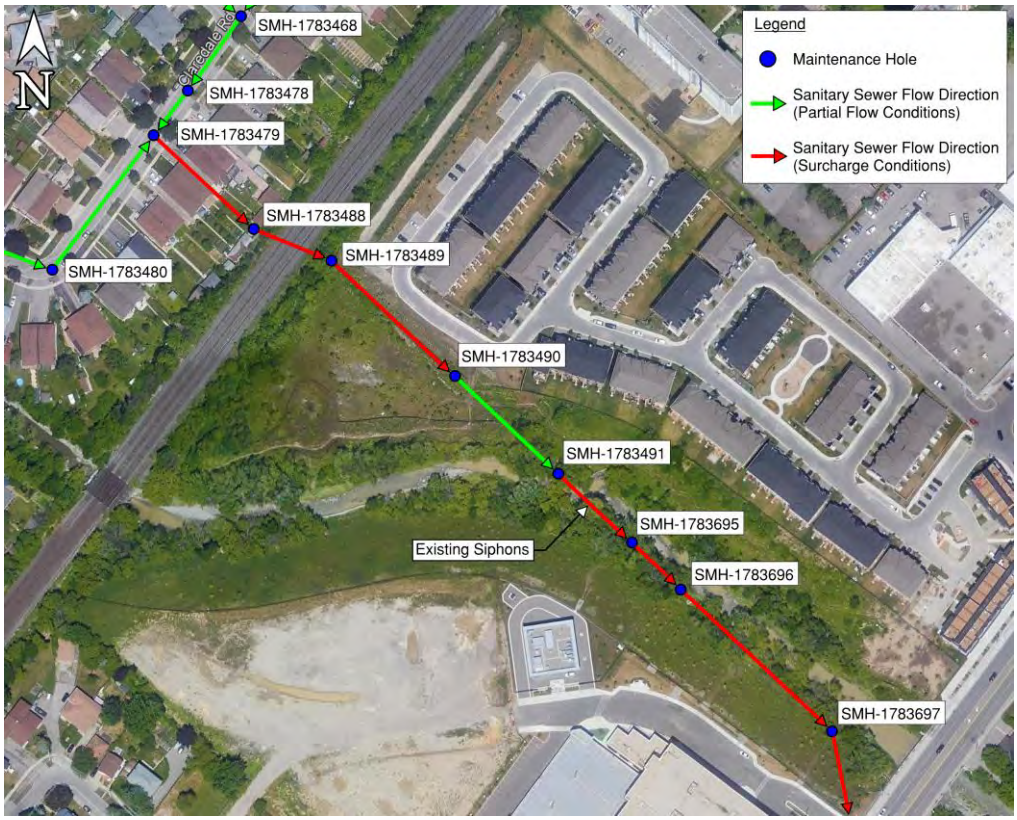


Figure 11: Surcharged Sewer Map - 25 Year SCS Storm (Existing Sewer Routing)

The surcharged sewers receive and convey all flows from the Claredale sanitary catchment (Branches 1 and 2) south towards Beechwood SPS. As indicated in Table 2, surcharging occurred due to both capacity constraints and downstream conditions causing backwater effects. Of note, sewer SMH-1783490.1, located immediately upstream of the siphons did not surcharge, but was at 98% of full pipe flow. Surcharging did not occur in any Branch 1 and Branch 2 sewers.

Table 2 – Surcharged Sewers - 25 Year SCS Storm (Existing Sewer Routing)

SEWER ID	U/S MH ID	D/S MH ID	SEWER DIA. (MM)	DEPTH TO WATER LEVEL[1]		SURCHARGE STATE
				U/S MH (M)	D/S MH (M)	
SMH-1783479.1	SMH-1783479	SMH-1783488	250	4.249	3.437	The HGL slope is greater than the pipe slope . Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.
SMH-1783488.1	SMH-1783488	SMH-1783489	250	3.437	3.260	The HGL slope is less than the pipe slope. Downstream capacity constraints and backwater conditions are present.
SMH-1783489.1	SMH-1783489	SMH-1783490	250	3.260	4.173	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.
SIPHONS	SMH-1783491	SMH-1783695	250	2.040	1.823	The HGL slope is less than the pipe slope. Downstream capacity constraints and backwater conditions are present.
SMH-1783695.1	SMH-1783695	SMH-1783696	250	1.823	1.321	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.
SMH-1783696.1	SMH-1783696	SMH-1783697	250	1.321	1.430	The HGL slope is less than the pipe slope. Downstream capacity constraints and backwater conditions are present.
SMH-1783697.1	SMH-1783697	SMH-1783094	250	1.430	3.304	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.

[1] Depth to water level is measured from grade to the hydraulic grade line at a given maintenance hole.

The hydraulic grade line was observed to be less than 1.8 m below grade at maintenance holes SMH-1783696 and SMH-1783697 (1.321 m and 1.430 m, respectively), both located downstream of the siphons. The location of these maintenance holes and associated sewer is shown in Figure 12.

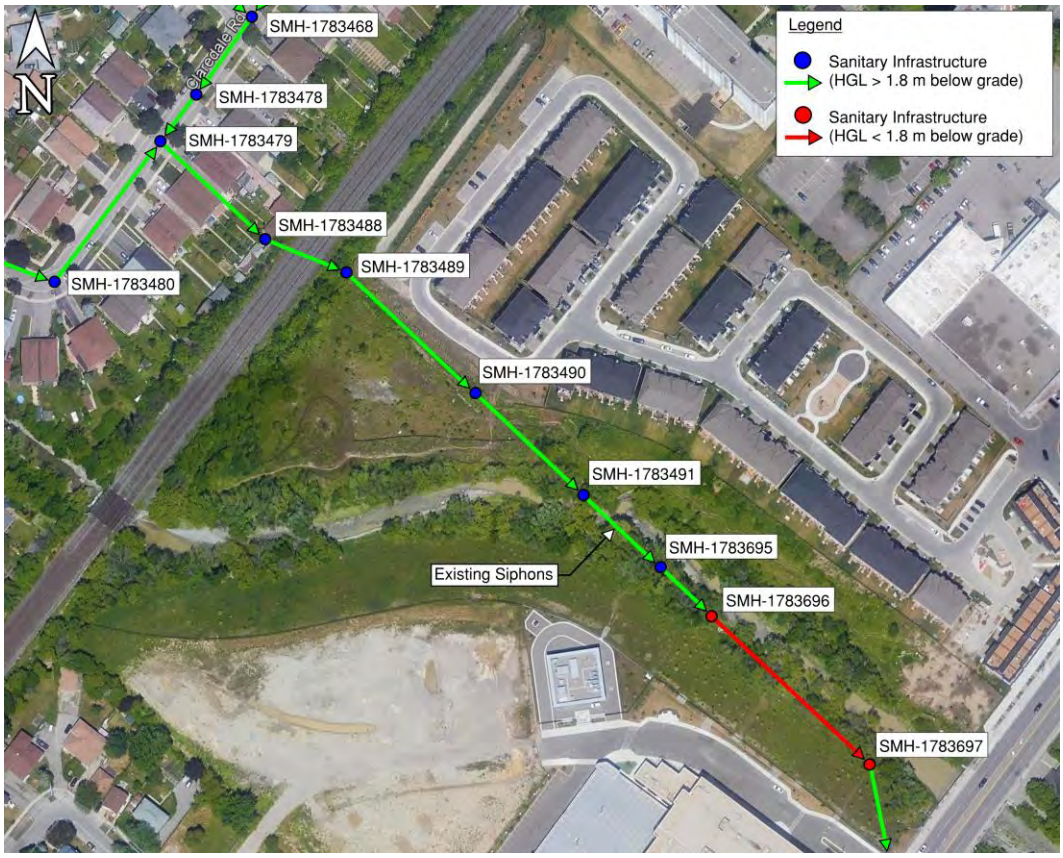


Figure 12: Location of Sanitary Infrastructure with HGL < 1.8 m below Grade – 25 Year SCS Storm (Existing Sewer Routing)

At the siphons, the hydraulic grade line ranges from 1.823 m to 2.040 m below grade, providing between 0.023 m and 0.240 m of freeboard to the assumed basement depth of 1.8 m. At SMH-1783309, the sewer invert is only 1.875 m below grade and the hydraulic grade line was observed to be 1.814 m below grade, providing only 0.014 m of freeboard to the assumed basement depth of 1.8 m. SMH-1783309 is located at the intersection of Claredale Road and Avonwood Drive, as shown in Figure 13.

Figure 13: Location of SMH-1783309 – 25 Year SCS Storm (Existing Sewer Routing)

At all other locations throughout the network, the hydraulic grade line remained a minimum of 0.9 m below a typical assumed basement depth of 1.8 m below grade.

On the basis that the hydraulic grade line is less than the assumed basement depth of 1.8 m below grade at maintenance holes SMH-1783696 and SMH-1783697, there is a a risk of basement flooding at this location. However, based on as-built information, this section of sewer does not appear to have any lateral service connections. Based on the available information, basement flooding is not expected to occur under the 25-year SCS storm scenario.

Under the 25-year storm scenario, the Region's standard requires the hydraulic grade line throughout the network to be greater than 1.8 m below grade. Thus, due to exceedances at SMH-1783696 and SMH-1783697, the existing sewer network does not comply with the Region's standards for sanitary sewer design for the 25-year storm scenario.

2.1.3 100-YEAR SCS STORM RESULTS

Under the 100-year SCS storm scenario, surcharge conditions were experienced in 7 reaches of sewer, including the siphons crossing under Cooksville Creek. The results for the existing sewer 100-year SCS storm scenario can be referred to in Attachment A-3. Details are provided below in Table 3 and Figure 14.

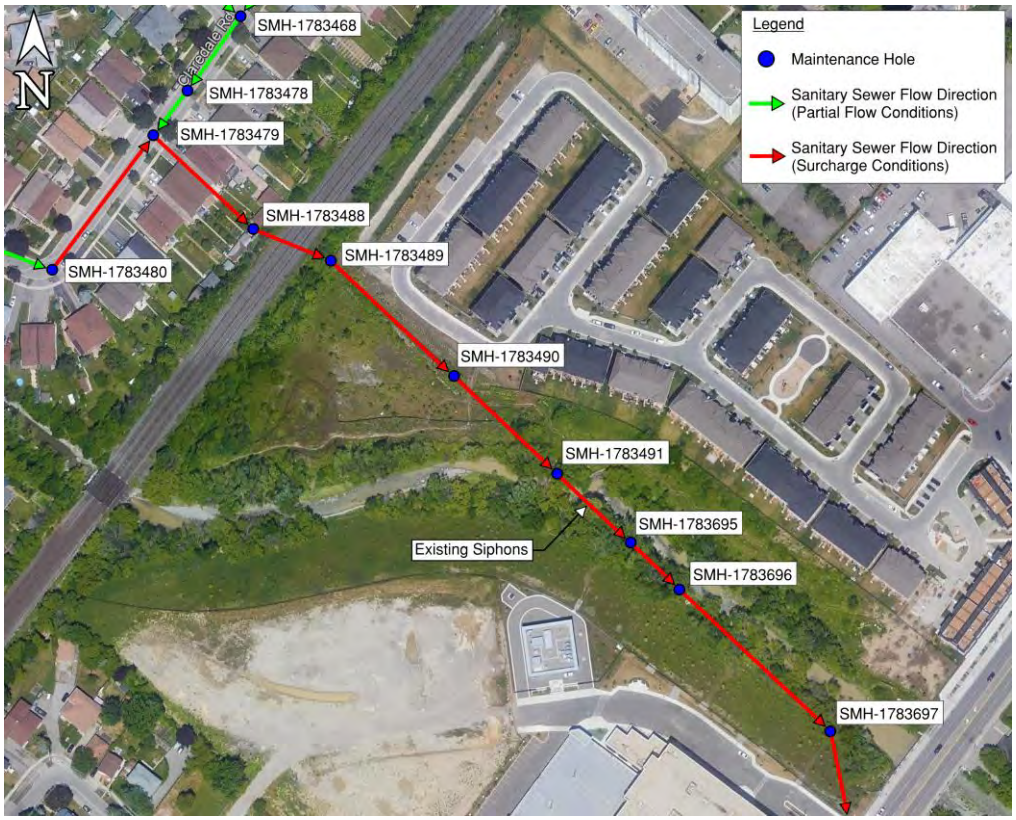


Figure 14: Surcharged Sewer Map - 100 Year SCS Storm (Existing Sewer Routing)

Sewers from maintenance holes SMH-1783479 to SMH-1783094 receive and convey all flows from the Claredale sanitary catchment (Branches 1 and 2) south towards Beechwood SPS. As indicated in Table 3, these sewers, with exception to the siphons, surcharged due to insufficient capacity and are likely the cause of backwater conditions causing surcharging in sewer SMH-1783480.1. All other upstream sewers did not surcharge.

Table 3 – Surcharged Sewers - 100 Year SCS Storm (Existing Sewer Routing)

SEWER ID	U/S MH ID	D/S MH ID	SEWER DIA. (MM)	DEPTH TO WATER LEVEL[1]		SURCHARGE STATE
				U/S MH (M)	D/S MH (M)	
SMH-1783480.1	SMH-1783480	SMH-1783479	250	2.611	3.719	The HGL slope is less than the pipe slope. Downstream capacity constraints and backwater conditions are present.
SMH-1783479.1	SMH-1783479	SMH-1783488	250	3.719	2.955	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.
SMH-1783488.1	SMH-1783488	SMH-1783489	250	2.955	2.816	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.
SMH-1783489.1	SMH-1783489	SMH-1783490	250	2.816	3.739	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.
SMH-1783490.1	SMH-1783490	SMH-1783491	250	3.739	1.412	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.
SIPHONS	SMH-1783491	SMH-1783695	250	1.412	1.111	The HGL slope is less than the pipe slope. Downstream capacity constraints and backwater conditions are present.
SMH-1783695.1	SMH-1783695	SMH-1783696	250	1.111	0.606	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.
SMH-1783696.1	SMH-1783696	SMH-1783697	250	0.606	0.739	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.
SMH-1783697.1	SMH-1783697	SMH-1783094	250	0.739	2.713	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.

[1] Depth to water level is measured from grade to the hydraulic grade line at a given maintenance hole.

The hydraulic grade line was observed to be less than 1.8 m below grade at the siphons and downstream infrastructure, as summarized in Table 4.

Table 4 – Sanitary Infrastructure with HGL < 1.8 m below Grade – 100 Year SCS Storm (Existing Sewer Routing)

SEWER ID	U/S MH ID	DEPTH OF HGL BELOW GRADE AT U/S MH (M)	D/S MH ID	DEPTH OF HGL BELOW GRADE AT D/S MH (M)
SIPHONS	SMH-1783491	1.412	SMH-1783695	1.111
SMH-1783695.1	SMH-1783695	1.111	SMH-1783696	0.606
SMH-1783696.1	SMH-1783696	0.606	SMH-1783697	0.739

The location of these maintenance holes and associated sewers is shown in Figure 15.

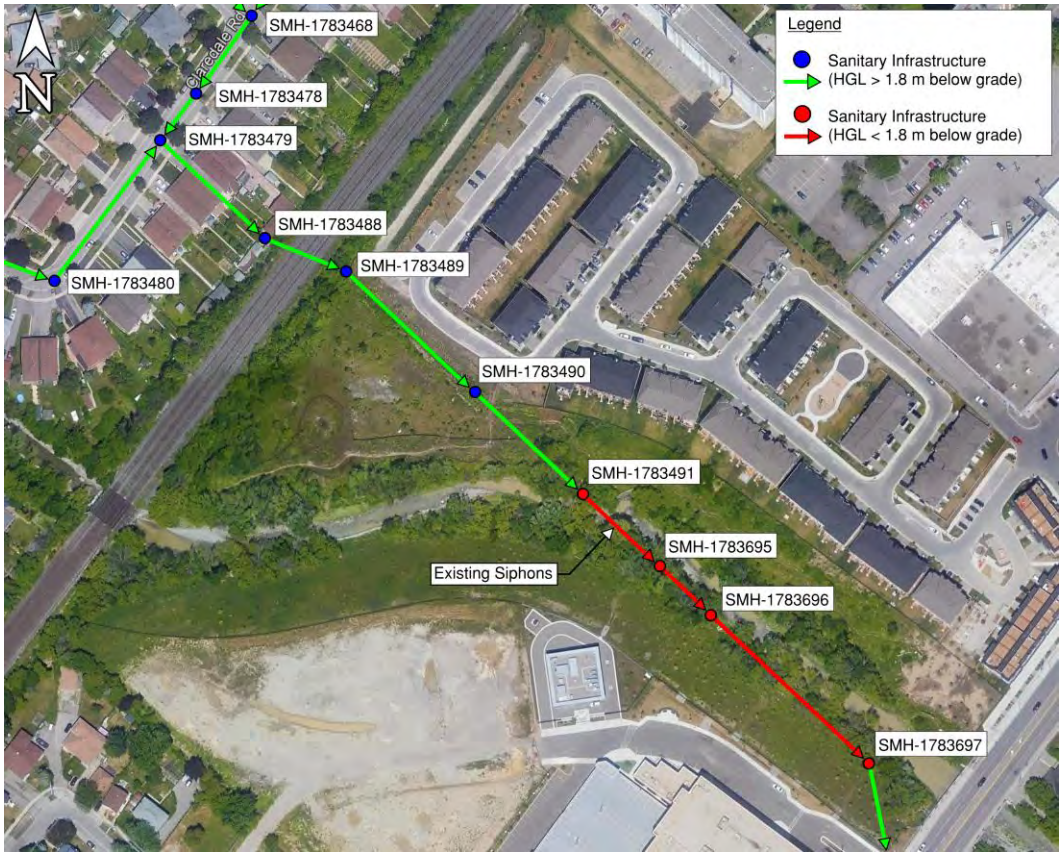


Figure 15: Location of Sanitary Infrastructure with HGL < 1.8 m below Grade – 100 Year SCS Storm (Existing Sewer Routing)

At SMH-1783309, the sewer invert is only 1.875 m below grade and the hydraulic grade line was observed to be 1.805 m below grade, providing only 0.005 m of freeboard to the assumed basement depth of 1.8 m. SMH-1783309 is located at the intersection of Claredale Road and Avonwood Drive, as shown in Figure 16.

Figure 16: Location of SMH-1783309 – 100 Year SCS Storm (Existing Sewer Routing)

At all other locations throughout the network, the hydraulic grade line remained a minimum of 0.8 m below a typical assumed basement depth of 1.8 m below grade.

On the basis that the hydraulic grade line is less than the assumed basement depth of 1.8 m below grade at maintenance holes SMH-1783491, SMH-1783695, SMH-1783696 and SMH-1783697, there is a a risk of basement flooding at this location. However, based on as-built information, this section of sewer does not appear to have any lateral service connections. Based on the available information, basement flooding is not expected to occur under the 100-year SCS storm scenario.

2.2 PROPOSED SEWER

2.2.1 5-YEAR SCS STORM RESULTS

Under the 5-year SCS storm scenario, surcharge conditions were not experienced in the sewer network.

With exception to one location, the hydraulic grade line throughout the network remained a minimum of a 0.9 m below a typical assumed basement depth of 1.8 m below grade. At SMH-1783309, the sewer invert is only 1.875 m below grade and the hydraulic grade line was observed to be 1.823 m below grade, providing only 0.023 m of freeboard to the assumed basement depth. SMH-1783309 is located at the intersection of Claredale Road and Avonwood Drive, as shown in Figure 17.

Figure 17: Location of SMH-1783309 – 5 Year SCS Storm (Proposed Sewer Routing)

Based on an assumed basement depth of 1.8 m, basement flooding is not expected to occur during a 5-year SCS storm event.

Under this scenario, all sewers except for the siphons have a flow depth relative to pipe diameter less than 85%. Thus, under the 5-year storm scenario, the proposed sewer network complies with the Region's standards for sanitary sewer design.

The results for the 5-year SCS storm scenario can be referred to in Attachment B-1.

2.2.2 25-YEAR SCS STORM RESULTS

Under the 25-year SCS storm scenario, only one section of sewer experienced surcharge conditions as detailed below in Table 5 and Figure 18.

Table 5 – Surcharged Sewers - 25 Year SCS Storm (Proposed Sewer Routing)

SEWER ID	U/S MH ID	D/S MH ID	SEWER DIA. (MM)	DEPTH TO WATER LEVEL[1]		SURCHARGE STATE
				U/S MH (M)	D/S MH (M)	
SMH-1783479.1	SMH-1783479	SMH-1783488	250	4.253	3.469	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.

[1] Depth to water level is measured from grade to the hydraulic grade line at a given maintenance hole.

Figure 18: Surcharged Sewer Map - 25 Year SCS Storm (Proposed Sewer Routing)

The surcharged reach of sewer receives and conveys all flows from the Claredale sanitary catchment (Branches 1 and 2) south towards Beechwood SPS. As indicated in Table 5,

surcharging occurred due to insufficient capacity in this reach of sewer. This section of sewer does not appear to have any lateral service connections. Surcharging resulted in backwater conditions, however, the backwater effects do not cause surcharging in the upstream sewers. Backwater effects were limited due to vertical drops between inlet and outlet connections at SMH-1783479: the inlet sewer from Branch 1 is 0.278 m above the outlet sewer and the inlet sewer from branch 2 is 1.159 m above the outlet sewer. The hydraulic grade line at SMH-1783479 is approximately 4.3 m below grade.

With exception to one location, the hydraulic grade line throughout the network remained a minimum of 0.9 m below a typical assumed basement depth of 1.8 m below grade. At SMH-1783309, the sewer invert is only 1.875 m below grade and the hydraulic grade line was observed to be 1.814 m below grade, providing only 0.014 m of freeboard to the assumed basement depth. SMH-1783309 is located at the intersection of Claredale Road and Avonwood Drive, as shown in Figure 19.

Figure 19: Location of SMH-1783309 – 25 Year SCS Storm (Proposed Sewer Routing)

Based on an assumed basement depth of 1.8 m, basement flooding is not expected to occur during a 25-year SCS storm event.

Under this scenario, the hydraulic grade line (HGL) throughout the network was greater than 1.8 m below grade. Thus, under the 25-year storm scenario, the proposed sewer network complies with the Region's standards for sanitary sewer design.

The results for the 25-year SCS storm scenario can be referred to in Attachment B-2.

2.2.3 100-YEAR SCS STORM RESULTS

Under the 100-year SCS storm scenario, three sewer sections experienced surcharge conditions, summarized below in Table 6 and Figure 20.

Figure 20: Surcharged Sewers – 100 Year SCS Storm (Proposed Sewer Routing)

Sewers SMH-1783479.1 and SMH-1783488.1 receive and convey all flows from the Claredale sanitary catchment (Branches 1 and 2) south towards Beechwood SPS. As indicated in Table 6, Sewers SMH-1783479.1 and SMH-1783488.1 surcharged due to insufficient capacity and are likely the cause of backwater conditions causing surcharging in sewer SMH-1783480.1.

Table 6 – Surcharged Sewers - 100 Year SCS Storm (Proposed Sewer Routing)

SEWER ID	U/S MH ID	D/S MH ID	SEWER DIA. (MM)	DEPTH TO WATER LEVEL[1]		SURCHARGE STATE
				U/S MH (M)	D/S MH (M)	
SMH-1783480.1	SMH-1783480	SMH-1783479	250	2.848	3.988	The HGL slope is less than the pipe slope. Downstream capacity constraints and backwater conditions are present.
SMH-1783479.1	SMH-1783479	SMH-1783488	250	3.988	3.377	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.
SMH-1783488.1	SMH-1783488	SMH-1783489	250	3.377	9.163	The HGL slope is greater than the pipe slope. Backwater effects are not present; surcharging is due to insufficient capacity in the given sewer.

[1] Depth to water level is measured from grade to the hydraulic grade line at a given maintenance hole.

With exception to one location, the hydraulic grade line throughout the network remained a minimum of 0.9 m below a typical assumed basement depth of 1.8 m below grade. At SMH-1783309, the sewer invert is only 1.875 m below grade and the hydraulic grade line was observed to be 1.805 m below grade, providing only 0.005 m of freeboard to the assumed basement depth. SMH-1783309 is located at the intersection of Claredale Road and Avonwood Drive, as shown in Figure 21.

Figure 21: Location of SMH-1783309 – 100 Year SCS Storm (Proposed Sewer Routing)

Based on an assumed basement depth of 1.8 m, basement flooding is not expected to occur during a 100-year SCS storm event. The results for the 100-year SCS storm scenario can be referred to in Attachment B-3.

3 CONCLUSIONS

In accordance with the Region's design standards for local sanitary sewers: under a 5-year SCS storm with 2041 population flows, the flow depth relative to pipe diameter must be less than 85%; under a 25-year SCS storm, the hydraulic grade line (HGL) must be greater than 1.8 m below grade throughout the network. A depth of 1.8 m below grade is also the typically assumed basement depth; a hydraulic grade line less than 1.8 m below grade poses a risk for basement flooding.

For the existing sewer alignment, under the 5-year SCS storm scenario, surcharging occurred at the double siphons crossing under Cooksville Creek; however, due to the depth of the sewers at this location, basement flooding is not expected to occur. Under the 5-year storm scenario, all sewers with exception to the double siphons comply with the Region's design standards.

Furthermore, for the existing sewer alignment, under the 25-year and 100-year SCS storm scenarios, surcharging occurred within multiple sewers throughout the network. Under the 25-year storm scenario, the HGL was less than 1.8 m below grade downstream of the siphons. Thus, the existing sewers do not comply with the Region's design standards for a 25-year storm event. The 100-year storm also resulted in an HGL less than 1.8 m below grade at and downstream of the siphons. On the basis that the hydraulic grade line is less than the assumed basement depth of 1.8 m below grade, there is a risk of basement flooding for buildings with service connections to these sewers. However, given that as-built information shows that there are no service connections to these sewers, basement flooding is not expected to occur under the 5-year, 25-year and 100-year storm events.

The proposed sewer alignment, which involves bypassing the double siphons via new 300 mm diameter sewers, was modelled under the 5-year, 25-year and 100-year SCS storm scenarios. For the proposed sewer alignment, under the 5-year SCS storm scenario, surcharge conditions were not experienced in the sewer network. Furthermore, for the proposed sewer alignment, under the 25-year and 100-year SCS storm scenarios, surcharging occurred in existing reaches of sewer located immediately upstream of the proposed sewers; however, due to the depth of the sewers at these locations, the HGL remained greater than 1.8 m below grade and thus basement flooding is not expected to occur.

4 RECOMMENDATIONS

The existing siphons are not in compliance with the Region's 5-year storm design standard, and the sewers downstream of the siphons are not in compliance with the Region's 25-year storm design standard for sanitary sewer design. To comply with the Region's design standards for both the 5-year and 25-year storm scenarios, WSP recommends installing, at minimum, the proposed sewer alignment, which bypasses the existing double siphons, connecting the existing maintenance hole south of the tracks (SMH-1783489) to the proposed maintenance hole (MH2 CD) connecting to Beechwood SPS. For reference, the proposed sewer alignment is shown in Figure 22.

Figure 22: Claredale Road Sanitary Catchment Area – Branch 3B (Proposed)

Although some surcharging is expected during 25 and 100-year storms, the risk of basement flooding is very low due to the depth of the surcharged sewers below grade.

Should the Region wish to eliminate all surcharging under 25 and 100-year storms, the existing sewers connecting the existing maintenance hole on Claredale Road (SMH-1783479) to the existing maintenance hole south of the tracks (SMH-1783489) could be replaced at the same time as the siphon bypass sewer. The existing sewers would be replaced with new sewers designed to eliminate surcharging, and following a similar alignment to the existing sewers. The alternative proposed sewer alignment, involving connecting the existing maintenance hole north of the tracks (SMH-1783479) to the proposed maintenance hole (MH2 CD) connecting to Beechwood SPS, is shown in Figure 23.

Figure 23: Claredale Road Sanitary Catchment Area – Alternative Branch 3B (Proposed)

However, replacing the sewers crossing the tracks to Claredale Road would come at significant expense and considerably greater disruption to the residents as temporary closure of Claredale Road for an extended period would be required. The Region should consider if the cost and disruption are justified to eliminate all surcharging under the 25 and 100 year storm events.

Additionally, under the proposed scenarios, at SMH-1783309, located at the intersection of Avonwood Dr. and Claredale Rd, the shallow sewer depth provides only 0.005 m to 0.023 m of freeboard to the assumed basement depth of 1.8 m. Additional investigation will be completed to determine basement depths at SMH-1783309. Should the investigation results indicate that the basements at this location are prone to flooding, sanitary infrastructure at SMH-1783309 shall be upgraded as part of this project.

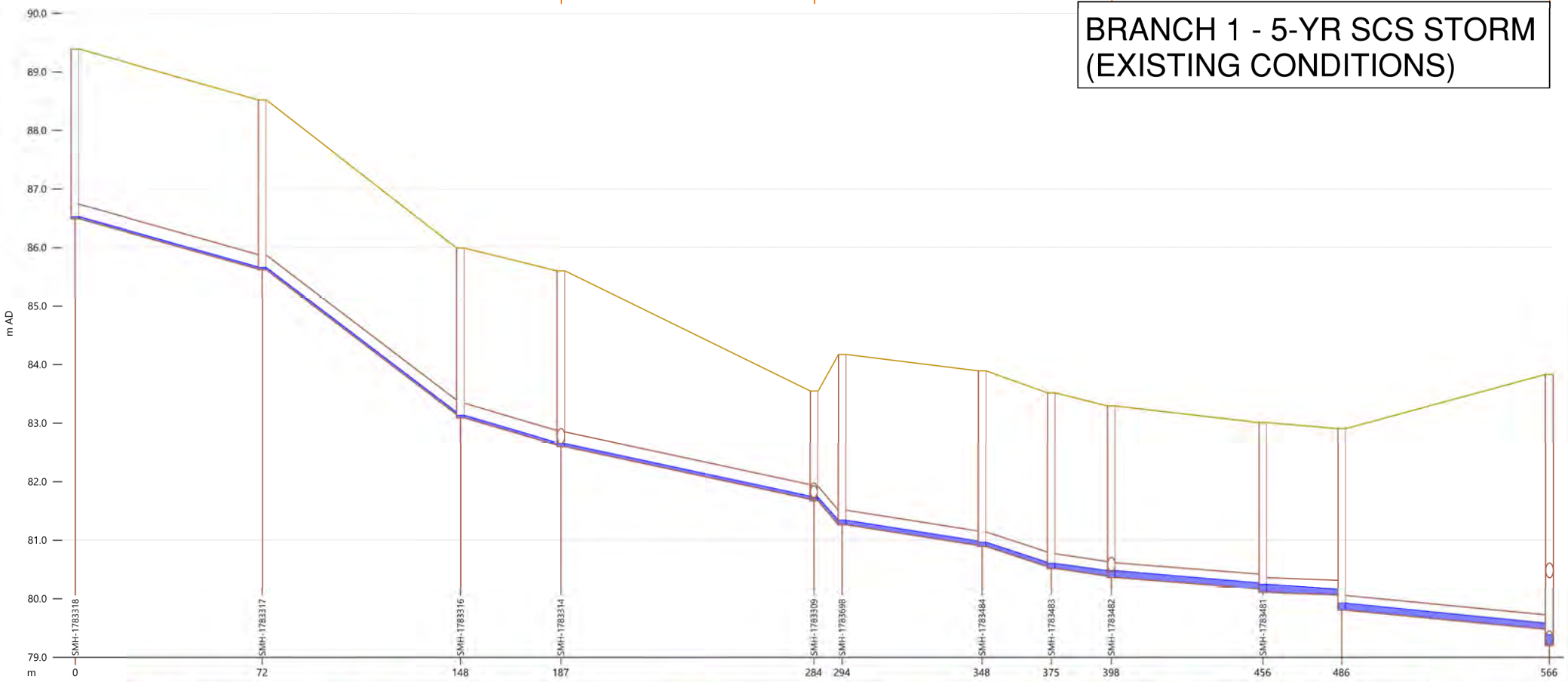
ATTACHMENT

A. EXISTING CONDITIONS RESULTS

ATTACHMENT

A-1. 5-YEAR SCS STORM RESULTS

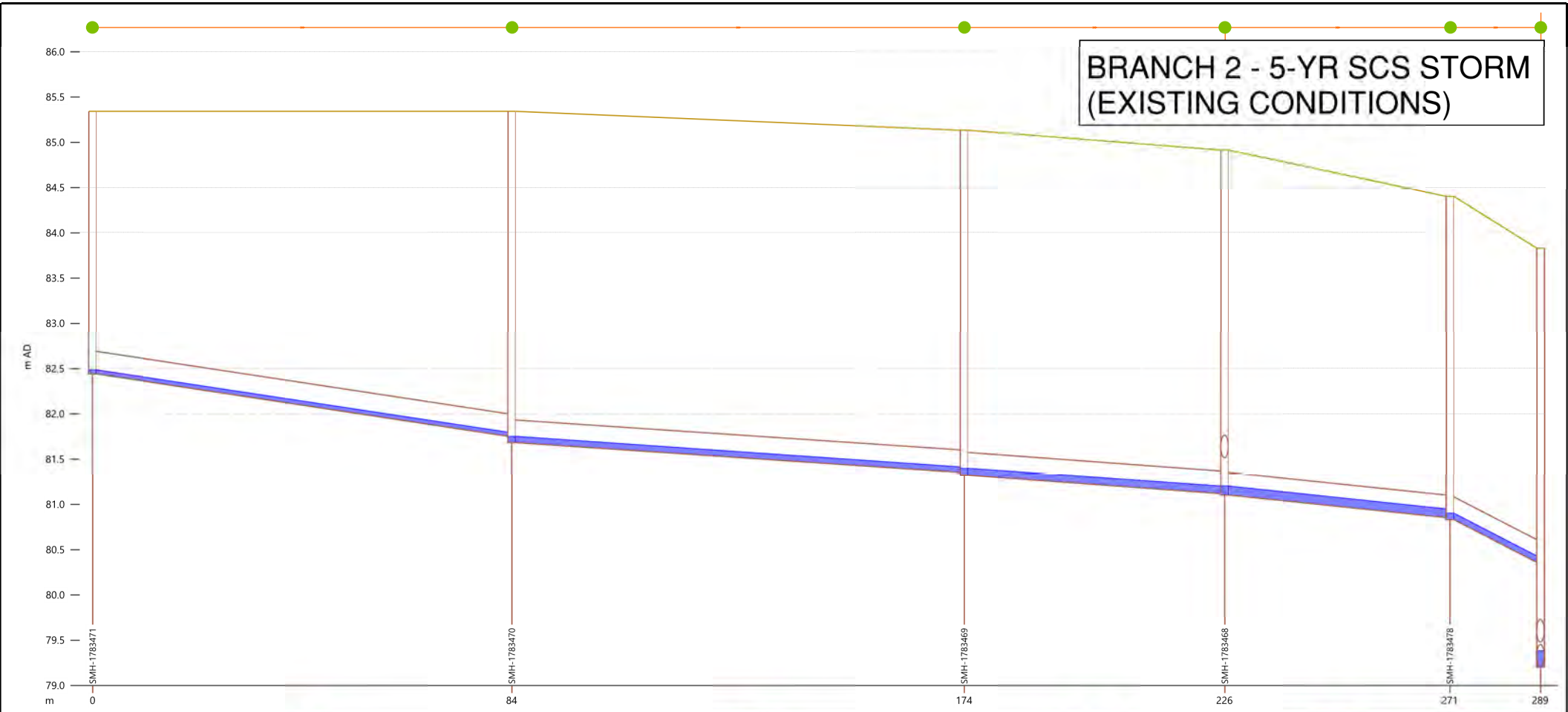
BRANCH 1 - 5-YR SCS STORM (EXISTING CONDITIONS)



Link												
US node ID	SMH-1783318.1	SMH-1783317.1	SMH-1783316.1	SMH-1783314.1	-	SMH-1783698.1	SMH-1783484.1	SMH-1783483.1	SMH-1783482.1	SMH-1783481.1	SMH-1783480.1	
ds node	SMH-1783317	SMH-1783316	SMH-1783314	SMH-1783309	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	SMH-1783479	
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	
length (m)	72.0	76.0	38.5	97.0	10.8	53.6	26.6	23.0	58.1	30.2	79.6	
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	
width (mm)	250	250	250	250	250	250	250	250	250	250	250	
height (mm)	250	250	250	250	250	250	250	250	250	250	250	
us inv (m AD)	86.493	85.621	83.092	82.601	81.675	81.265	80.894	80.519	80.364	80.111	79.806	
ds inv (m AD)	85.631	83.146	82.625	81.702	81.265	80.910	80.549	80.385	80.172	80.065	79.480	
grad (m/m)	0.01197	0.03256	0.01213	0.00926	-	0.00662	0.01297	0.00582	0.00330	0.00152	0.00410	
pfc (m3/s)	0.065	0.107	0.066	0.057	0.116	0.048	0.068	0.045	0.034	0.023	0.038	
surc	0.13	0.14	0.16	0.19	0.29	0.29	0.27	0.37	0.45	0.53	0.46	
US depth (m)	0.032	0.035	0.039	0.047	0.052	0.073	0.069	0.081	0.113	0.132	0.115	
US flow (m3/s)	0.00086	0.00219	0.00218	0.00358	-	0.00835	0.00957	0.00956	0.01398	0.01396	0.01599	
US velocity (m/s)	0.236	0.531	0.444	0.558	1.137	0.704	0.875	0.695	0.651	0.531	0.727	
DS depth (m)	0.032	0.035	0.039	0.047	0.073	0.073	0.069	0.092	0.096	0.095	0.102	
DS flow (m3/s)	0.00086	0.00218	0.00218	0.00357	-	0.00834	0.00956	0.00955	0.01396	0.01395	0.01588	
DS velocity (m/s)	0.235	0.530	0.444	0.557	0.703	0.703	0.875	0.598	0.809	0.814	0.841	

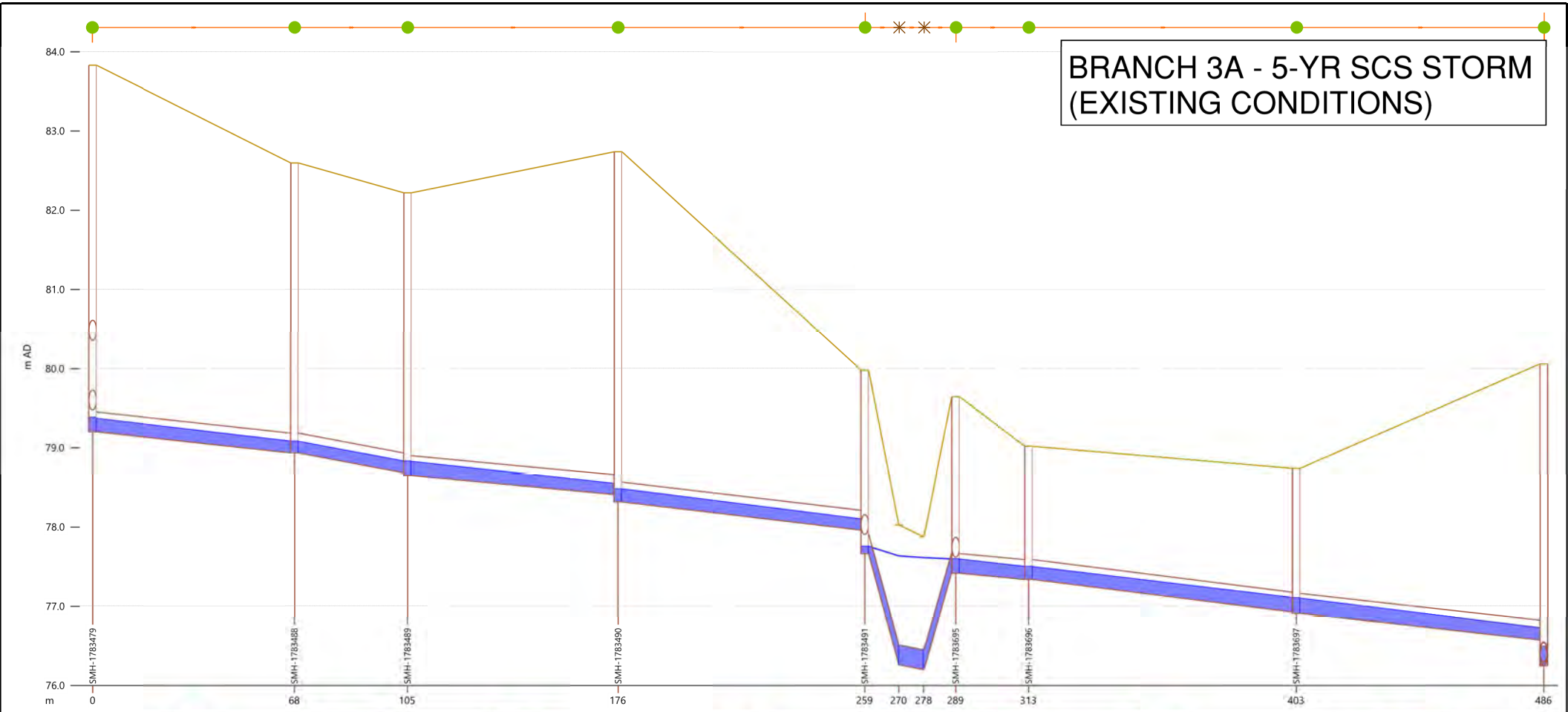
Node	SMH-1783318	SMH-1783317	SMH-1783316	SMH-1783314	SMH-1783309	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	SMH-1783479
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary
ground (m AD)	89.393	88.521	85.992	85.601	83.550	84.175	83.894	83.519	83.294	83.011	82.906	83.832
HD table												
Num gullies	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
level (m AD)	86.525	85.656	83.131	82.648	81.727	81.338	80.963	80.600	80.477	80.243	79.921	79.383
flood dep (m)	-2.868	-2.865	-2.861	-2.953	-1.823	-2.837	-2.931	-2.919	-2.817	-2.768	-2.985	-4.449

BRANCH 2 - 5-YR SCS STORM (EXISTING CONDITIONS)



Link		SMH-1783471.1		SMH-1783470.1		SMH-1783469.1		SMH-1783468.1		SMH-1783478.1	
US node ID		SMH-1783471		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478	
ds node		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478		SMH-1783479	
System type		sanitary		sanitary		sanitary		sanitary		sanitary	
length (m)		83.8		90.3		52.0		45.0		18.1	
Shape ID		CIRC		CIRC		CIRC		CIRC		CIRC	
width (mm)		250		250		250		250		250	
height (mm)		250		250		250		250		250	
us inv (m AD)		82.442		81.683		81.324		81.104		80.833	
ds inv (m AD)		81.753		81.354		81.119		80.854		80.361	
grad (m/m)		0.00822		0.00364		0.00394		0.00556		0.02614	
pfc (m3/s)		0.054		0.036		0.037		0.044		0.096	
surc		0.17		0.26		0.33		0.39		0.27	
US depth (m)		0.043		0.066		0.073		0.096		0.068	
US flow (m3/s)		0.00268		0.00488		0.00648		0.01340		0.01338	
US velocity (m/s)		0.483		0.473		0.545		0.768		1.235	
DS depth (m)		0.042		0.057		0.082		0.094		0.068	
DS flow (m3/s)		0.00266		0.00484		0.00646		0.01338		0.01338	
DS velocity (m/s)		0.481		0.572		0.479		0.792		1.234	
Node	SMH-1783471		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478		-
System type	sanitary		sanitary		sanitary		sanitary		sanitary		sanitary
ground (m AD)	85.342		85.343		85.134		84.914		84.403		83.832
HD table											
Num gullies	1.000		1.000		1.000		1.000		1.000		1.000
level (m AD)	82.485		81.749		81.397		81.201		80.901		79.383
flood dep (m)	-2.857		-3.594		-3.737		-3.713		-3.502		-4.449

BRANCH 3A - 5-YR SCS STORM (EXISTING CONDITIONS)



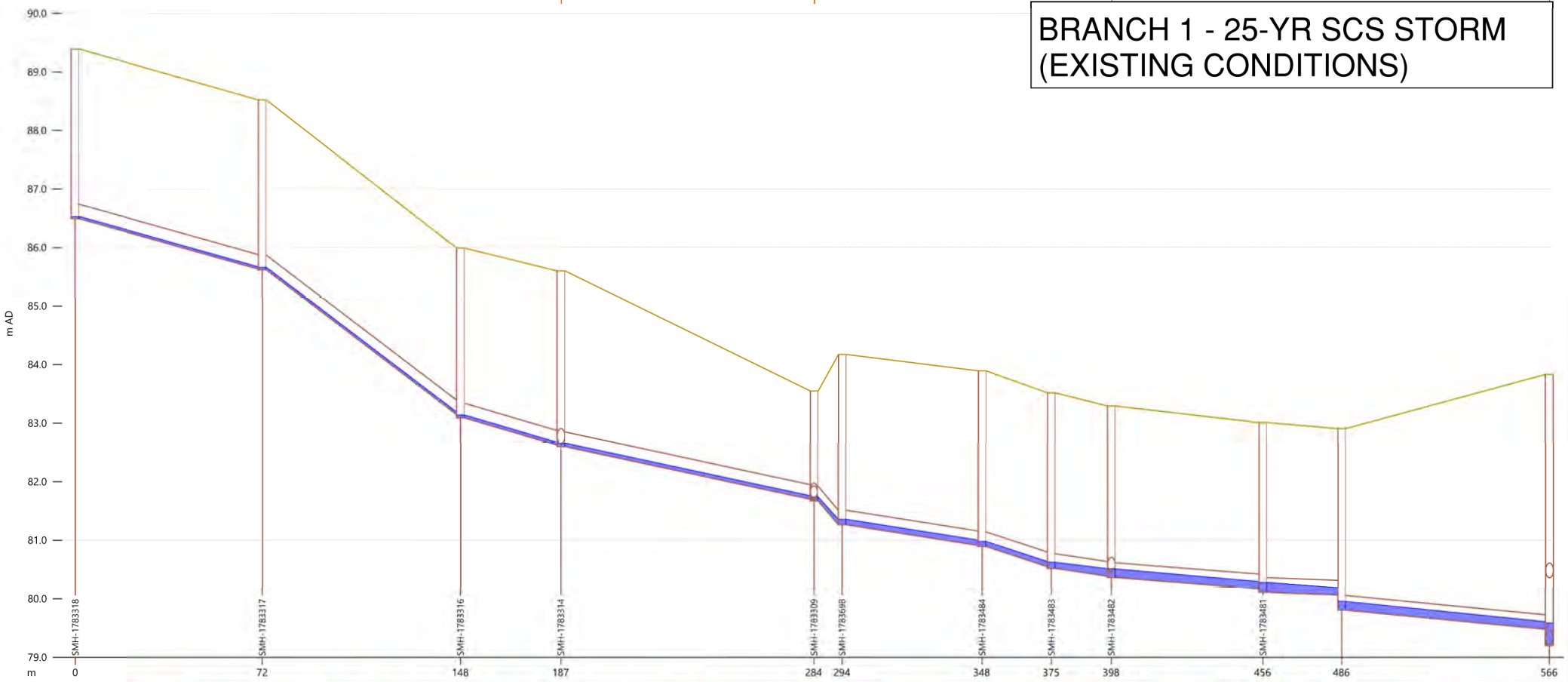
Link	SMH-1783479.1	SMH-1783488.1	SMH-1783489.1	SMH-1783490.1	-	-	-	SMH-1783695.1	SMH-1783696.1	SMH-1783697.1
US node ID	SMH-1783479	SMH-1783488	SMH-1783489	SMH-1783490	-	-	-	SMH-1783695	SMH-1783696	SMH-1783697
ds node	SMH-1783488	SMH-1783489	SMH-1783490	SMH-1783491	-	-	-	SMH-1783696	SMH-1783697	SMH-1783094
System type	sanitary	sanitary	sanitary	sanitary	sanitary	-	sanitary	sanitary	sanitary	sanitary
length (m)	67.7	37.8	70.4	82.6	11.4	8.3	10.6	24.4	89.6	82.8
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	250	250	250	250	250	250	250	250
height (mm)	250	250	250	250	250	250	250	250	250	250
us inv (m AD)	79.202	78.937	78.651	78.318	77.663	-	76.200	77.416	77.340	76.913
ds inv (m AD)	78.937	78.687	78.410	77.962	76.263	-	77.434	77.340	76.928	76.575
grad (m/m)	0.00391	0.00661	0.00342	0.00431	0.12263	-	-	0.00311	0.00460	0.00408
pfc (m3/s)	0.037	0.048	0.035	0.039	0.208	0.052	-0.203	0.033	0.040	0.038
surc	0.67	0.58	0.71	0.65	1.00	1.00	1.00	0.71	0.72	0.75
US depth (m)	0.168	0.142	0.177	0.162	0.095	1.374	1.416	0.177	0.159	0.188
US flow (m3/s)	0.02924	0.02914	0.02909	0.02895	0.02890	-	0.02889	0.02887	0.02880	0.03440
US velocity (m/s)	0.837	1.010	0.791	0.863	1.756	0.512	0.510	0.779	0.876	0.877
DS depth (m)	0.145	0.145	0.139	0.139	1.374	1.416	0.163	0.160	0.181	0.151
DS flow (m3/s)	0.02914	0.02911	0.02896	0.02891	0.02889	-	0.02888	0.02881	0.02866	0.03421
DS velocity (m/s)	0.989	1.021	1.035	1.033	0.512	0.510	0.867	0.872	0.769	1.101

Node	SMH-1783479	SMH-1783488	SMH-1783489	SMH-1783490	SMH-1783491	-	-	-	SMH-1783696	SMH-1783697	SMH-1783094
System type	sanitary	sanitary	sanitary	sanitary	sanitary	-	-	sanitary	sanitary	sanitary	sanitary
ground (m AD)	83.832	82.597	82.221	82.738	79.983	-	-	79.646	79.020	78.743	80.061
HD table											
Num gullies	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
level (m AD)	79.383	79.081	78.832	78.481	77.758	-	-	77.597	77.500	77.108	76.493
flood dep (m)	-4.449	-3.516	-3.389	-4.257	-2.225	-	-	-2.049	-1.520	-1.635	-3.567

ATTACHMENT

A-2. 25-YEAR SCS STORM RESULTS

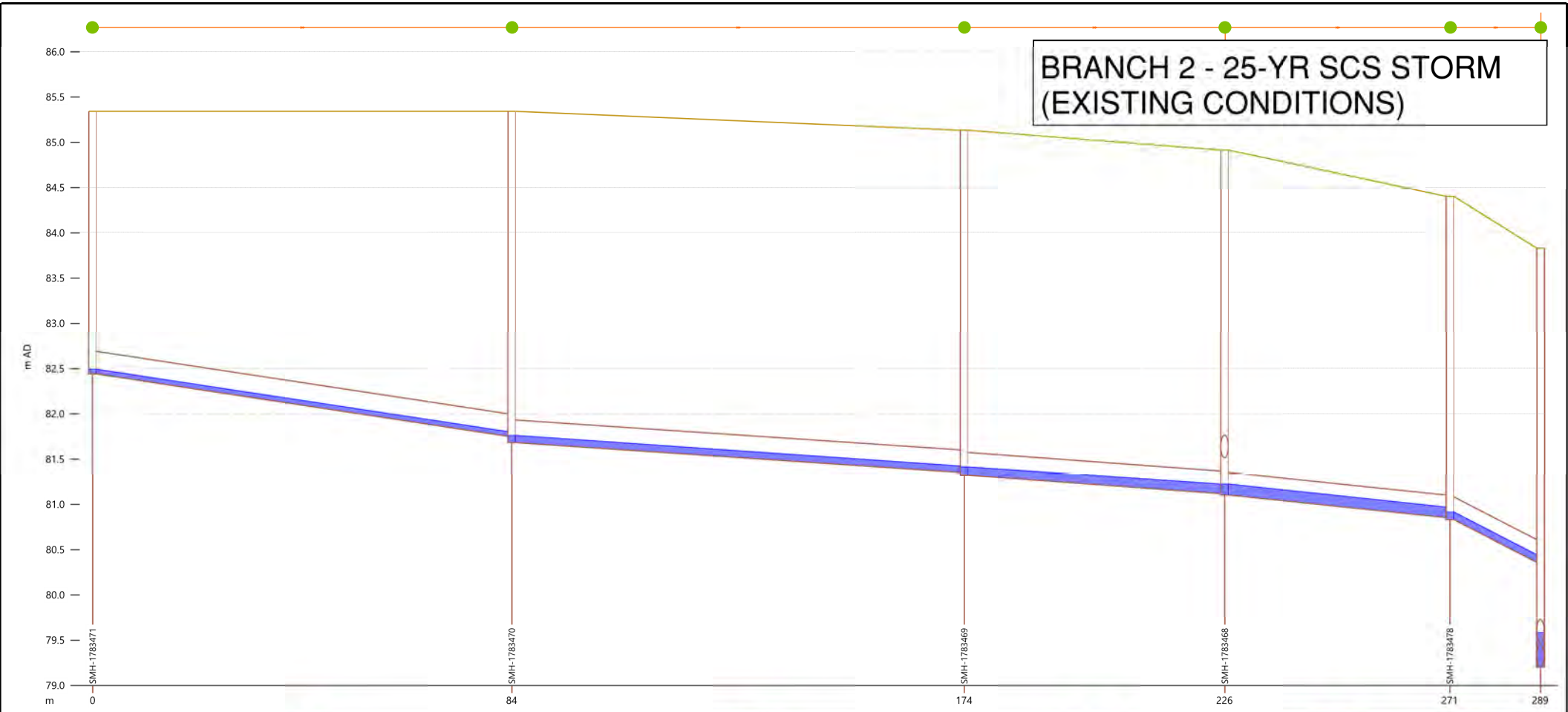
BRANCH 1 - 25-YR SCS STORM (EXISTING CONDITIONS)



Link	SMH-1783318.1	SMH-1783317.1	SMH-1783316.1	SMH-1783314.1	-	SMH-1783698.1	SMH-1783484.1	SMH-1783483.1	SMH-1783482.1	SMH-1783481.1	SMH-1783480.1
US node ID	SMH-1783318	SMH-1783317	SMH-1783316	SMH-1783314	[illegible]	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480
ds node	SMH-1783317	SMH-1783316	SMH-1783314	[illegible]	SMH-1783309	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	SMH-1783479
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary
length (m)	72.0	76.0	38.5	97.0	10.8	53.6	26.6	23.0	58.1	30.2	79.6
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	250	250	250	250	250	250	250	250	250
height (mm)	250	250	250	250	250	250	250	250	250	250	250
us inv (m AD)	86.493	85.621	83.092	82.601	81.675	81.265	80.894	80.519	80.364	80.111	79.806
ds inv (m AD)	85.631	83.146	82.625	81.702	81.265	80.910	80.549	80.385	80.172	80.065	79.480
grad (m/m)	0.01197	0.03256	0.01213	0.00926	-	0.00662	0.01297	0.00582	0.00330	0.00152	0.00410
pfc (m3/s)	0.065	0.107	0.066	0.057	0.116	0.048	0.068	0.045	0.034	0.023	0.038
surc	0.14	0.15	0.18	0.22	0.36	0.36	0.33	0.49	0.57	0.66	0.58
US depth (m)	0.034	0.038	0.045	0.055	0.060	0.089	0.082	0.100	0.143	0.164	0.144
US flow (m3/s)	0.00127	0.00329	0.00326	0.00529	-	0.01248	0.01425	0.01424	0.02075	0.02070	0.02374
US velocity (m/s)	0.313	0.695	0.539	0.667	1.363	0.796	1.013	0.780	0.717	0.606	0.810
DS depth (m)	0.034	0.038	0.045	0.055	0.089	0.089	0.082	0.124	0.117	0.116	0.125
DS flow (m3/s)	0.00126	0.00326	0.00325	0.00527	-	0.01247	0.01424	0.01425	0.02070	0.02068	0.02365
DS velocity (m/s)	0.310	0.691	0.538	0.665	0.795	0.796	1.013	0.613	0.920	0.924	0.962

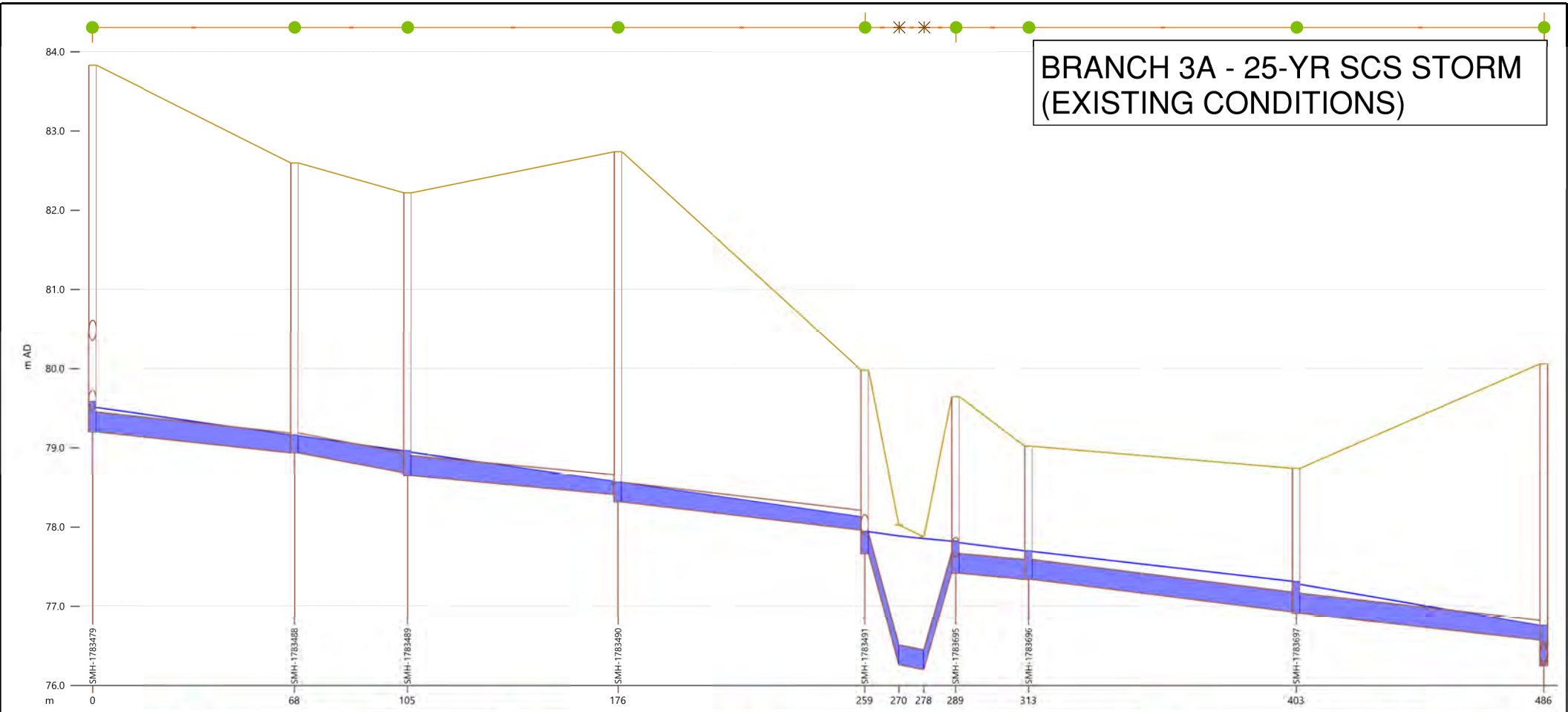
Node	SMH-1783318	SMH-1783317	SMH-1783316	SMH-1783314	SMH-1783309	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	SMH-1783479
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary
ground (m AD)	89.393	88.521	85.992	85.601	83.550	84.175	83.894	83.519	83.294	83.011	82.906	83.832
HD table												
Num gullies	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
level (m AD)	86.527	85.659	83.137	82.656	81.736	81.354	80.976	80.619	80.509	80.276	79.954	79.583
flood dep (m)	-2.866	-2.862	-2.855	-2.945	-1.814	-2.821	-2.918	-2.900	-2.785	-2.735	-2.952	-4.249

BRANCH 2 - 25-YR SCS STORM (EXISTING CONDITIONS)



Link		SMH-1783471.1		SMH-1783470.1		SMH-1783469.1		SMH-1783468.1		SMH-1783478.1	
US node ID		SMH-1783471		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478	
ds node		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478		SMH-1783479	
System type		sanitary		sanitary		sanitary		sanitary		sanitary	
length (m)		83.8		90.3		52.0		45.0		18.1	
Shape ID		CIRC		CIRC		CIRC		CIRC		CIRC	
width (mm)		250		250		250		250		250	
height (mm)		250		250		250		250		250	
us inv (m AD)		82.442		81.683		81.324		81.104		80.833	
ds inv (m AD)		81.753		81.354		81.119		80.854		80.361	
grad (m/m)		0.00822		0.00364		0.00394		0.00556		0.02614	
pfc (m3/s)		0.054		0.036		0.037		0.044		0.096	
surc		0.20		0.31		0.42		0.48		0.32	
US depth (m)		0.050		0.077		0.088		0.119		0.081	
US flow (m3/s)		0.00381		0.00699		0.00932		0.01953		0.01950	
US velocity (m/s)		0.553		0.545		0.605		0.848		1.425	
DS depth (m)		0.049		0.068		0.104		0.114		0.081	
DS flow (m3/s)		0.00378		0.00694		0.00928		0.01950		0.01949	
DS velocity (m/s)		0.551		0.645		0.505		0.898		1.425	
Node	SMH-1783471		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478		-
System type	sanitary		sanitary		sanitary		sanitary		sanitary		sanitary
ground (m AD)	85.342		85.343		85.134		84.914		84.403		83.832
HD table											
Num gullies	1.000		1.000		1.000		1.000		1.000		1.000
level (m AD)	82.492		81.760		81.412		81.223		80.914		79.583
flood dep (m)	-2.850		-3.583		-3.722		-3.691		-3.489		-4.249

BRANCH 3A - 25-YR SCS STORM (EXISTING CONDITIONS)



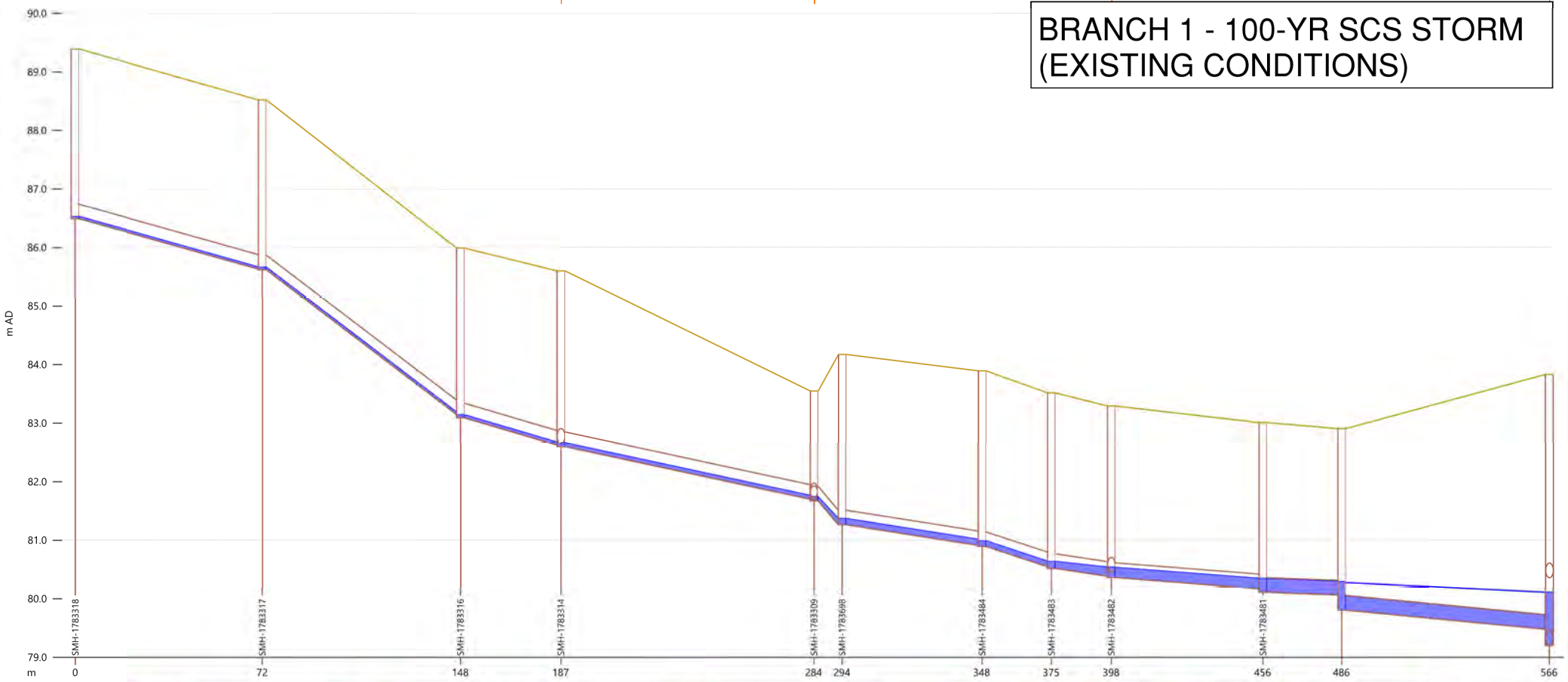
Link	SMH-1783479.1	SMH-1783488.1	SMH-1783489.1	SMH-1783490.1	-	-	-	SMH-1783695.1	SMH-1783696.1	SMH-1783697.1
US node ID	SMH-1783479	SMH-1783488	SMH-1783489	SMH-1783490	-	-	-	SMH-1783695	SMH-1783696	SMH-1783697
ds node	SMH-1783488	SMH-1783489	SMH-1783490	SMH-1783491	-	-	-	SMH-1783696	SMH-1783697	SMH-1783094
System type	sanitary	sanitary	sanitary	sanitary	sanitary	-	sanitary	sanitary	sanitary	sanitary
length (m)	67.7	37.8	70.4	82.6	11.4	8.3	10.6	24.4	89.6	82.8
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	250	250	250	250	250	250	250	250
height (mm)	250	250	250	250	250	250	250	250	250	250
us inv (m AD)	79.202	78.937	78.651	78.318	77.663	-	76.200	77.416	77.340	76.913
ds inv (m AD)	78.937	78.687	78.410	77.962	76.263	-	77.434	77.340	76.928	76.575
grad (m/m)	0.00391	0.00661	0.00342	0.00431	0.12263	-	-	0.00311	0.00460	0.00408
pfc (m3/s)	0.037	0.048	0.035	0.039	0.208	0.052	-0.203	0.033	0.040	0.038
surc	2.00	1.00	2.00	0.98	1.00	1.00	1.00	2.00	1.00	2.00
US depth (m)	0.308	0.214	0.293	0.244	0.280	1.626	1.655	0.387	0.352	0.365
US flow (m3/s)	0.04286	0.04184	0.04082	0.04066	0.04023	-	0.04021	0.03837	0.03811	0.04594
US velocity (m/s)	0.879	1.082	0.830	0.906	1.758	0.706	0.705	0.820	0.922	0.894
DS depth (m)	0.223	0.276	0.165	0.165	1.626	1.655	0.389	0.360	0.387	0.182
DS flow (m3/s)	0.04203	0.04089	0.04076	0.04034	0.04021	-	0.04019	0.03835	0.03806	0.04586
DS velocity (m/s)	1.039	1.033	1.182	1.176	0.706	0.705	0.882	0.912	0.739	1.244

Node	SMH-1783479	SMH-1783488	SMH-1783489	SMH-1783490	SMH-1783491	-	-	-	SMH-1783696	SMH-1783697	SMH-1783094
System type	sanitary	sanitary	sanitary	sanitary	sanitary	-	-	sanitary	sanitary	sanitary	sanitary
ground (m AD)	83.832	82.597	82.221	82.738	79.983	-	-	79.646	79.020	78.743	80.061
HD table											
Num gullies	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
level (m AD)	79.583	79.160	78.961	78.565	77.943	-	-	77.823	77.699	77.313	76.756
flood dep (m)	-4.249	-3.437	-3.260	-4.173	-2.040	-	-	-1.823	-1.321	-1.430	-3.304

ATTACHMENT

A-3. 100-YEAR SCS STORM RESULTS

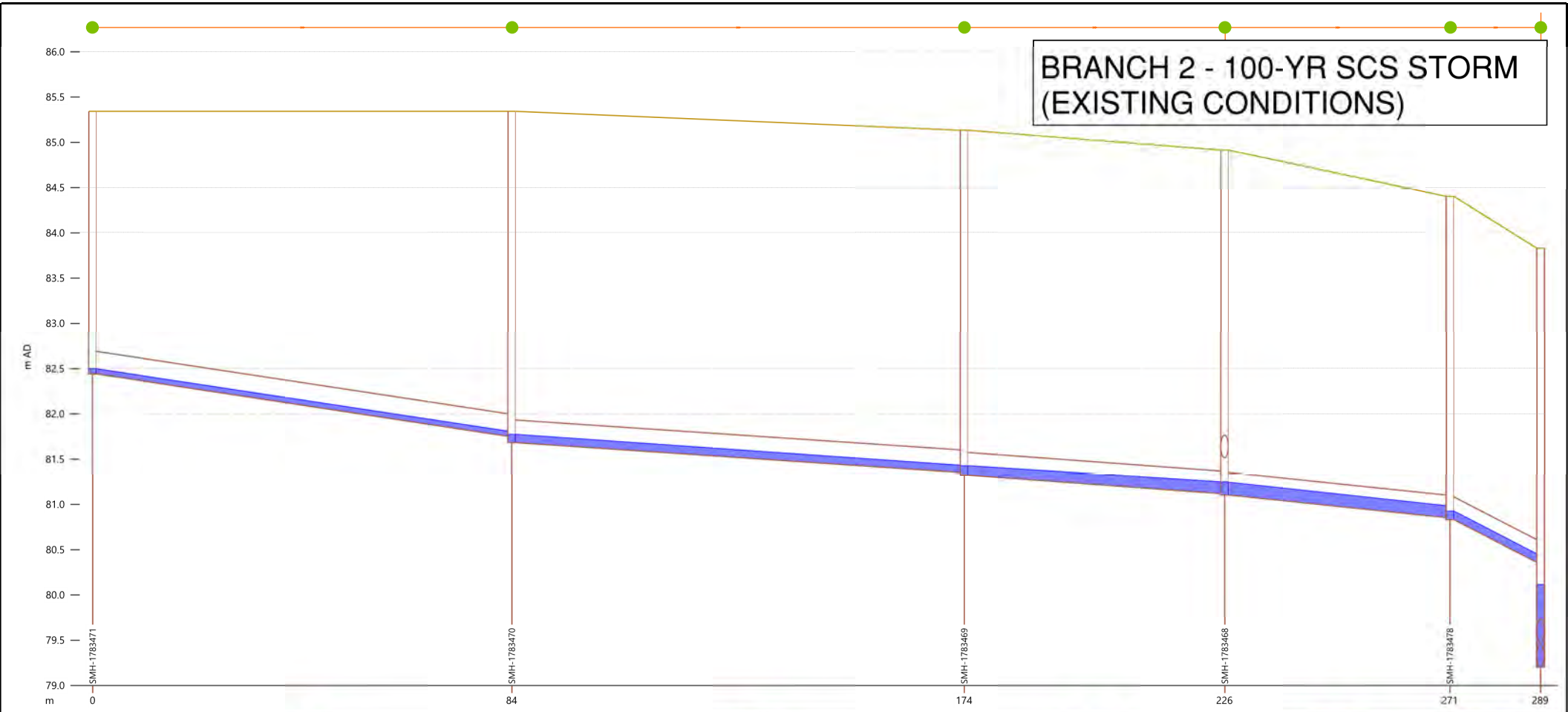
BRANCH 1 - 100-YR SCS STORM (EXISTING CONDITIONS)



Link												
US node ID	SMH-1783318.1	SMH-1783317.1	SMH-1783316.1	SMH-1783314.1	-	SMH-1783698.1	SMH-1783484.1	SMH-1783483.1	SMH-1783482.1	SMH-1783481.1	SMH-1783480.1	
ds node	SMH-1783317	SMH-1783316	SMH-1783314	SMH-1783309	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	SMH-1783479	
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	
length (m)	72.0	76.0	38.5	97.0	10.8	53.6	26.6	23.0	58.1	30.2	79.6	
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	
width (mm)	250	250	250	250	250	250	250	250	250	250	250	
height (mm)	250	250	250	250	250	250	250	250	250	250	250	
us inv (m AD)	86.493	85.621	83.092	82.601	81.675	81.265	80.894	80.519	80.364	80.111	79.806	
ds inv (m AD)	85.631	83.146	82.625	81.702	81.265	80.910	80.549	80.385	80.172	80.065	79.480	
grad (m/m)	0.01197	0.03256	0.01213	0.00926	-	0.00662	0.01297	0.00582	0.00330	0.00152	0.00410	
pfc (m3/s)	0.065	0.107	0.066	0.057	0.116	0.048	0.068	0.045	0.034	0.023	0.038	
surc	0.15	0.17	0.20	0.25	0.42	0.42	0.37	0.62	0.70	0.94	1.00	
US depth (m)	0.037	0.042	0.051	0.063	0.069	0.104	0.093	0.117	0.170	0.235	0.472	
US flow (m3/s)	0.00172	0.00447	0.00442	0.00710	-	0.01678	0.01897	0.01894	0.02738	0.02725	0.03098	
US velocity (m/s)	0.385	0.815	0.622	0.734	1.513	0.864	1.133	0.837	0.772	0.667	0.858	
DS depth (m)	0.037	0.042	0.051	0.063	0.105	0.104	0.093	0.155	0.176	0.231	0.634	
DS flow (m3/s)	0.00170	0.00443	0.00441	0.00706	-	0.01674	0.01895	0.01899	0.02726	0.02723	0.02763	
DS velocity (m/s)	0.381	0.811	0.621	0.732	0.862	0.863	1.132	0.616	1.008	1.015	0.981	

Node	SMH-1783318	SMH-1783317	SMH-1783316	SMH-1783314	SMH-1783309	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	SMH-1783479
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary
ground (m AD)	89.393	88.521	85.992	85.601	83.550	84.175	83.894	83.519	83.294	83.011	82.906	83.832
HD table												
Num gullies	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
level (m AD)	86.530	85.663	83.143	82.664	81.745	81.370	80.988	80.637	80.540	80.348	80.295	80.113
flood dep (m)	-2.863	-2.858	-2.849	-2.937	-1.805	-2.805	-2.906	-2.882	-2.754	-2.663	-2.611	-3.719

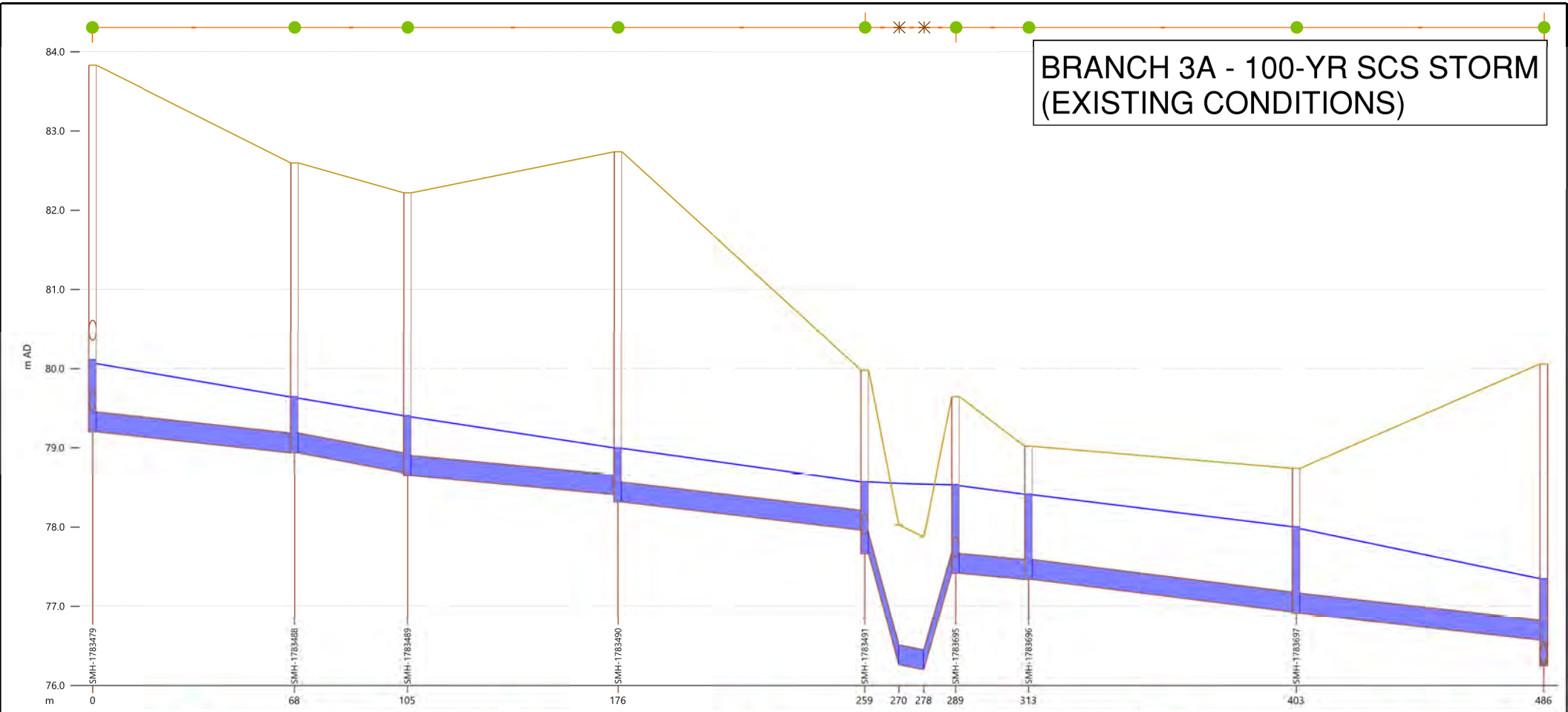
BRANCH 2 - 100-YR SCS STORM (EXISTING CONDITIONS)



Link	SMH-1783471.1	SMH-1783470.1	SMH-1783469.1	SMH-1783468.1	SMH-1783478.1
US node ID	SMH-1783471	SMH-1783470	SMH-1783469	SMH-1783468	SMH-1783478
ds node	SMH-1783470	SMH-1783469	SMH-1783468	SMH-1783478	SMH-1783479
System type	sanitary	sanitary	sanitary	sanitary	sanitary
length (m)	83.8	90.3	52.0	45.0	18.1
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	250	250	250
height (mm)	250	250	250	250	250
us inv (m AD)	82.442	81.683	81.324	81.104	80.833
ds inv (m AD)	81.753	81.354	81.119	80.854	80.361
grad (m/m)	0.00822	0.00364	0.00394	0.00556	0.02614
pfc (m3/s)	0.054	0.036	0.037	0.044	0.096
surc	0.22	0.35	0.51	0.56	0.36
US depth (m)	0.054	0.088	0.101	0.139	0.091
US flow (m3/s)	0.00487	0.00902	0.01208	0.02557	0.02552
US velocity (m/s)	0.621	0.584	0.656	0.912	1.579
DS depth (m)	0.054	0.077	0.128	0.130	0.091
DS flow (m3/s)	0.00485	0.00895	0.01199	0.02552	0.02551
DS velocity (m/s)	0.620	0.700	0.516	0.986	1.579

Node	SMH-1783471	SMH-1783470	SMH-1783469	SMH-1783468	SMH-1783478	-
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary
ground (m AD)	85.342	85.343	85.134	84.914	84.403	83.832
HD table						
Num gullies	1.000	1.000	1.000	1.000	1.000	1.000
level (m AD)	82.496	81.771	81.425	81.247	80.924	80.113
flood dep (m)	-2.846	-3.572	-3.709	-3.667	-3.479	-3.719

BRANCH 3A - 100-YR SCS STORM (EXISTING CONDITIONS)



Link	SMH-1783479.1	SMH-1783488.1	SMH-1783489.1	SMH-1783490.1	-	-	-	SMH-1783695.1	SMH-1783696.1	SMH-1783697.1
US node ID	SMH-1783479	SMH-1783488	SMH-1783489	SMH-1783490	-	-	-	SMH-1783695	SMH-1783696	SMH-1783697
ds node	SMH-1783488	SMH-1783489	SMH-1783490	SMH-1783491	-	-	-	SMH-1783696	SMH-1783697	SMH-1783094
System type	sanitary	sanitary	sanitary	sanitary	sanitary	-	sanitary	sanitary	sanitary	sanitary
length (m)	67.7	37.8	70.4	82.6	11.4	8.3	10.6	24.4	89.6	82.8
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	250	250	250	250	250	250	250	250
height (mm)	250	250	250	250	250	250	250	250	250	250
us inv (m AD)	79.202	78.937	78.651	78.318	77.663	-	76.200	77.416	77.340	76.913
ds inv (m AD)	78.937	78.687	78.410	77.962	76.263	-	77.434	77.340	76.928	76.575
grad (m/m)	0.00391	0.00661	0.00342	0.00431	0.12263	-	-	0.00311	0.00460	0.00408
pfc (m3/s)	0.037	0.048	0.035	0.039	0.208	0.052	-0.203	0.033	0.040	0.038
surc	2.00	2.00	2.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00
US depth (m)	0.861	0.690	0.739	0.676	0.908	2.290	2.343	1.108	1.070	1.067
US flow (m3/s)	0.05123	0.04981	0.04928	0.04874	0.04196	-	0.04179	0.04376	0.04322	0.05412
US velocity (m/s)	0.960	1.108	0.939	0.944	1.758	0.733	0.731	0.821	0.915	1.014
DS depth (m)	0.707	0.719	0.590	0.610	2.290	2.343	1.101	1.074	1.077	0.775
DS flow (m3/s)	0.05080	0.04972	0.04913	0.04801	0.04180	-	0.04171	0.04369	0.04302	0.05387
DS velocity (m/s)	1.058	1.036	1.226	1.271	0.733	0.731	0.884	0.910	0.798	1.289

Node	SMH-1783479	SMH-1783488	SMH-1783489	SMH-1783490	SMH-1783491	-	-	-	SMH-1783696	SMH-1783697	SMH-1783094
System type	sanitary	sanitary	sanitary	sanitary	sanitary	-	-	sanitary	sanitary	sanitary	sanitary
ground (m AD)	83.832	82.597	82.221	82.738	79.983	-	-	79.646	79.020	78.743	80.061
HD table											
Num gullies	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
level (m AD)	80.113	79.642	79.405	78.999	78.571	-	-	78.535	78.414	78.004	77.347
flood dep (m)	-3.719	-2.955	-2.816	-3.739	-1.412	0.523	0.666	-1.111	-0.606	-0.739	-2.713

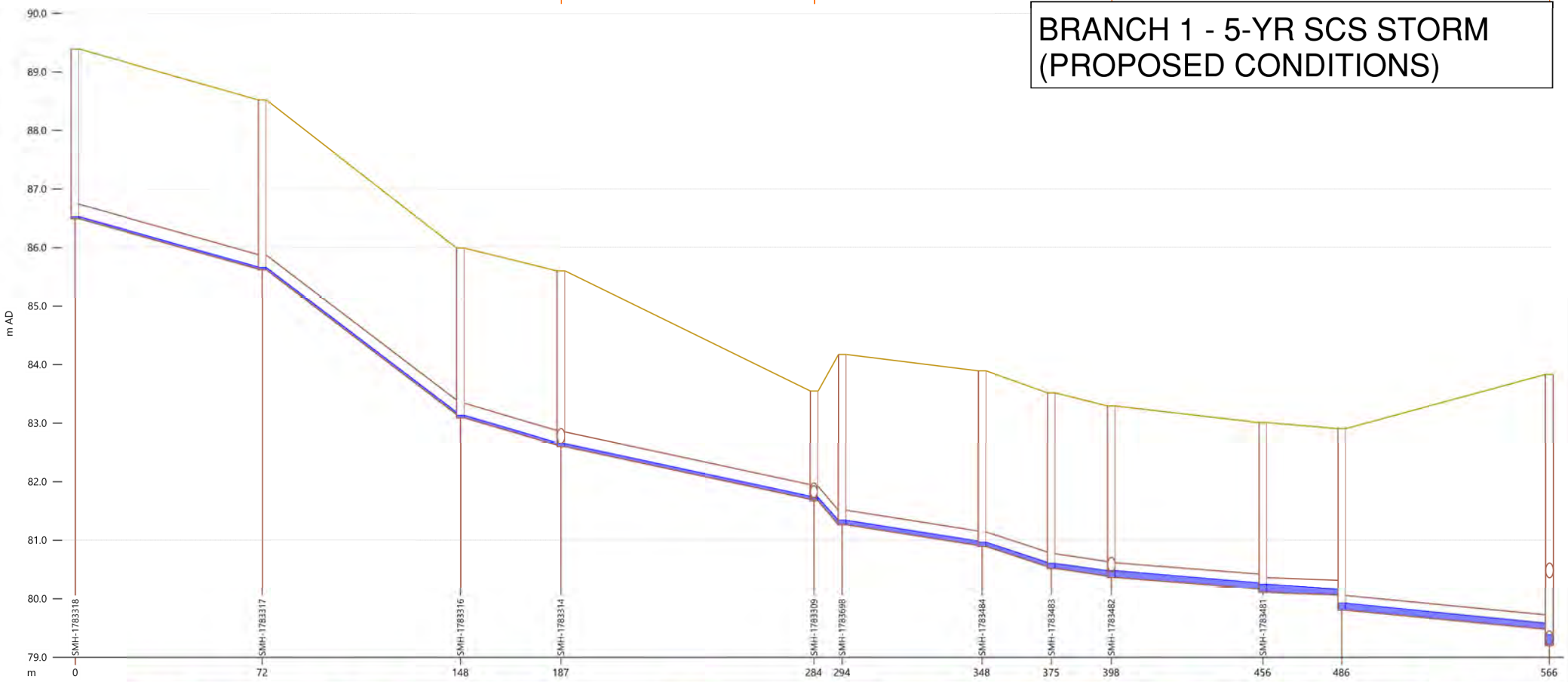
ATTACHMENT

B. PROPOSED CONDITIONS RESULTS

ATTACHMENT

B-1. 5-YEAR SCS STORM RESULTS

BRANCH 1 - 5-YR SCS STORM (PROPOSED CONDITIONS)



Link												
US node ID	SMH-1783318	SMH-1783317	SMH-1783316	SMH-1783314	-	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	
ds node	SMH-1783317	SMH-1783316	SMH-1783314	SMH-1783309	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	SMH-1783479	
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	
length (m)	72.0	76.0	38.5	97.0	10.8	53.6	26.6	23.0	58.1	30.2	79.6	
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	
width (mm)	250	250	250	250	250	250	250	250	250	250	250	
height (mm)	250	250	250	250	250	250	250	250	250	250	250	
us inv (m AD)	86.493	85.621	83.092	82.601	81.675	81.265	80.894	80.519	80.364	80.111	79.806	
ds inv (m AD)	85.631	83.146	82.625	81.702	81.265	80.910	80.549	80.385	80.172	80.065	79.480	
grad (m/m)	0.01197	0.03256	0.01213	0.00926	-	0.00662	0.01297	0.00582	0.00330	0.00152	0.00410	
pfc (m3/s)	0.065	0.107	0.066	0.057	0.116	0.048	0.068	0.045	0.034	0.023	0.038	
surc	0.13	0.14	0.16	0.19	0.29	0.29	0.27	0.37	0.45	0.53	0.46	
US depth (m)	0.032	0.035	0.039	0.047	0.052	0.073	0.069	0.081	0.113	0.132	0.115	
US flow (m3/s)	0.00086	0.00219	0.00218	0.00358	-	0.00835	0.00957	0.00956	0.01399	0.01396	0.01599	
US velocity (m/s)	0.236	0.531	0.444	0.558	1.137	0.704	0.875	0.695	0.651	0.531	0.727	
DS depth (m)	0.032	0.035	0.039	0.047	0.073	0.073	0.069	0.092	0.096	0.095	0.102	
DS flow (m3/s)	0.00086	0.00218	0.00218	0.00357	-	0.00834	0.00957	0.00956	0.01396	0.01395	0.01588	
DS velocity (m/s)	0.235	0.530	0.444	0.557	0.703	0.704	0.875	0.598	0.809	0.814	0.841	

Node	SMH-1783318	SMH-1783317	SMH-1783316	SMH-1783314	SMH-1783309	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	SMH-1783479
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary
ground (m AD)	89.393	88.521	85.992	85.601	83.550	84.175	83.894	83.519	83.294	83.011	82.906	83.832
HD table												
Num gullies	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
level (m AD)	86.525	85.656	83.131	82.648	81.727	81.338	80.963	80.600	80.477	80.243	79.921	79.383
flood dep (m)	-2.868	-2.865	-2.861	-2.953	-1.823	-2.837	-2.931	-2.919	-2.817	-2.768	-2.985	-4.449

BRANCH 2 - 5-YR SCS STORM (PROPOSED CONDITIONS)

Link		SMH-1783471.1		SMH-1783470.1		SMH-1783469.1		SMH-1783468.1		SMH-1783478.1	
US node ID		SMH-1783471		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478	
ds node		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478		SMH-1783479	
System type		sanitary		sanitary		sanitary		sanitary		sanitary	
length (m)		83.8		90.3		52.0		45.0		18.1	
Shape ID		CIRC		CIRC		CIRC		CIRC		CIRC	
width (mm)		250		250		250		250		250	
height (mm)		250		250		250		250		250	
us inv (m AD)		82.442		81.683		81.324		81.104		80.833	
ds inv (m AD)		81.753		81.354		81.119		80.854		80.361	
grad (m/m)		0.00822		0.00364		0.00394		0.00556		0.02614	
pfc (m3/s)		0.054		0.036		0.037		0.044		0.096	
surc		0.17		0.26		0.33		0.39		0.27	
US depth (m)		0.043		0.066		0.073		0.096		0.068	
US flow (m3/s)		0.00268		0.00488		0.00649		0.01340		0.01338	
US velocity (m/s)		0.483		0.473		0.545		0.768		1.235	
DS depth (m)		0.042		0.057		0.082		0.094		0.068	
DS flow (m3/s)		0.00266		0.00484		0.00646		0.01338		0.01338	
DS velocity (m/s)		0.482		0.572		0.479		0.792		1.235	
Node	SMH-1783471		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478		-
System type	sanitary		sanitary		sanitary		sanitary		sanitary		sanitary
ground (m AD)	85.342		85.343		85.134		84.914		84.403		83.832
HD table											
Num gullies	1.000		1.000		1.000		1.000		1.000		1.000
level (m AD)	82.485		81.749		81.397		81.201		80.901		79.383
flood dep (m)	-2.857		-3.594		-3.737		-3.713		-3.502		-4.449

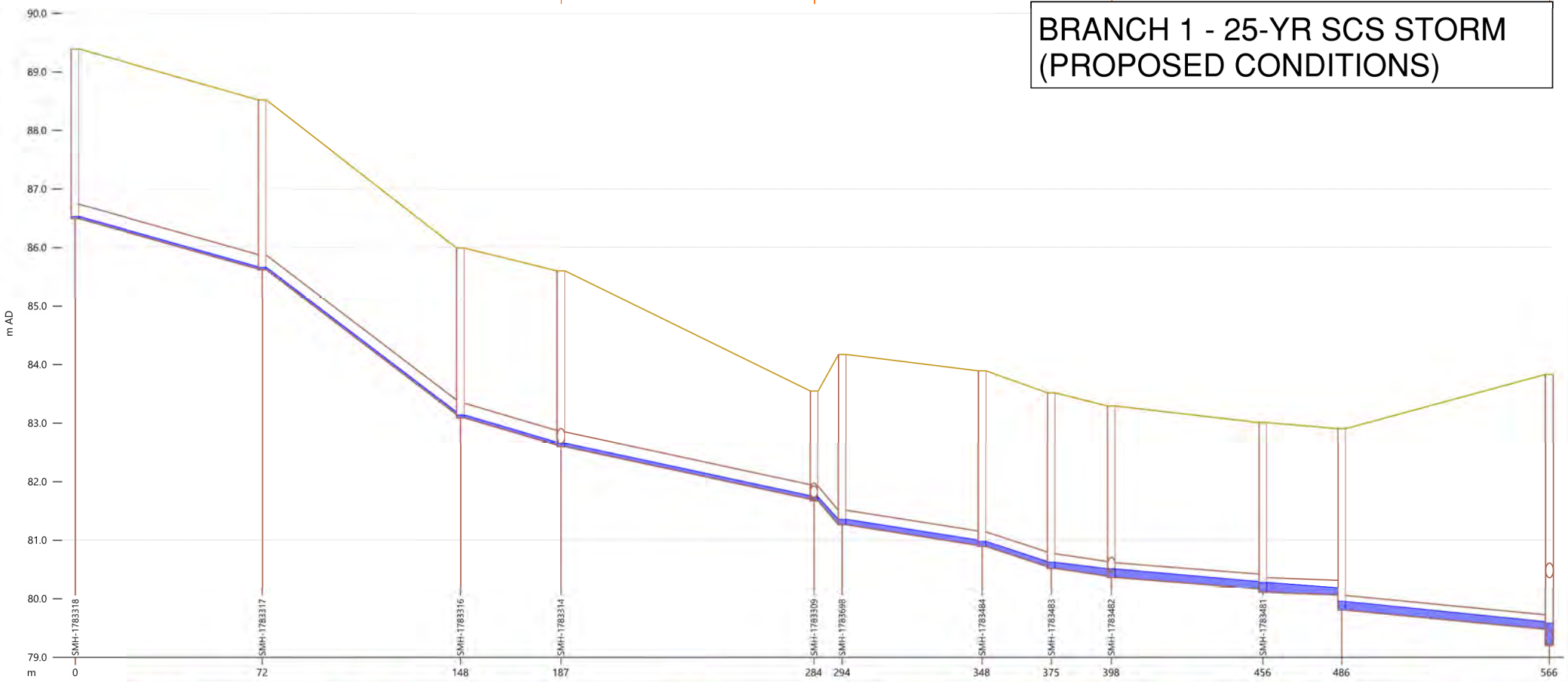
Link		SMH-1783479.1	SMH-1783488.1	-	MH1 CD.2	-
US node ID		SMH-1783479	SMH-1783488	-	MH1 CD	-
ds node		SMH-1783488	SMH-1783489	-	MH2 CD	-
System type		sanitary	sanitary	-	sanitary	-
length (m)		67.7	37.8	5.0	226.0	5.1
Shape ID		CIRC	CIRC	-	CIRC	-
width (mm)		250	250	300	300	300
height (mm)		250	250	300	300	300
us inv (m AD)		79.202	78.937	-	72.830	-
ds inv (m AD)		78.937	78.687	-	71.700	-
grad (m/m)		0.00391	0.00661	-	0.00500	-
pfc (m3/s)		0.037	0.048	-	0.068	-
surc		0.67	0.57	-	0.46	-
US depth (m)		0.168	0.142	-	0.138	-
US flow (m3/s)		0.02924	0.02914	-	0.02911	-
US velocity (m/s)		0.837	1.011	-	0.917	-
DS depth (m)		0.145	0.140	-	0.131	-
DS flow (m3/s)		0.02914	0.02913	-	0.02881	-
DS velocity (m/s)		0.990	1.033	-	0.970	-

Node	SMH-1783479	SMH-1783488	SMH-1783489	MH1 CD	MH2 CD
System type	sanitary	sanitary	sanitary	sanitary	sanitary
ground (m AD)	83.832	82.597	82.221	82.221	75.000
HD table					
Num gullies	1.000	1.000	1.000	1.000	1.000
level (m AD)	79.383	79.081	72.993	72.968	71.811
flood dep (m)	-4.449	-3.516	-9.228	-9.253	-3.189

ATTACHMENT

B-2. 25-YEAR SCS STORM RESULTS

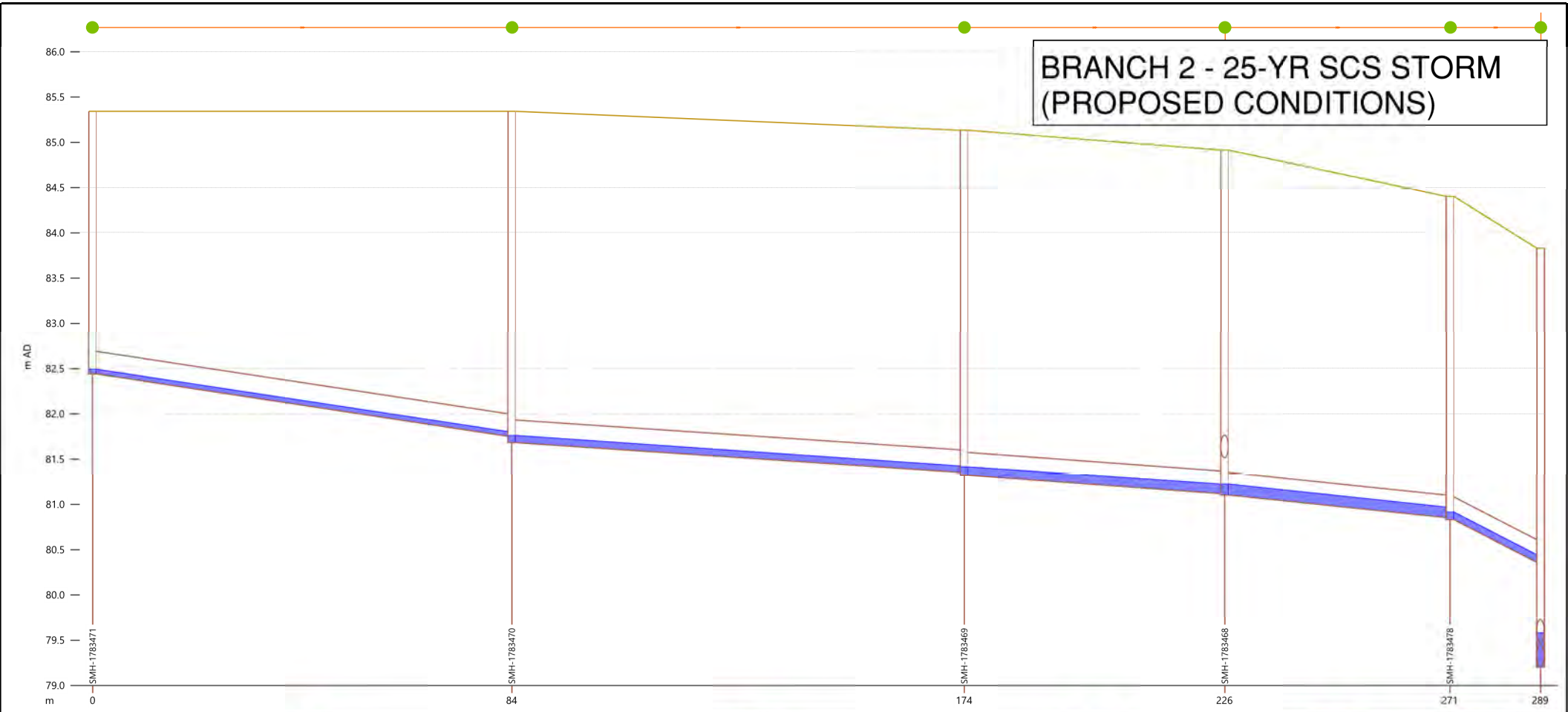
BRANCH 1 - 25-YR SCS STORM (PROPOSED CONDITIONS)



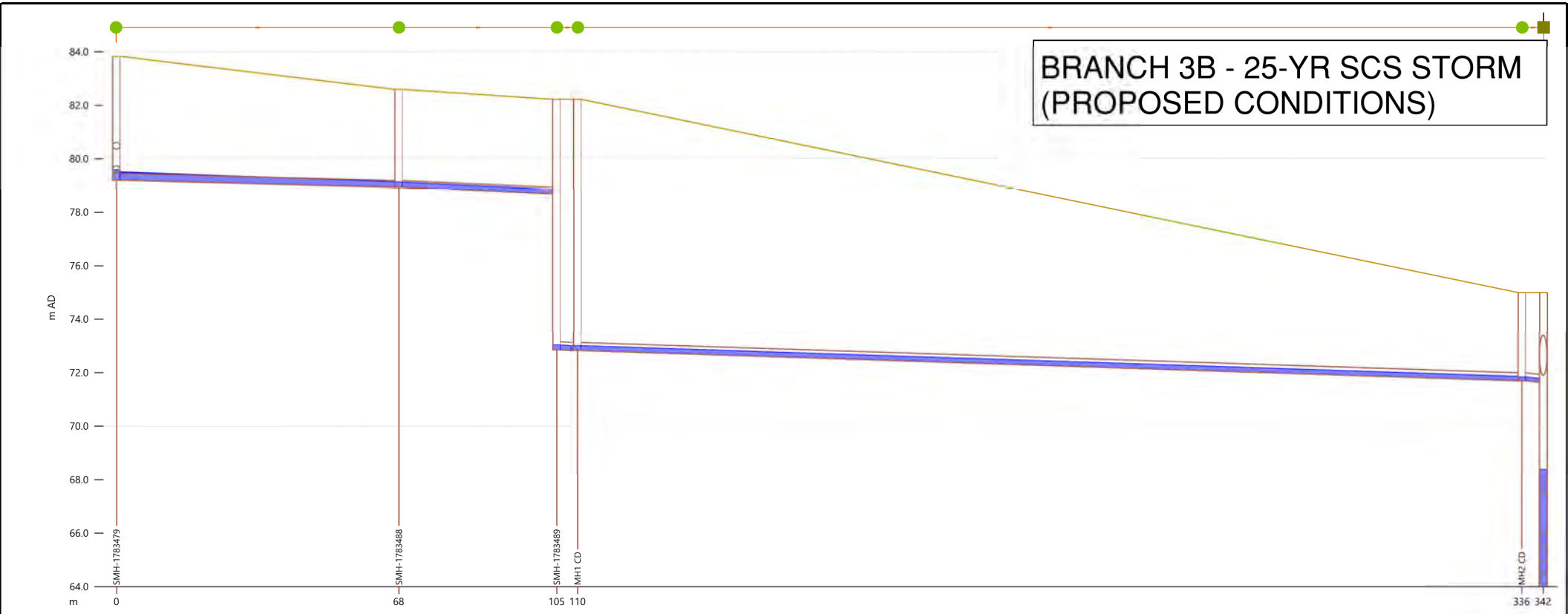
Link	SMH-1783318.1	SMH-1783317.1	SMH-1783316.1	SMH-1783314.1	-	SMH-1783698.1	SMH-1783484.1	SMH-1783483.1	SMH-1783482.1	SMH-1783481.1	SMH-1783480.1
US node ID	SMH-1783318	SMH-1783317	SMH-1783316	SMH-1783314	SMH-1783309	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480
ds node	SMH-1783317	SMH-1783316	SMH-1783314	SMH-1783309	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	SMH-1783479
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary
length (m)	72.0	76.0	38.5	97.0	10.8	53.6	26.6	23.0	58.1	30.2	79.6
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	250	250	250	250	250	250	250	250	250
height (mm)	250	250	250	250	250	250	250	250	250	250	250
us inv (m AD)	86.493	85.621	83.092	82.601	81.675	81.265	80.894	80.519	80.364	80.111	79.806
ds inv (m AD)	85.631	83.146	82.625	81.702	81.265	80.910	80.549	80.385	80.172	80.065	79.480
grad (m/m)	0.01197	0.03256	0.01213	0.00926	-	0.00662	0.01297	0.00582	0.00330	0.00152	0.00410
pfc (m3/s)	0.065	0.107	0.066	0.057	0.116	0.048	0.068	0.045	0.034	0.023	0.038
surc	0.14	0.15	0.18	0.22	0.36	0.36	0.33	0.49	0.57	0.66	0.58
US depth (m)	0.034	0.038	0.045	0.055	0.060	0.089	0.082	0.100	0.143	0.164	0.144
US flow (m3/s)	0.00127	0.00329	0.00326	0.00529	-	0.01248	0.01426	0.01424	0.02075	0.02070	0.02374
US velocity (m/s)	0.313	0.695	0.539	0.667	1.363	0.796	1.013	0.780	0.717	0.606	0.810
DS depth (m)	0.034	0.038	0.045	0.055	0.089	0.089	0.082	0.124	0.117	0.116	0.125
DS flow (m3/s)	0.00126	0.00326	0.00325	0.00527	-	0.01246	0.01424	0.01425	0.02070	0.02068	0.02364
DS velocity (m/s)	0.310	0.691	0.538	0.665	0.795	0.795	1.013	0.613	0.920	0.924	0.961

Node	SMH-1783318	SMH-1783317	SMH-1783316	SMH-1783314	SMH-1783309	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	SMH-1783479
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary
ground (m AD)	89.393	88.521	85.992	85.601	83.550	84.175	83.894	83.519	83.294	83.011	82.906	83.832
HD table												
Num gullies	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
level (m AD)	86.527	85.659	83.137	82.656	81.736	81.354	80.976	80.619	80.509	80.276	79.954	79.579
flood dep (m)	-2.866	-2.862	-2.855	-2.945	-1.814	-2.821	-2.918	-2.900	-2.785	-2.735	-2.952	-4.253

BRANCH 2 - 25-YR SCS STORM (PROPOSED CONDITIONS)



Link		SMH-1783471.1		SMH-1783470.1		SMH-1783469.1		SMH-1783468.1		SMH-1783478.1	
US node ID		SMH-1783471		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478	
ds node		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478		SMH-1783479	
System type		sanitary		sanitary		sanitary		sanitary		sanitary	
length (m)		83.8		90.3		52.0		45.0		18.1	
Shape ID		CIRC		CIRC		CIRC		CIRC		CIRC	
width (mm)		250		250		250		250		250	
height (mm)		250		250		250		250		250	
us inv (m AD)		82.442		81.683		81.324		81.104		80.833	
ds inv (m AD)		81.753		81.354		81.119		80.854		80.361	
grad (m/m)		0.00822		0.00364		0.00394		0.00556		0.02614	
pfc (m3/s)		0.054		0.036		0.037		0.044		0.096	
surc		0.20		0.31		0.42		0.48		0.32	
US depth (m)		0.050		0.077		0.088		0.119		0.081	
US flow (m3/s)		0.00381		0.00699		0.00932		0.01953		0.01949	
US velocity (m/s)		0.553		0.545		0.605		0.848		1.425	
DS depth (m)		0.049		0.068		0.104		0.114		0.081	
DS flow (m3/s)		0.00378		0.00694		0.00928		0.01949		0.01949	
DS velocity (m/s)		0.551		0.645		0.505		0.898		1.425	
Node	SMH-1783471		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478		-
System type	sanitary		sanitary		sanitary		sanitary		sanitary		sanitary
ground (m AD)	85.342		85.343		85.134		84.914		84.403		83.832
HD table											
Num gullies	1.000		1.000		1.000		1.000		1.000		1.000
level (m AD)	82.492		81.760		81.412		81.223		80.914		79.579
flood dep (m)	-2.850		-3.583		-3.722		-3.691		-3.489		-4.253



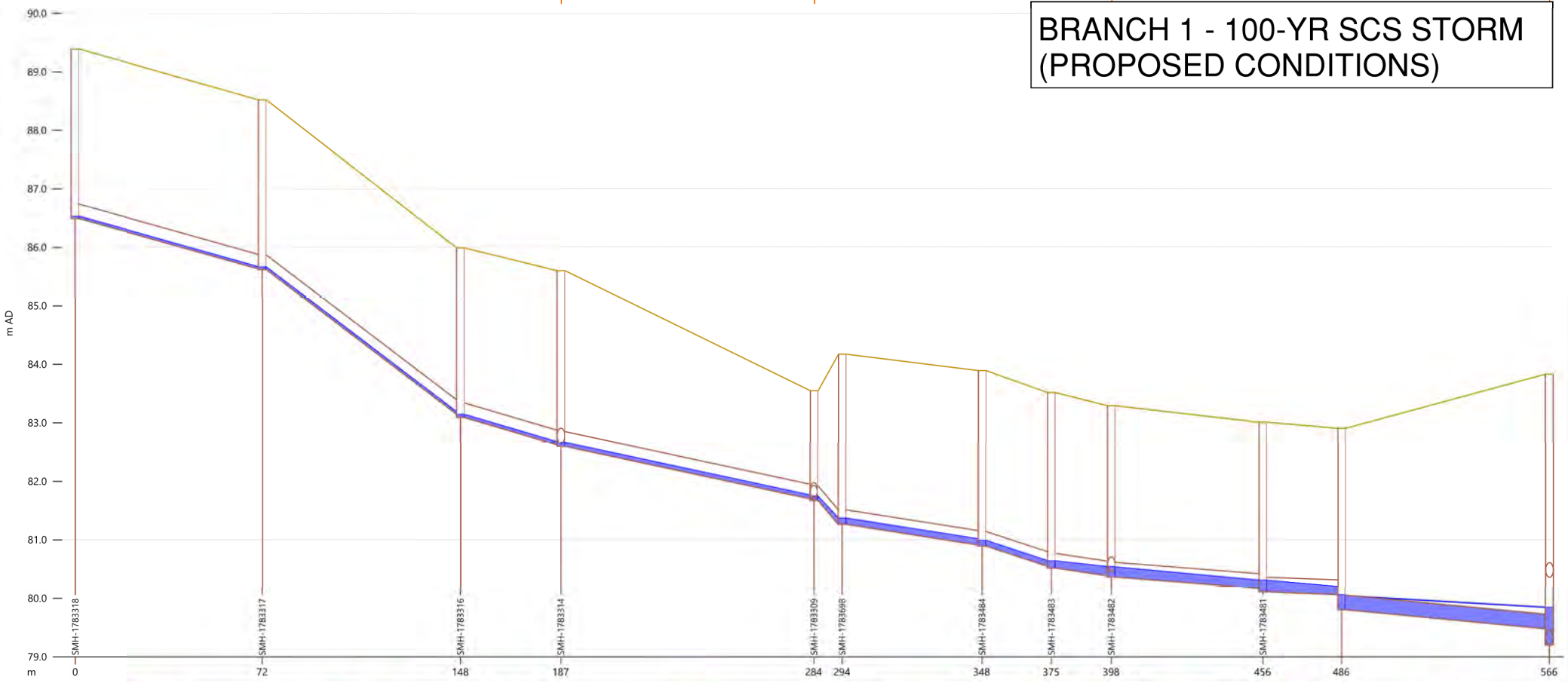
Link	SMH-1783479.1	SMH-1783488.1	-	MH1 CD.2	-
US node ID	SMH-1783479	SMH-1783488	-	MH1 CD	-
ds node	SMH-1783488	SMH-1783489	-	MH2 CD	-
System type	sanitary	sanitary	-	sanitary	-
length (m)	67.7	37.8	5.0	226.0	5.1
Shape ID	CIRC	CIRC	-	CIRC	-
width (mm)	250	250	300	300	300
height (mm)	250	250	300	300	300
us inv (m AD)	79.202	78.937	-	72.830	-
ds inv (m AD)	78.937	78.687	-	71.700	-
grad (m/m)	0.00391	0.00661	-	0.00500	-
pfc (m3/s)	0.037	0.048	-	0.068	-
surc	2.00	0.73	-	0.57	-
US depth (m)	0.303	0.182	-	0.172	-
US flow (m3/s)	0.04288	0.04265	-	0.04262	-
US velocity (m/s)	0.879	1.113	-	1.014	-
DS depth (m)	0.192	0.170	-	0.160	-
DS flow (m3/s)	0.04266	0.04263	-	0.04242	-
DS velocity (m/s)	1.056	1.202	-	1.106	-

Node	SMH-1783479	SMH-1783488	SMH-1783489	MH1 CD	MH2 CD
System type	sanitary	sanitary	sanitary	sanitary	sanitary
ground (m AD)	83.832	82.597	82.221	82.221	75.000
HD table					
Num gullies	1.000	1.000	1.000	1.000	1.000
level (m AD)	79.579	79.128	73.029	73.003	71.836
flood dep (m)	-4.253	-3.469	-9.192	-9.218	-3.164

ATTACHMENT

B-3. 100-YEAR SCS STORM RESULT

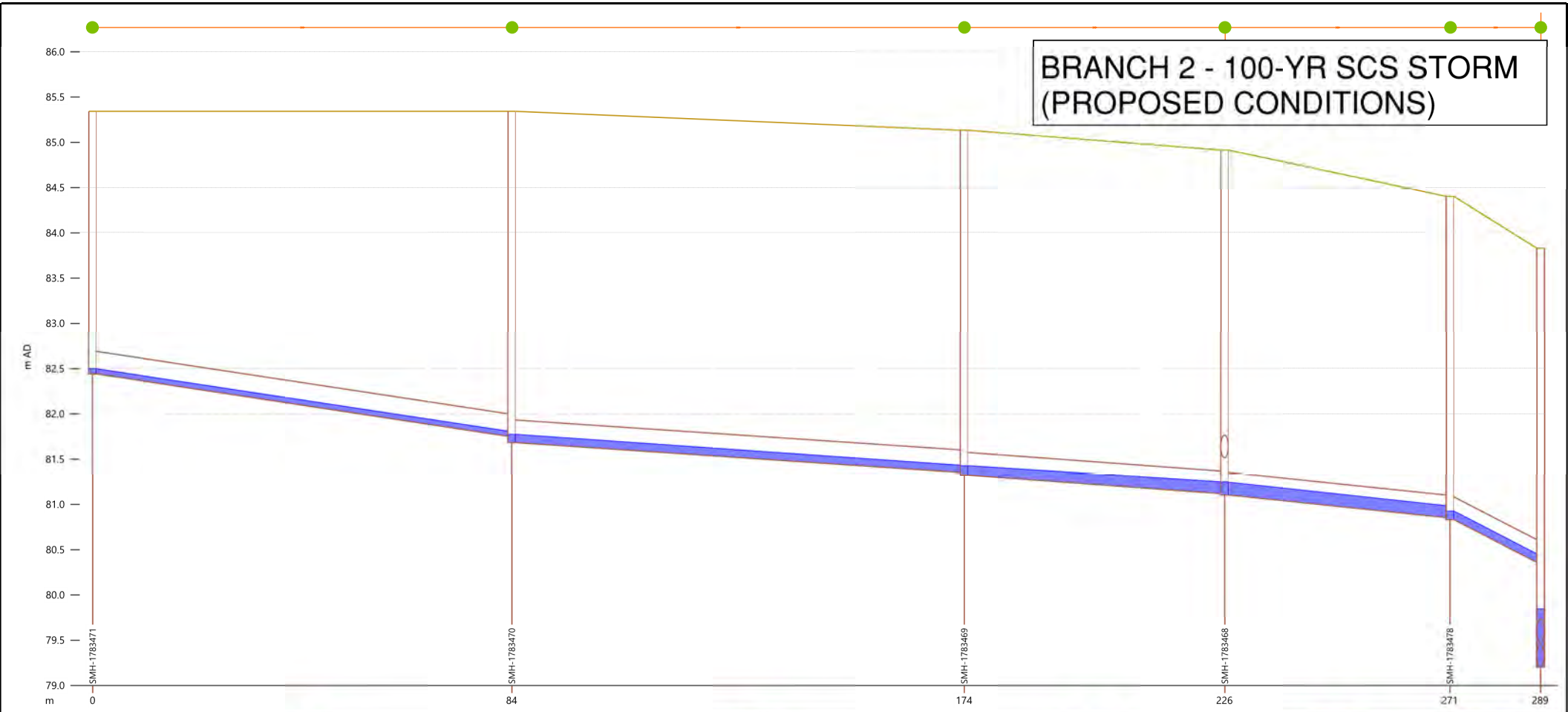
BRANCH 1 - 100-YR SCS STORM (PROPOSED CONDITIONS)



Link												
US node ID	SMH-1783318.1	SMH-1783317.1	SMH-1783316.1	SMH-1783314.1	-	SMH-1783698.1	SMH-1783484.1	SMH-1783483.1	SMH-1783482.1	SMH-1783481.1	SMH-1783480.1	
ds node	SMH-1783317	SMH-1783316	SMH-1783314	SMH-1783309	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	SMH-1783479	
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	
length (m)	72.0	76.0	38.5	97.0	10.8	53.6	26.6	23.0	58.1	30.2	79.6	
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	
width (mm)	250	250	250	250	250	250	250	250	250	250	250	
height (mm)	250	250	250	250	250	250	250	250	250	250	250	
us inv (m AD)	86.493	85.621	83.092	82.601	81.675	81.265	80.894	80.519	80.364	80.111	79.806	
ds inv (m AD)	85.631	83.146	82.625	81.702	81.265	80.910	80.549	80.385	80.172	80.065	79.480	
grad (m/m)	0.01197	0.03256	0.01213	0.00926	-	0.00662	0.01297	0.00582	0.00330	0.00152	0.00410	
pfc (m3/s)	0.065	0.107	0.066	0.057	0.116	0.048	0.068	0.045	0.034	0.023	0.038	
surc	0.15	0.17	0.20	0.25	0.42	0.42	0.37	0.62	0.68	0.78	1.00	
US depth (m)	0.037	0.042	0.051	0.063	0.069	0.104	0.093	0.117	0.170	0.194	0.240	
US flow (m3/s)	0.00172	0.00447	0.00442	0.00710	-	0.01677	0.01897	0.01894	0.02737	0.02724	0.03110	
US velocity (m/s)	0.385	0.815	0.622	0.734	1.513	0.864	1.133	0.837	0.772	0.667	0.858	
DS depth (m)	0.037	0.042	0.051	0.063	0.105	0.104	0.093	0.155	0.136	0.134	0.368	
DS flow (m3/s)	0.00170	0.00442	0.00441	0.00706	-	0.01674	0.01895	0.01899	0.02725	0.02723	0.03026	
DS velocity (m/s)	0.381	0.810	0.620	0.732	0.862	0.863	1.132	0.617	1.008	1.015	0.984	

Node	SMH-1783318	SMH-1783317	SMH-1783316	SMH-1783314	SMH-1783309	SMH-1783698	SMH-1783484	SMH-1783483	SMH-1783482	SMH-1783481	SMH-1783480	SMH-1783479
System type	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary	sanitary
ground (m AD)	89.393	88.521	85.992	85.601	83.550	84.175	83.894	83.519	83.294	83.011	82.906	83.832
HD table												
Num gullies	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
level (m AD)	86.530	85.663	83.143	82.664	81.745	81.370	80.988	80.637	80.540	80.308	80.058	79.844
flood dep (m)	-2.863	-2.858	-2.849	-2.937	-1.805	-2.805	-2.906	-2.882	-2.754	-2.703	-2.848	-3.988

BRANCH 2 - 100-YR SCS STORM (PROPOSED CONDITIONS)



Link		SMH-1783471.1		SMH-1783470.1		SMH-1783469.1		SMH-1783468.1		SMH-1783478.1	
US node ID		SMH-1783471		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478	
ds node		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478		SMH-1783479	
System type		sanitary		sanitary		sanitary		sanitary		sanitary	
length (m)		83.8		90.3		52.0		45.0		18.1	
Shape ID		CIRC		CIRC		CIRC		CIRC		CIRC	
width (mm)		250		250		250		250		250	
height (mm)		250		250		250		250		250	
us inv (m AD)		82.442		81.683		81.324		81.104		80.833	
ds inv (m AD)		81.753		81.354		81.119		80.854		80.361	
grad (m/m)		0.00822		0.00364		0.00394		0.00556		0.02614	
pfc (m3/s)		0.054		0.036		0.037		0.044		0.096	
surc		0.22		0.35		0.51		0.56		0.36	
US depth (m)		0.054		0.088		0.101		0.139		0.091	
US flow (m3/s)		0.00487		0.00902		0.01208		0.02556		0.02551	
US velocity (m/s)		0.621		0.584		0.656		0.912		1.579	
DS depth (m)		0.054		0.077		0.128		0.130		0.091	
DS flow (m3/s)		0.00484		0.00895		0.01199		0.02551		0.02551	
DS velocity (m/s)		0.619		0.700		0.516		0.985		1.579	
Node	SMH-1783471		SMH-1783470		SMH-1783469		SMH-1783468		SMH-1783478		-
System type	sanitary		sanitary		sanitary		sanitary		sanitary		sanitary
ground (m AD)	85.342		85.343		85.134		84.914		84.403		83.832
HD table											
Num gullies	1.000		1.000		1.000		1.000		1.000		1.000
level (m AD)	82.496		81.771		81.425		81.247		80.924		79.844
flood dep (m)	-2.846		-3.572		-3.709		-3.667		-3.479		-3.988

BRANCH 3B - 100-YR SCS STORM (PROPOSED CONDITIONS)

Link	SMH-1783479.1	SMH-1783488.1	-	MH1 CD.2	-
US node ID	SMH-1783479	SMH-1783488	-	MH1 CD	-
ds node	SMH-1783488	SMH-1783489	-	MH2 CD	-
System type	sanitary	sanitary	-	sanitary	-
length (m)	67.7	37.8	5.0	226.0	5.1
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	300	300	300
height (mm)	250	250	300	300	300
us inv (m AD)	79.202	78.937	-	72.830	-
ds inv (m AD)	78.937	78.687	-	71.700	-
grad (m/m)	0.00391	0.00661	-	0.00500	-
pfc (m3/s)	0.037	0.048	0.068	0.068	0.105
surc	2.00	2.00	0.67	0.66	0.51
US depth (m)	0.579	0.260	0.201	0.199	0.154
US flow (m3/s)	0.05341	0.05335	-	0.05328	-
US velocity (m/s)	1.019	1.127	1.061	1.070	1.454
DS depth (m)	0.286	0.189	0.201	0.180	0.154
DS flow (m3/s)	0.05339	0.05331	-	0.05303	-
DS velocity (m/s)	1.073	1.336	1.057	1.200	1.454

Node	SMH-1783479	SMH-1783488	SMH-1783489	MH1 CD	MH2 CD
System type	sanitary	sanitary	sanitary	sanitary	sanitary
ground (m AD)	83.832	82.597	82.221	82.221	75.000
HD table					
Num gullies	1.000	1.000	1.000	1.000	1.000
level (m AD)	79.844	79.220	73.058	73.031	71.854
flood dep (m)	-3.988	-3.377	-9.163	-9.190	-3.146

APPENDIX

C-2 *TM 1 – LIST OF ALTERNATIVES*

TECHNICAL MEMORANDUM

TO: Region of Peel

FROM: WSP

SUBJECT: List of Alternatives for the Claredale EA Project

DATE: **May 8, 2020**

1 INTRODUCTION

WSP Canada (WSP) was retained by the Regional Municipality of Peel (Region) to upgrade Beach Street Sewage Pumping Station (SPS), Beechwood SPS, and associated gravity sewer works. As a part of the proposed upgrades, the Region has indicated the need to replace the existing siphons under Cooksville Creek and install a new sanitary sewer to connect the Claredale Road sanitary catchment area to Beechwood SPS.

Claredale Road is a residential street located in the City of Mississauga, west of Cawthra Road and between Atwater Avenue and the C.N. Rail tracks situated north of Lakeshore Road East. The Claredale Road sanitary sewer network collects flows from all sanitary lateral connections on Claredale Road, Ettridge Court, Raphael Avenue and Avonwood Drive, as well as a small portion of the lateral connections on Atwater Avenue and Northaven Drive. In addition, weeping tiles and homeowner sump pumps discharge to the Claredale Road sanitary sewer network.

The Claredale Road sanitary drainage area has a maximum flow of 29 L/s that is conveyed via a 250 mm diameter gravity sewer south towards Lakeshore Road East. The existing sewer travels between houses 1116 and 1120 on Claredale Road, beneath the C.N. Rail tracks through a steel tunnel liner, crosses the Cooksville Creek by means of a double siphon, and ultimately discharges southerly to Beechwood Avenue. Beach Street SPS previously serviced the communities of Port Credit and Lakeview in southern Mississauga, including the Claredale Road sewer network, however these flows are now being directed to Beechwood SPS. A map of the Claredale Road sanitary catchment area is shown in Figure 1. All sewers and maintenance holes upstream of the siphons are coloured red.

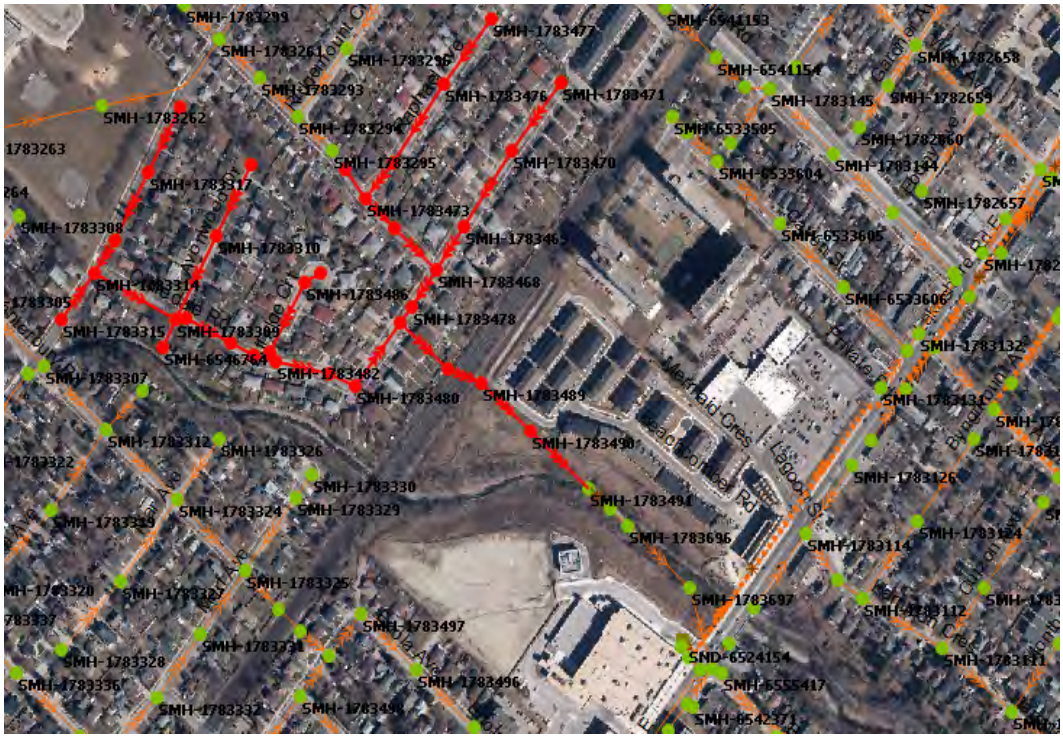


Figure 1: Claredale Road Sanitary Catchment Area

This technical memorandum discusses the need to replace the existing siphon under Cooksville Creek and to install a new sanitary sewer for the Claredale Road catchment area. This technical memorandum presents various alternatives as possible solutions to the problems discussed.

2 PROBLEM STATEMENT

There are several conditions within the study area that have triggered the need to install a new sanitary sewer for the Claredale Road sanitary catchment area. These conditions include:

- The siphons under Cooksville Creek are approaching the end of their service life and do not meet the Region's current design standards for minimum flow velocity in sewers
- The siphons are prone to frequent blockage, resulting in regular sewer and lateral connection backups
- To prevent blockage, the siphons require frequent maintenance and cleaning at considerable expense and effort to the Region
- The Region has experienced accessibility and maintenance challenges to unblock the frequently obstructed siphons
- The existing sanitary maintenance hole on the north bank of Cooksville Creek is at risk of exposure due to further erosion and undermining of the nearby gabion

Considering the points listed above, the Problem/Opportunity Statement for the Municipal Class EA is defined as follows:

> *The double siphons used to convey wastewater from the Claredale Road sanitary catchment area under Cooksville Creek are approaching the end of their service life. Furthermore, the siphons do not comply with Region of Peel sanitary sewer design standards. As a result, the siphons have experienced frequent obstructions, subjecting the Claredale Road sanitary catchment area to sewer and lateral connection backups. The*

Region of Peel has been challenged with the frequency and degree of maintenance required to unblock the obstructed siphons and tributary sewers.

To address the Problem/Opportunity Statement, the Region has initiated a Municipal Class EA planning process which evaluates alternative solutions to solve the problem identified above.

3 STUDY AREA AND AREA OF FOCUS

The Context Area covers the area that may be indirectly impacted by the works within the Study Area. The Study Area includes the Area of Focus and the area proximate to the Area of Focus that may be indirectly impacted by the works considered in the EA process. The Area of Focus is defined as the area that may be directly impacted by the works considered in the EA process, and is bound by the C.N. Rail Tracks to the north, Beachcomber Road to the east, Lakeshore Road East to the south, and Enola Avenue to the west. Figure 2 below shows a map of the Area of Focus, Study Area and Context Area for the Claredale Road Class EA.

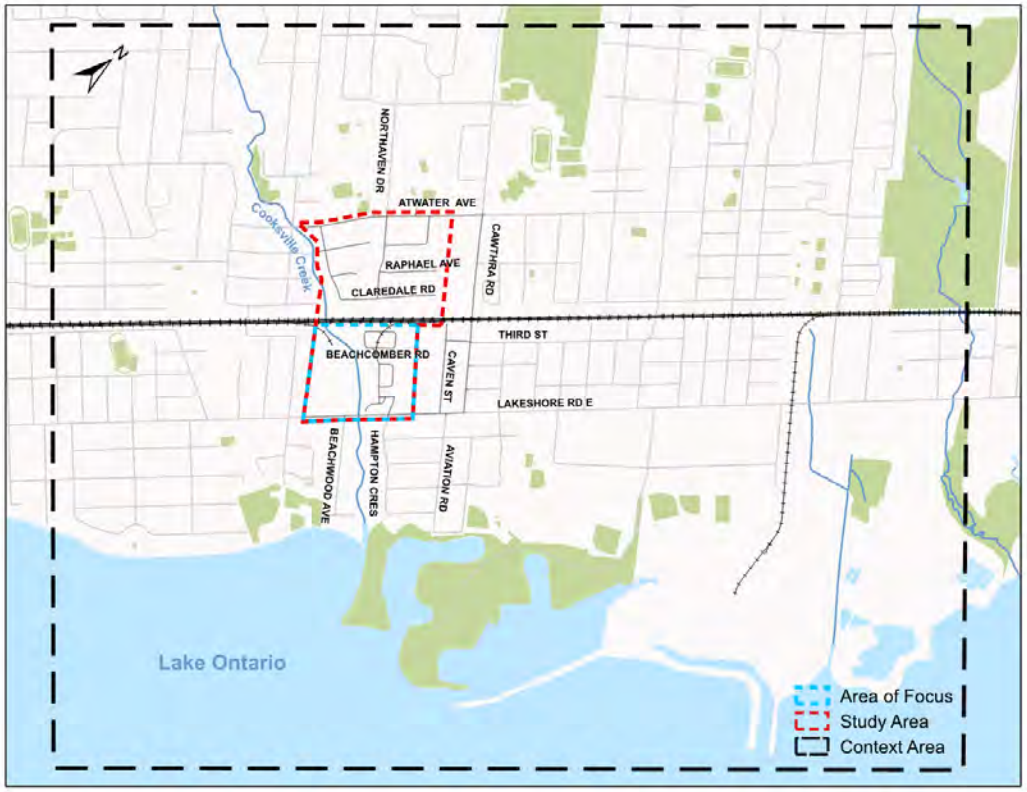


Figure 2: Study Area and Context Area Map

4 ALTERNATIVE SOLUTIONS

Feasible and practical alternatives were identified and then all alternatives that do not fully address the issues defined in the Problem Statement are screened out. This approach is similar to that followed for other Class EAs completed by the Region.

The identified alternatives will be subject to a detailed evaluation based on environmental, social, cultural, economic, and technical criteria to determine the preferred solution.

The approach for evaluation of alternatives is discussed in Section 5 below.

Figure 3 illustrates the progression in the process for identification of alternatives relative to the public consultation stages of the Class EA.

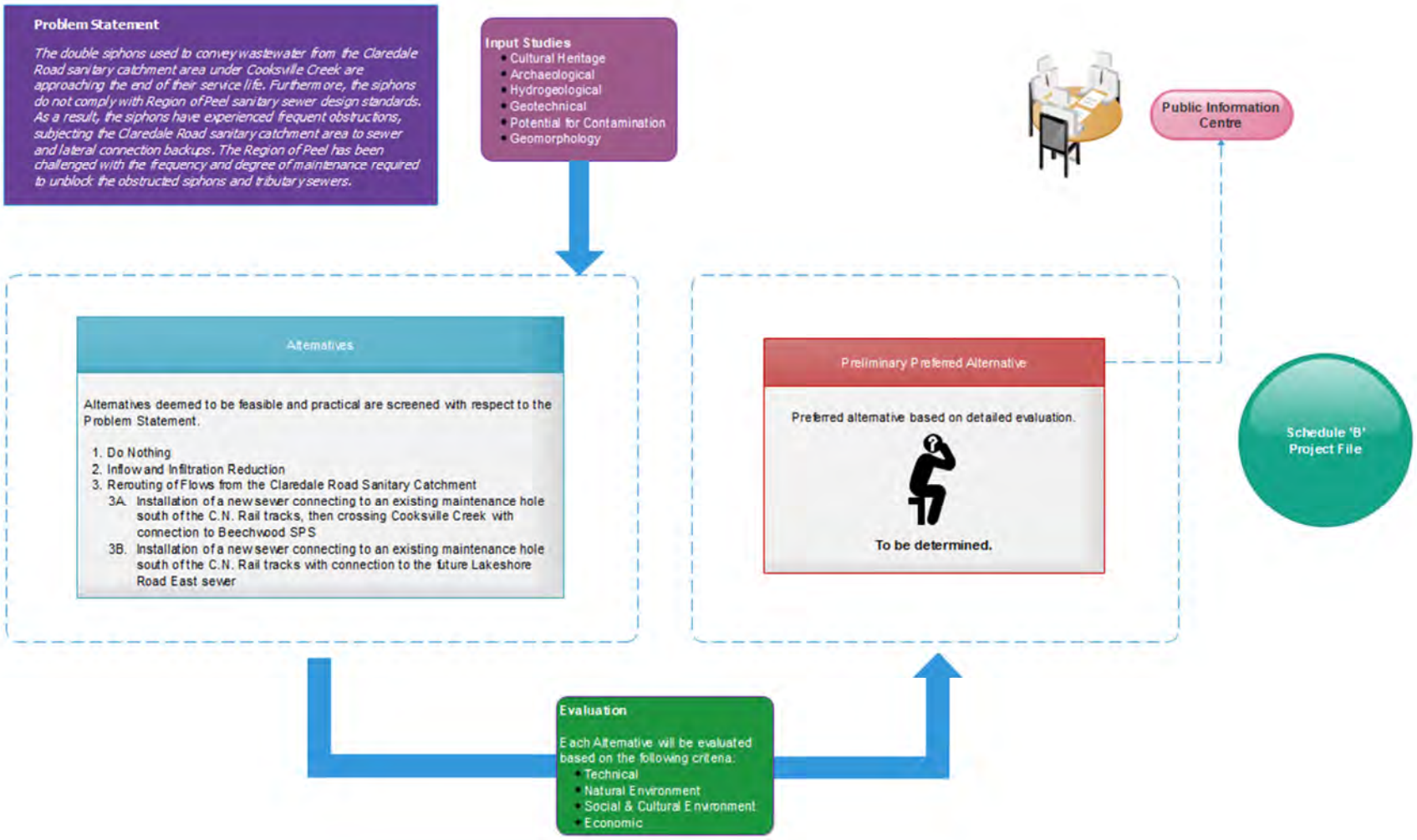


Figure 3: Preferred Alternative Identification Process

4.1 ALTERNATIVES

Various alternatives to address the problem were identified. The "Do Nothing" alternative is included as it is typically used as a baseline for comparison in the Class EA process. The alternatives considered for this study include:

1. Do Nothing
2. Inflow and Infiltration Reduction
    - Maintain existing sanitary conveyance infrastructure and reduce sources of inflow and infiltration into the Claredale Road sewer system
3. Rerouting of Flows from the Claredale Road Sanitary Catchment

A cursory review of the alternatives above relative to the Problem Statement allows to easily screen out alternatives that do not "solve the problem."

Alternative 1 does not address current condition, capacity, and operational issues associated with the siphons. Alternative 2 may address the capacity issues associated with the siphons but does not address condition and operation-related concerns. Alternative 3 fully addresses the concerns related to the condition, capacity and operation of the siphons. Therefore, only Alternative 3 is carried forward for further evaluation.

Under Alternative 3, various alternative sewer alignments were identified. To determine the limits of the existing sewer that requires replacement, WSP conducted a hydraulic analysis, modelling existing and potential proposed sewer alignments. The results of this analysis are documented in Technical Memorandum: Claredale EA Project – Hydraulic Analysis (WSP, 2020), and can be referred to in Appendix A. Based on the analysis results, it was determined that replacement of the sewer starting south of the C.N. Rail tracks is sufficient for addressing the problem statement. As such, two alternative sewer alignments were identified. Both alternatives involve decommissioning the existing siphons.

Alternative 3A

- Installation of a new sewer connecting to an existing maintenance hole south of the C.N. Rail tracks, then crossing Cooksville Creek with connection to Beechwood SPS

Alternative 3B

- Installation of a new sewer connecting to an existing maintenance hole south of the C.N. Rail tracks with connection to the future Lakeshore Road East sewer

Upon initial review, the two alternatives to implementing Alternative 3 are deemed feasible and are carried forward for further evaluation.

The next step involves refining the alternatives and identifying alignments for the linear infrastructure.

Sewer alignments would ideally minimize the distance between the start and end points (generally, the shorter the distance, the lower the construction cost). Another consideration for routing would be impact to existing roadways and infrastructure, and constraints due to natural, social/cultural and/or archaeological features. Therefore, often a straight-line route will not be feasible.

4.1.1 ALTERNATIVE 3A

GENERAL

Alternative 3A involves rerouting flows from the Claredale Road sanitary catchment via a new 300 mm gravity sewer which connects to existing maintenance hole SMH-1783489 and crosses under Cooksville Creek, discharging into existing MH-2A, located southeast of Beechwood SPS.

To connect the Claredale sewer network to MH-2A via the new 300 mm gravity sewer, two new maintenance holes will be constructed:

- One maintenance hole within the open space south of the C.N. Rail tracks, east of Cooksville Creek; and
- One maintenance hole immediately upstream of MH-2A, west of Cooksville Creek.

The maintenance holes will be situated such that there is sufficient clearance between the proposed sewer alignment and existing siphons and Beechwood sewage pumping station. The depth of the proposed sewer will be approximately 8 to 10 metres below grade, ensuring sufficient cover between the sewer and Cooksville Creek bed.

A permanent access road to MH1 will be installed for maintenance purposes. The access road will be comprised of permeable pavers suitable for flushing and CCTV truck loading.

A key plan of the proposed sanitary sewer alignment is shown in Figure 4. As shown on the key plan, there will be sufficient clearance between the proposed sewer and the existing siphon, allowing the existing sewers to remain operational during construction.

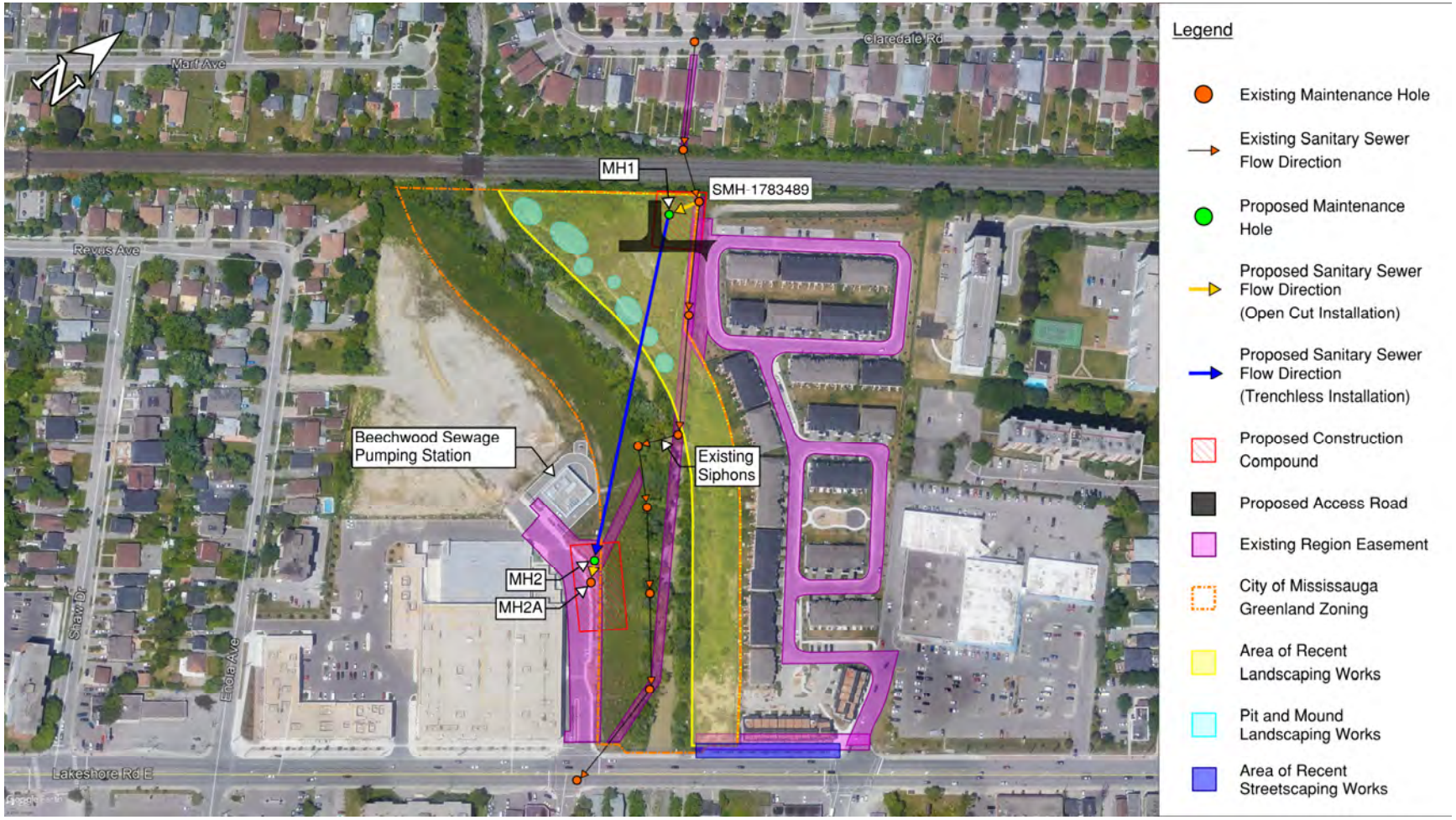


Figure 4: Alternative 3A – Key Plan

CONSTRUCTION METHODOLOGY

To limit disruption to the watercourse, microtunneling is proposed to be used to install the new gravity sewer crossing under the Cooksville Creek. A MTBM with a minimum inside pipe diameter of 900 mm will be required to complete the proposed tunnel drive length. The proposed sewer crossing Cooksville Creek will be constructed within a protective 900 mm liner.

To take advantage of the existing access road to Beechwood SPS, it is proposed that the microtunnel entry shaft be located at MH2 and the exit shaft be located at MH1. Due to the short connection distance, open cut construction will be utilized for the sewer between SMH-1783489 and MH1, and between MH2 and MH-2A.

Site access and egress to the construction compound for proposed MH1 will be via Beachcomber Road (south of the tracks, east of the Creek) and a newly constructed access road extending off Beachcomber Road.

The proposed compound for MH2 adjacent to MH-2A will be located on the Beechwood SPS site (south of the tracks, west of the Creek) which allows for access from Lakeshore Road for construction equipment and materials.

Since the proposed infrastructure will only convey flows from the Claredale Road catchment, the sewer on Claredale Road can remain live until final connections of the proposed sewer are completed. Sanitary bypass pumping will be required for the final connection.

PERMITS AND APPROVALS

An easement will be required from the City of Mississauga for the new sewers from SMH-1783489 to MH2. Although there is an existing easement, consultation and approval will be required for the use of Beachcomber Road and the Beechwood SPS access road for site access and the transportation of construction materials and equipment. Approval will also be required for construction of MH1 and the access road extending off Beachcomber Road. A list of approval requirements for Alternative 3A is included in Table 1.

Table 1: Alternative 3A – Permits and Approvals

ORGANIZATION	PERMIT / APPROVAL
Ministry of the Environment, Conservation & Parks (MECP)	✓ Sanitary Sewer ECA ✓ Environmental Activity Sector Registration for construction dewatering activities - OR – Permit to Take Water – during construction
City of Mississauga – Planning and Building Department	N/A

ORGANIZATION	PERMIT / APPROVAL
Credit Valley Conservation	✓ Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Permit – for work in the Cooksville Creek flood plain ✓ Notification of Project Start
Electrical Safety Authority (ESA)	N/A
Occupational Health and Safety Act	✓ Pre-Start Health and Safety Review (PSR)
Region of Peel / City of Mississauga	✓ Public Utilities Coordination Committees (PUCC) ✓ Easement agreement for construction in the Greenlands zone
Beachcomber Road Condominium Corporation	✓ Modification to easement agreement to allow for construction access

NATURAL ENVIRONMENT CONSIDERATIONS

Landscaping works, including regrading, vegetating and the addition of pit and mound features, were recently completed by the Beachcomber Road Condominium Corporation. The limits of the landscaping works can be referred to in Figure 4 and are delineated by Cooksville Creek to the west, the C.N. Rail tracks to the north, Beachcomber Road to the east, and Lakeshore Road East to the south. This area, as well as the area immediately west of Cooksville Creek are classified as by City of Mississauga Zoning By-law 0225-2007 as a G1: Greenlands – Natural Hazards Zone.

Construction works at MH1 and MH2 will impact vegetation, including trees and shrubbery. The location of MH1 and its associated construction compound are such that the pit and mound landscaping features, which are situated closer to Cooksville Creek, are not expected to be directly impacted. As well, typically, more equipment is required at the entry location and the entry shaft is larger in diameter than its counterpart. As such, the entry shaft is proposed to be located at MH2 with the exit shaft at MH1.

Furthermore, the use of microtunneling will reduce impacts to the Greenlands, and by tunnelling with sufficient clearance below the watercourse, direct impacts to Cooksville Creek will be eliminated. As the sewer is required to cross under Cooksville Creek, it is within the Credit Valley Conservation (CVC) regulated area and will require CVC approval.

SOCIAL AND CULTURAL ENVIRONMENT CONSIDERATIONS

The proposed sewer is in compliance with current land use and zoning regulations. The use of microtunneling techniques will minimize the disruption to the residents in terms of traffic, noise, dust and vibrations compared to open cut construction methods. By utilizing MH2 as the microtunnel entry point as opposed to MH1, heavy construction traffic through Beachcomber Road will also be reduced. It should be noted that all of the social and cultural impacts are temporary for the duration of construction; there are no permanent impacts.

ECONOMIC CONSIDERATIONS

No land acquisition costs are expected for Alternative 3A, although a sewer easement will need to be arranged with the City of Mississauga for the works within the Greenlands zone. A high-level conceptual construction cost estimate is detailed in Table 2 below. Permitting and traffic management costs are not included.

Table 2: Alternative 3A – Conceptual Cost Estimate

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
Shaft/MH1	10	m (depth)	$60,000	$600,000
300mm Sewer MH1 to SMH-1783489 - open cut	10	m	$1,500	$15,000
300mm Sewer MH2 to MH1 - microtunnel	235	m	$9,000	$2,115,000
Shaft/MH2	10	m (depth)	$60,000	$600,000
			Total	**$3,330,000**

The design life of a gravity sewer is typically between 80 and 100 years. Life cycle (maintenance) cost for a gravity sewer is negligible.

4.1.2 ALTERNATIVE 3B

GENERAL

Alternative 3B involves rerouting flows from the Claredale Road sanitary catchment via a new 300 mm gravity sewer which connects to existing maintenance hole SMH-1783490 and travels southwards discharging into a new maintenance hole to be constructed as part of the future Lakeshore Road East sewer. This alternative provides an option for bypassing the siphons without having to cross under Cooksville Creek.

A permanent access road to MH1 will be installed for maintenance purposes. The access road will be comprised of permeable pavers suitable for flushing and CCTV truck loading.

A key plan of the proposed sanitary sewer alignment is shown in Figure 5. As shown on the key plan, there will be sufficient clearance between the proposed sewer and the existing siphon, allowing the existing sewers to remain operational during constructio

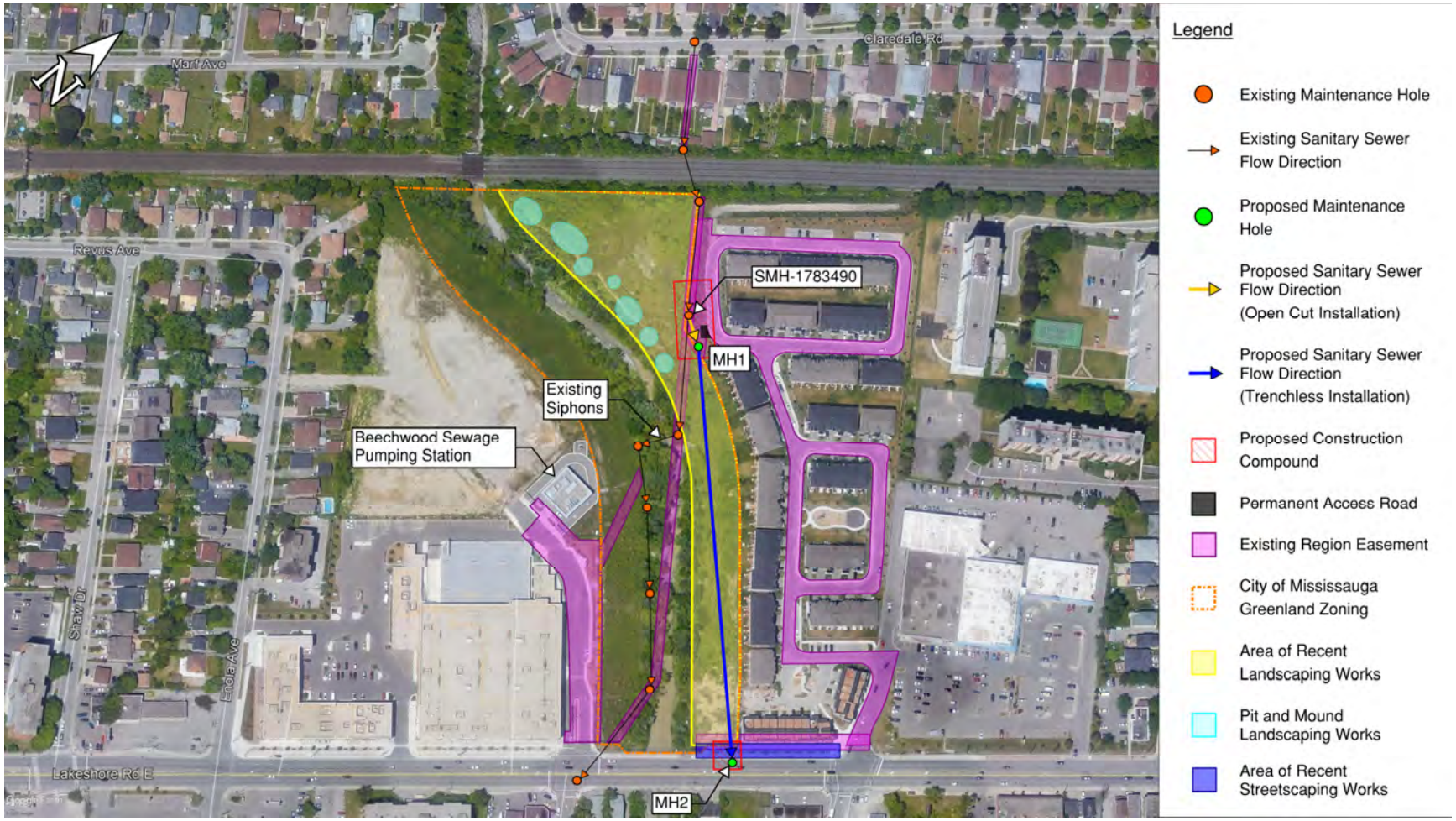


Figure 5: Alternative 3B – Key Plan

To connect the Claredale sewer network to the future Lakeshore Road East sewer via the new 300 mm gravity sewer, two new maintenance holes will be constructed:

- One maintenance hole adjacent to existing SMH 1783490
- One maintenance hole along Lakeshore Road East, east of Cooksville Creek.

The maintenance holes will be situated such that there is sufficient clearance between the proposed sewer alignment and existing siphons. The depth of the proposed sewer will be approximately 7 to 9 metres below grade.

Maintenance hole MH2 is to be constructed as part of a separate Region project. As such, implementation of this alternative is constrained by completion of the new gravity sewer on Lakeshore Road East from Aviation Road to Beechwood Avenue.

CONSTRUCTION METHODOLOGY

To limit disruption to existing at-grade infrastructure, microtunneling is proposed to be used to install the new gravity sewer. A MTBM with a minimum inside pipe diameter of 900 mm will be required to complete the proposed tunnel drive length. As the proposed sewer will be travelling adjacent to, but not crossing Cooksville Creek, construction complexity will be reduced.

As the microtunnel entry compound has additional spatial and equipment-related requirements compared to the exit compound, it is proposed that MH1 be used as the entry shaft and MH2 for the exit shaft.

Site access and egress to the construction compound for the entry shaft will be via Beachcomber Road and a newly constructed access road extending off Beachcomber Road. The entry shaft location and access road is shown in Figure 6.

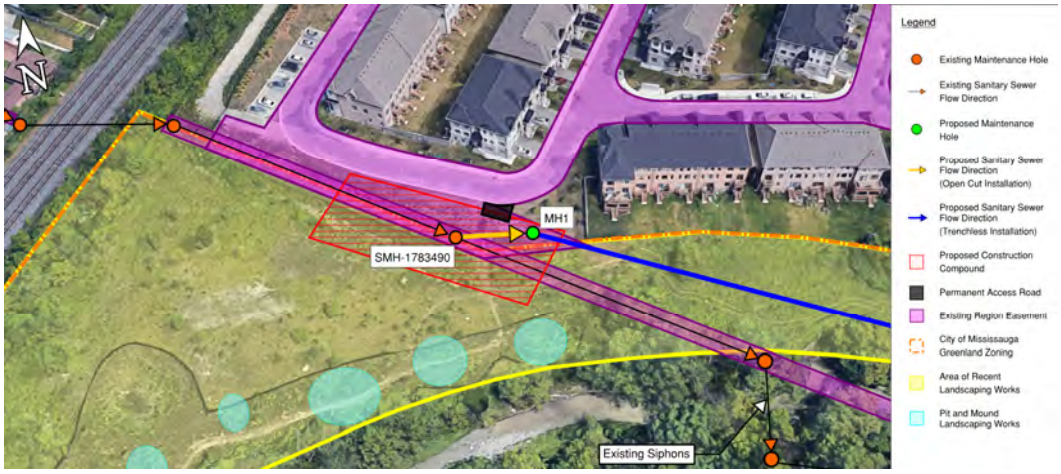


Figure 6: Alternative 3B – Entry Shaft Location off Beachcomber Road

Since the proposed infrastructure will only convey flows from the Claredale Road catchment, the sewer on Claredale Road can remain live until final connections of the proposed sewer are completed. Sanitary bypass pumping will be required for the final connection.

The proposed compound for MH2 along Lakeshore Road East will be accessible via Lakeshore Road East. A section of the north side of Lakeshore Road East proximate to the construction compound will likely have to be closed for the duration of construction, estimated at 6 months.

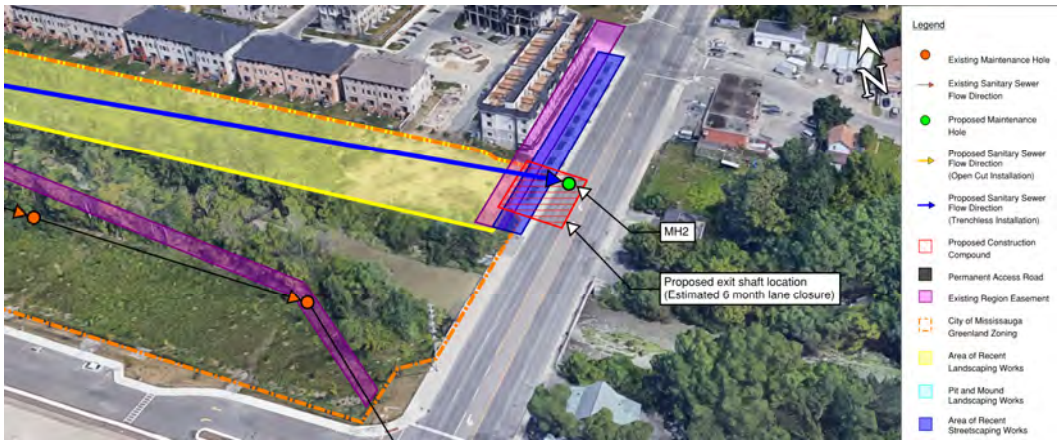


Figure 7: Alternative 3B – Exit Shaft Location on Lakeshore Road East

PERMITS AND APPROVALS

An easement will be required from the City of Mississauga for the new sewer from MH1 to MH2. Furthermore, although there is an existing easement, consultation and approval will be required for the use of Beachcomber Road for site access and the transportation of construction materials and equipment. Approval will also be required for construction of MH1 and the access road extending off Beachcomber Road. A list of approval requirements for Alternative 3B is included in Table 3.

Table 3: Alternative 3B – Permits and Approvals

ORGANIZATION	PERMIT / APPROVAL
Ministry of the Environment, Conservation & Parks (MECP)	✓ Sanitary Sewer ECA ✓ Environmental Activity Sector Registration for construction dewatering activities - OR – Permit to Take Water – during construction
City of Mississauga – Planning and Building Department	N/A
City of Mississauga – Transportation and Works Department	✓ Road Occupancy Permit
Credit Valley Conservation	✓ Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Permit – for work in the Cooksville Creek flood plain ✓ Notification of Project Start

Electrical Safety Authority (ESA)	N/A
Occupational Health and Safety Act	✓ Pre-Start Health and Safety Review (PSR)
Region of Peel / City of Mississauga	✓ Public Utilities Coordination Committees (PUCC) ✓ Easement agreement for construction in the Greenlands zone
Beachcomber Road Condominium Corporation	✓ Modification to easement agreement to allow for construction access

NATURAL ENVIRONMENT CONSIDERATIONS

Landscaping works, including regrading, vegetating and the addition of pit and mound features, were recently completed by the Beachcomber Road Condominium Corporation. The limits of the landscaping works can be referred to in Figure 5 and are delineated by Cooksville Creek to the west, the C.N. Rail tracks to the north, Beachcomber Road to the east, and Lakeshore Road East to the south. This area, as well as the area immediately west of Cooksville Creek are classified as by City of Mississauga Zoning By-law 0225-2007 as a G1: Greenlands – Natural Hazards Zone.

Construction works at MH1 will impact nearby vegetation, comprising mainly shrubbery. The location of MH1 and its associated construction compound are such that the pit and mound landscaping features, which are situated closer to Cooksville Creek, are not expected to be directly impacted. To mitigate construction impacts to the Greenlands zone, the proposed access road to MH1 shall be comprised of permeable pavers.

Furthermore, the use of microtunneling will reduce impacts to the Greenlands. As the sewer is proximate to Cooksville Creek, it is within the Credit Valley Conservation (CVC) regulated area and will require CVC approval.

SOCIAL AND CULTURAL ENVIRONMENT CONSIDERATIONS

The proposed sewer is in compliance with current land use and zoning regulations. The proposed location of the microtunnel exit shaft and construction compound on Lakeshore Road East will result in significant impacts to local traffic and residents. For approximately 6 months, the westbound lane will be closed for construction. However, with careful planning and implementation of traffic management strategies, the severity of the impacts can be minimized.

The use of microtunneling techniques will minimize the disruption to the residents in terms of traffic, noise, dust and vibrations compared to open cut construction methods. It should be noted that all the social and cultural impacts are temporary for the duration of construction; there are no permanent impacts.

ECONOMIC CONSIDERATIONS

No land acquisition costs are expected for Alternative 3B, although a sewer easement will need to be arranged with the City of Mississauga for the works within the Greenlands zone. A high-level conceptual construction cost estimate is detailed in Table 4 below. Permitting and traffic management costs are not included.

Table 4: Alternative 3B – Conceptual Cost Estimate

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
Shaft/MH1	10	m (depth)	$60,000	$600,000
300mm Sewer MH1 to SMH-1783490 – open cut	10	m	$1,500	$15,000
300mm Sewer SMH-1783490 to MH1 – microtunnel	260	m	$9,000	$2,340,000
Shaft/MH2	10	m (depth)	$60,000	$600,000
			Total	**$3,555,000**

The design life of a gravity sewer is typically between 80 and 100 years. Life cycle (maintenance) cost for a gravity sewer is negligible.

5 EVALUATION OF ALTERNATIVES

A set of evaluation criteria were identified based on various technical inputs, and grouped under four categories as follows:

1. Natural Environment Considerations
2. Social & Cultural Environment Considerations
3. Economic Considerations
4. Technical Considerations

Each of the four categories above will be further evaluated based on sub-criteria. The five alternatives will then be comparatively evaluated using the detailed sub-criteria. An evaluation matrix will be developed to compare the data found from the technical investigations and studies. The detailed evaluation of each alternative solution shall be based on an assessment of potential impacts and in consideration of input received from agency consultation and technical study.

The evaluation criteria for the evaluation of the alternatives can be referred to in Table 5.

Table 5: Evaluation Criteria

EVALUATION CRITERIA	DEFINITION
Natural Environment Considerations	
Proximity to Environmentally Sensitive Areas	Means potential for adverse impact(s) to features and areas, which may include significant wetlands, fish habitat, significant woodlands, habitat of endangered species and threatened species, wildlife habitat, and significant areas of natural and scientific interest, which are important for their environmental and social value as a legacy of the natural landscape area (adopted from PPS, 2014).
Impact to Watercourses	Means potential for adverse impact(s) to watercourses and associated tributaries, including ground water and surface water features, to ensure hydrologic functions and linkages are maintained.
Impact to Species at Risk	Means potential for adverse impact(s) to features and land forms which include the habitat for species identified as at risk by the Province, in accordance with O. Reg. 230/08.
Tree Removal	Means the quantity of trees required to be removed to accommodate the proposed development.
Potential for Contamination	Means the potential for contamination for each alternative as identified through the Phase 1 ESA.
GHG Emissions & Carbon Footprint	Means the potential for greenhouse gas emissions and overall carbon footprint of the work.
Social & Cultural Environment Considerations	
Impact to Cultural Heritage Resources	Means the potential for adverse impacts identified as having cultural heritage value or interest by a community, including an Indigenous community. The area may involve features such as structures, spaces, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association (adapted from PPS, 2014).
Impact to Archaeological Resources	Means potential for adverse impacts to areas containing artifacts, archaeological sites, marine and archaeological sites, as defined under the *Ontario Heritage Act*. The identification and evaluation of such resources are based upon the Phase I Archaeological Survey.
Land Use / Zoning Compliance	Means the compliance with Provincial, Regional, Municipal, and other agency policies, plans, and regulations. This framework controls the use of land and directs development to appropriate locations. This criterion will also consider the extent of any required amendments to land use or zoning regulations.
Traffic Impacts during Construction	Means the severity of adverse construction impacts on adjacent land uses, specifically traffic congestion.
Noise Impacts during Construction	Means the severity of adverse construction impacts on adjacent land uses, specifically noise pollution.
Dust Impacts during Construction	Means the severity of adverse construction impacts on adjacent land uses, specifically dust.
Removal of Recreational Space (Private or Public)	Means the amount of private or public recreational space which will be removed for both the pumping station and forced main alignment.

EVALUATION CRITERIA	DEFINITION
Economic Considerations	
Land Acquisition Cost	Means the cost of acquiring the necessary land for the project from the existing legal owner.
Capital Costs	Means the capital costs required to acquire land, obtain necessary approvals and permits, and construct each option.
Life Cycle (Maintenance) Costs	Means the project life cycle (maintenance) costs of each alternative including operational costs such as electricity usage.
Technical Considerations	
Land Acquisition Process	Means the process of acquiring the necessary land for the project from the existing legal owner, including impacts to the project timeline and associated complications. This includes land owned by the townhouse complex, C.N. Rail, and any required agreements or easements in relation to the rail corridor.
Constructability	Means challenges or risks associated with undertaking construction.
Impact to Existing Utilities	Means the impact of each alternative to existing utilities. An alignment within an existing road right-of-way will have a greater impact on existing utilities.
Permits and Approvals	Means the ability to obtain and number of required permits and approvals for the project (ex. – conservation authority, C.N. Rail).
Public Input	
Public Input	Means the preferred alternative as identified by members of the community at the Public Information Centre.

6 NEXT STEPS

The defined strategies, and alternatives will be reviewed by the Region to initiate discussions and receive initial feedback. The Region's comments will be incorporated, and a detailed evaluation will be carried out to identify the preferred solution. The preferred solution will identify the approach to addressing the problem statement and define the preferred sanitary sewer alignment for the rerouting of flows from the Claredale Road sanitary catchment.

APPENDIX

C-3 *TM 2 – EVALUATION OF ALTERNATIVES*

TECHNICAL MEMORANDUM #2

TO: Region of Peel

FROM: WSP

SUBJECT: Analysis of Alternatives for the Claredale EA Project

DATE: **June 9, 2020**

1 INTRODUCTION

WSP Canada (WSP) submitted Technical Memorandum #1 – List of Alternatives, dated May 8, 2020, which discussed the need to replace the existing siphons under Cooksville Creek and presented the following alternatives which fully address the condition, capacity and operation related concerns:

Alternative 3A

- Installation of a new sewer connecting to an existing maintenance hole south of the C.N. Rail tracks, then crossing Cooksville Creek with connection to Beechwood SPS

Alternative 3B

- Installation of a new sewer connecting to an existing maintenance hole south of the C.N. Rail tracks with connection to the future Lakeshore Road East sewer

This technical memorandum discusses the methodology and criteria used for evaluation of the alternatives and presents the preferred solution.

2 EVALUATION METHODOLOGY

The objective of the evaluation process is to identify and recommend a preferred solution. The preferred solution is the alternative that best satisfies the Problem Statement based on the evaluation criteria.

A set of evaluation criteria were identified based on various technical inputs, and grouped under four main categories as follows:

1. Natural Environment Considerations
2. Social & Cultural Environment Considerations
3. Economic Considerations
4. Technical Considerations

Each criterion was assigned a weighting relative to its importance to the project. A criterion with a higher weighting was considered to have greater importance to the project.

Based on an assessment of expected impacts and existing studies, the alternatives were then comparatively evaluated. Under each criterion, the alternatives were assigned a numerical score, ranging from one (1) to three (3). An alternative assigned a score of 1 is least preferred, while a score of 3 is most preferred.

Under each criterion, the weighted score was calculated as the product of the assigned weighting and score. The final score for each alternative was calculated as the sum of all weighted scores. The alternative with the higher final score was determined to be the preferred solution. The evaluation criteria can be referred to in **Table 1**.

Table 1: Evaluation Criteria

EVALUATION CRITERIA	DEFINITION
Natural Environment Considerations	
Proximity to Environmentally Sensitive Areas including Impact to Species at Risk	Means potential for adverse impact(s) to features and areas, which may include significant wetlands, fish habitat, significant woodlands, habitat of endangered species and threatened species, wildlife habitat, and significant areas of natural and scientific interest, which are important for their environmental and social value as a legacy of the natural landscape area (adopted from PPS, 2014). Means potential for adverse impact(s) to features and land forms which include the habitat for species identified as at risk by the Province, in accordance with O. Reg. 230/08.
Impact to Watercourses	Means potential for adverse impact(s) to watercourses and associated tributaries, including ground water and surface water features, to ensure hydrologic functions and linkages are maintained.
Impact to Shrubbery and Other Vegetation	Means the potential for disruption or removal of shrubbery and other vegetation to accommodate the proposed works.
Potential for Contamination	Means the potential for contamination for each alternative as identified through the Phase 1 ESA.
GHG Emissions & Carbon Footprint	Means the potential for greenhouse gas emissions and overall carbon footprint of the work.
Social & Cultural Environment Considerations	
Impact to Cultural Heritage Resources	Means the potential for adverse impacts identified as having cultural heritage value or interest by a community, including an Indigenous community. The area may involve features such as structures, spaces, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association (adapted from PPS, 2014).
Land Use / Zoning Compliance	Means the compliance with Provincial, Regional, Municipal, and other agency policies, plans, and regulations. This framework controls the use of land and directs development to appropriate locations. This criterion will also consider the extent of any required amendments to land use or zoning regulations.
Traffic Impacts during Construction	Means the severity of adverse construction impacts on adjacent land uses, specifically traffic congestion.
Noise Impacts during Construction	Means the severity of adverse construction impacts on adjacent land uses, specifically noise pollution.
Dust Impacts during Construction	Means the severity of adverse construction impacts on adjacent land uses, specifically dust.
Removal of Recreational Space (Private or Public)	Means the amount of private or public recreational space which will be removed for both the pumping station and forced main alignment.
Economic Considerations	
Capital Costs	Means the capital costs required to acquire land, obtain necessary approvals and permits, and construct each option.

EVALUATION CRITERIA	DEFINITION
Life Cycle (Maintenance) Costs	Means the project life cycle (maintenance) costs of each alternative including operational costs such as electricity usage.
Technical Considerations	
Constructability	Means challenges or risks associated with undertaking construction.
Impact to Existing Utilities	Means the impact of each alternative to existing utilities. An alignment within an existing road right-of-way will have a greater impact on existing utilities.
Permits and Approvals	Means the ability to obtain and number of required permits and approvals for the project (ex. – conservation authority, C.N. Rail).

3 EVALUATION OF ALTERNATIVES

The results of the comparative analysis were summarized in a matrix with the following colour-coding corresponding to each assigned score:

Table 2: Scoring Legend

SCORE	DEFINITION AND COLOUR-CODING
1	Least Preferred
2	Less Preferred
3	Most Preferred

The evaluation matrix can be referred to in **Table 3**.

Table 3: Evaluation Matrix

		ALTERNATIVE 3A			ALTERNATIVE 3B		
	Weighting	**Rationale**	**Score**	**Weighted Score**	**Rationale**	**Score**	**Weighted Score**
Natural Environment Considerations							
Proximity to Environmentally Sensitive Areas including Impact to Species at Risk	3	Per City of Mississauga Zoning By-law 0225-2007, the proposed sewers will be installed on lands classified as G1: Greenlands – Natural Hazards Zone. Per the City of Mississauga Natural Areas Survey (2008), two birds and two mammals were documented, and they were: ring-billed gull, American robin, coyote, and raccoon. No species at risk were documented.	3	9	Per City of Mississauga Zoning By-law 0225-2007, the proposed sewers will be installed on lands classified as G1: Greenlands – Natural Hazards Zone. Per the City of Mississauga Natural Areas Survey (2008), two birds and two mammals were documented, and they were: ring-billed gull, American robin, coyote, and raccoon. No species at risk were documented.	3	9
Impact to Watercourses	3	The proposed sewer rerouting flows from the Claredale sanitary catchment will cross Cooksville Creek via microtunneling with sufficient clearance below the creek bed. The new Lakeshore Road East sewer (under separate Region project) will also cross Cooksville Creek. The watercourse will not be directly impacted by construction, however there will ultimately be 2 separate sewer crossing Cooksville Creek.	2	6	The proposed sewer will connect to a new Lakeshore Road East sewer (under separate Region project) which will cross Cooksville Creek via microtunneling with sufficient clearance below the creek bed. The watercourse will not be directly impacted by construction.	3	9
Impact to Shrubbery and other Vegetation	2	As a majority of the new sewer will be installed using microtunneling, impact to vegetation will be limited. Shrubbery and vegetation will be impacted by the construction compounds and open cut works at MH1 and MH2. Restoration works will be required after construction is complete.	2	4	As a majority of the new sewer will be installed using microtunneling, impact to vegetation will be limited. Shrubbery and vegetation will be impacted by the construction compounds and open cut works at MH1 and MH2. Restoration works will be required after construction is complete.	2	4
Potential for Contamination	2	There is an inherent potential for contamination associated with construction of a new sanitary sewer and decommissioning of existing sanitary sewers.	2	4	There is an inherent potential for contamination associated with construction of a new sanitary sewer and decommissioning of existing sanitary sewers.	2	4
GHG Emissions & Carbon Footprint	2	Greenhouse gases will be emitted by the operation of heavy construction vehicles throughout the duration of construction.	2	4	Greenhouse gases will be emitted by the operation of heavy construction vehicles throughout the duration of construction.	2	4
Sub-Total		**27**			**30**		
Social & Cultural Environment Considerations							
Impact to Cultural Heritage Resources	2	Per the City of Mississauga Natural Areas Survey (2008), the area surrounding the Creek is residential and industrial with no cultural heritage resources identified.	3	6	Per the City of Mississauga Natural Areas Survey (2008), the area surrounding the Creek is residential and industrial with no cultural heritage resources identified.	3	6
Land Use / Zoning Compliance	2	Per Section 2.1.1 of the City of Mississauga Zoning By-law 0225-2007, the proposed sewer construction works are generally exempt from the requirements of the By-law.	3	6	Per Section 2.1.1 of the City of Mississauga Zoning By-law 0225-2007, the proposed sewer construction works are generally exempt from the requirements of the By-law.	3	6
Traffic Impacts during Construction	3	There will be construction vehicle traffic through Beachcomber Road and Beechwood Avenue. As the entry shaft will be located off Beechwood Avenue, traffic impacts to Beachcomber Road will be reduced.	3	9	As the entry shaft will be located off Beachcomber Road, heavy vehicle traffic through Beachcomber Road will be greater than Alternative 3A. There will be traffic disruptions along Lakeshore Road East as MH2 is located in the westbound lanes. A section of the Lakeshore Road East westbound lanes will be closed for the duration of construction, estimated at 6 months. Impacts will require mitigation through scheduling and traffic management.	1	3
Noise Impacts during Construction	3	The entry shaft location has additional spatial and equipment requirements compared to the exit shaft location. As the entry shaft will be located off of Beechwood Avenue, noise impacts to residents on Beachcomber Road will be reduced.	2	6	The entry shaft location has additional spatial and equipment requirements compared to the exit shaft location. As the entry shaft will be located off of Beachcomber Road, there will be greater noise impacts to residents on Beachcomber Road compared to Alternative 3A. In addition, there will be significant noise impacts to the businesses proximate to the construction works along Lakeshore Road East.	1	3

		ALTERNATIVE 3A			ALTERNATIVE 3B		
Dust Impacts during Construction	2	The entry shaft location has additional spatial and equipment requirements compared to the exit shaft location. As the entry shaft will be located off of Beechwood Avenue, dust impacts to residents on Beachcomber Road will be reduced.	2	4	The entry shaft location has additional spatial and equipment requirements compared to the exit shaft location. As the entry shaft will be located off of Beachcomber Road, there will be greater dust impacts to residents on Beachcomber Road compared to Alternative 3A. In addition, there will be significant dust impacts to the businesses proximate to the construction works along Lakeshore Road East.	1	2
Removal of Recreational Space (Private or Public)	2	No removal of recreational space, either private or public, is anticipated.	3	6	No removal of recreational space, either private or public, is anticipated.	3	6
Sub-Total		**37**			**26**		
Economic Considerations							
Capital Costs	3	The high-level conceptual construction cost estimate for the proposed works, including permitting and traffic management is approximately $3,500,000.	3	9	The high-level conceptual construction cost estimate for the proposed works, including permitting and traffic management is approximately $4,000,000. Please note that this cost estimate does not include the cost of the new Lakeshore Road East sewer which will be completed as a separate project.	2	6
Life Cycle (Maintenance) Costs	2	As the design life of a gravity sewer is typically between 80 and 100 years, life cycle (maintenance) costs for a gravity sewer is negligible.	3	6	As the design life of a gravity sewer is typically between 80 and 100 years, life cycle (maintenance) costs for a gravity sewer is negligible.	3	6
Sub-Total		**15**			**12**		
Technical Considerations							
Constructability	3	By situating the entry shaft off of Beechwood Avenue, there will be sufficient space for the construction compound and site access will not be constrained.	3	9	The construction compound for MH2 will be located along Lakeshore Road East, resulting in spatial constraints for the construction compound and site access challenges.	1	3
Impact to Existing Utilities	2	Minimal impact to utilities due to a large portion of construction occurring on or close to the Beachwood SPS site.	3	6	Due to the proximity to Lake Shore East, there is a potential for impact to utilities such as existing communication cable.	2	4
Permits and Approvals	2	Permits and approvals will be required of the MECP for construction of a new sanitary sewer, City of Mississauga for an easement for construction in the Greenlands zone, and the CVC for works in the Cooksville Creek floodplain.	3	6	Permits and approvals will be required of the MECP for construction of a new sanitary sewer, City of Mississauga for road occupancy and an easement for construction in the Greenlands zone, and the CVC for works in the Cooksville Creek floodplain.	3	6
Sub-Total		**21**			**13**		
TOTAL		**100**			**81**		

4 PREFERRED SOLUTION

Alternative 3A is more favourable socially and culturally with significantly less impacts to traffic, dust and noise during construction as compared to Alternative 3B. Alternative 3A was also slightly more favourable from a cost perspective as the total sewer length is shorter and the less traffic management is required than Alternative 3B. From a technical standpoint, Alternative 3A was also more favourable in terms of constructability and impact to existing utilities.

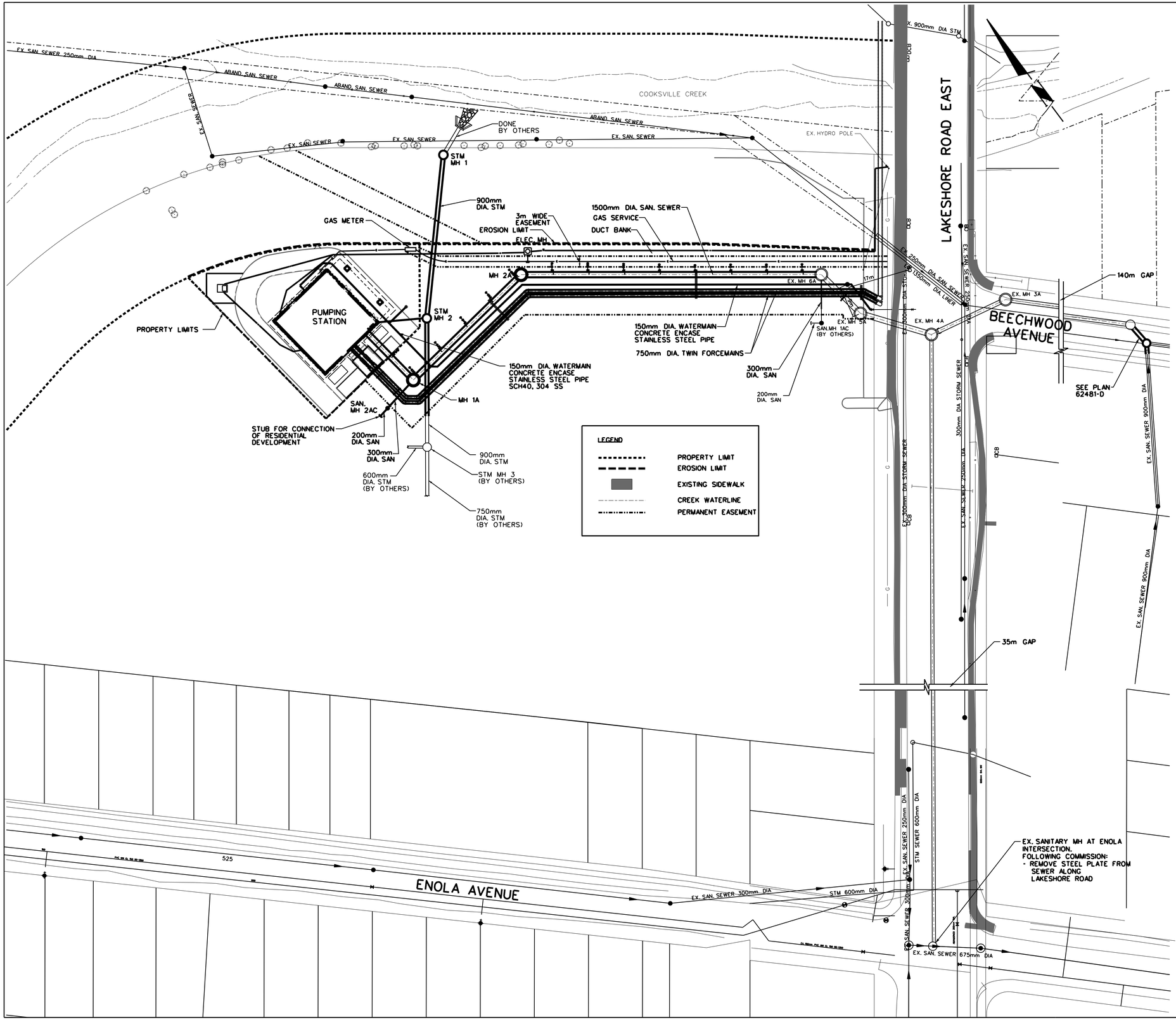
Based on the comparative analysis, Alternative 3A had an overall higher score than Alternative 3B. Thus, Alternative 3A is the preferred alternative solution.

APPENDIX

D EXISTING LINEAR INFRASTRUCTURE

APPENDIX

D-1 *AS-BUILT DRAWINGS FOR BEECHWOOD SPS*

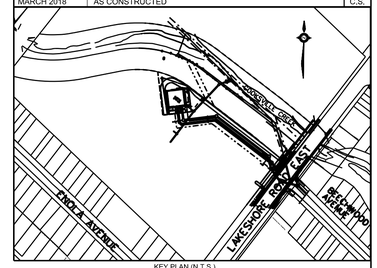


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS	MAY 2017	J.M.	GAS MAINS	MAY 2017	J.M.
STORM SEWERS	MAY 2017	J.M.	BELL U/G CABLE	MAY 2017	J.M.
WATERMAINS	MAY 2017	J.M.	HYDRO U/G CABLE	MAY 2017	J.M.
TRANSIT	MAY 2017	J.M.	HYDRO ONE	MAY 2017	J.M.
PARKS & REC.	MAY 2017	J.M.	CTV	MAY 2017	J.M.
ONT. CLEAN WATER	MAY 2017	J.M.	COMMUNIC. CABLES	MAY 2017	J.M.

REVISIONS

DATE	DETAILS	INIT.
MARCH 2018	AS CONSTRUCTED	C.S.



KEY PLAN (N.T.S.)

ORGINALLY STAMPED AND SIGNED BY IAN FINLAYSON DEC. 2014

Designed by ____ Chkd. ____

Approved by

WSP
600 Cochrane Drive, Suite 500, Markham, ON, L3R 5K3
Telephone: (905) 475-7270 / Fax: (905) 475-5994

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

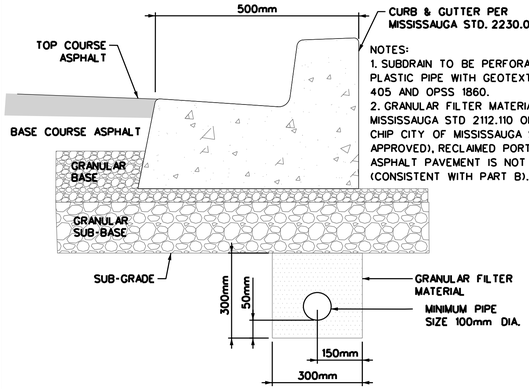
10m 0 10 20 30m SCALE 1:500

Region of Peel
Working for you

CONSTRUCTION OF BEECHWOOD SEWAGE PUMPING STATION

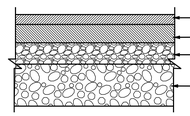
CIVIL OVERALL SITE PLAN

CAD Area	-	Area	Z-07	Project No.	06-2935
Checked by	M.A./C.C.	Drawn by	N.V./K.K.	Plan No.	62474-D
Date	DEC. 2014	Sheet	3 of 127		



NOTES:
1. SUBDRAIN TO BE PERFORATED CORRUGATED PLASTIC PIPE WITH GEOTEXTILE AS PER OPSS 405 AND OPSS 1860.
2. GRANULAR FILTER MATERIAL TO BE CITY OF MISSISSAUGA STD 2112.110 OR 6mm WASHED CHIP CITY OF MISSISSAUGA STD 2112.111 (IF APPROVED). RECLAIMED PORTLAND CEMENT OR ASPHALT PAVEMENT IS NOT ALLOWED. (CONSISTENT WITH PART B).

SUBDRAIN DETAIL
N.T.S.

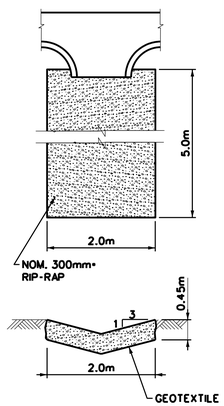


PAVEMENT STRUCTURE DETAIL
N.T.S.

LEGEND

- ASPHALT PAVEMENT
- 80.24 EXISTING GRADE ELEVATION
- X81.80 PROPOSED GRADE ELEVATION
- BARRIER CURB PER CITY OF MISSISSAUGA STD. DWG. 2230.010
- DROPPED CURB
- OVERLAND SHEET FLOW
- GENERAL SLOPE

OPSD 604.010
CURB OUTLET



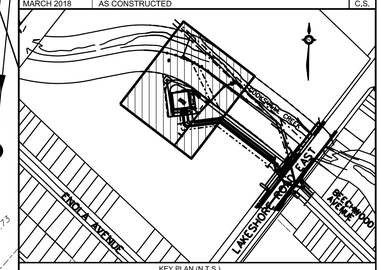
DETAIL 'A'
N.T.S.

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS	MAY 2014	J.M.	GAS MAINS	MAY 2014	J.M.
STORM SEWERS	MAY 2014	J.M.	BELL U/G CABLE	MAY 2014	J.M.
WATERMAINS	MAY 2014	J.M.	HYDRO U/G CABLE	MAY 2014	J.M.
TRANSIT	MAY 2014	J.M.	HYDRO ONE	MAY 2014	J.M.
PARKS & REC.	MAY 2014	J.M.	CTV	MAY 2014	J.M.
ONT. CLEAN WATER	MAY 2014	J.M.	COMMUNIC. CABLES	MAY 2014	J.M.

REVISIONS

DATE	DETAILS	INIT.
MARCH 2018	AS CONSTRUCTED	C.S.



KEY PLAN (N.T.S.)

ORGINALLY STAMPED AND SIGNED BY IAN FINLAYSON DEC 2014

Designed by | Chkd. | Approved by

WSP
600 Cochrane Drive, Suite 500, Markham, ON, L3R 5K3
Telephone: (905) 475-7270 / Fax: (905) 475-5994

NOTICE TO CONTRACTOR
48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL	CABLE TELEVISION/FIBREOPTIC PROVIDERS:
CITY OF MISSISSAUGA WORKS DEPT.	BELL CANADA
CITY OF BRAMPTON WORKS DEPT.	ENERSOURCE TELECOM
TOWN OF CALEDON WORKS DEPT.	HYDRO ONE TELECOM
BELL CANADA	ROGERS CABLE
ENBRIDGE INCORPORATED-GAS DISTRIBUTION	ALLSTREAM
ONTARIO MINISTRY OF TRANSPORTATION	PSN (PUBLIC SECTOR NETWORK)
ONTARIO CLEAN WATER AGENCY	FUTUREWAY (FCI BROADBAND)
HYDRO ONE NETWORKS	
ENERSOURCE, HYDRO MISSISSAUGA	
HYDRO ONE BRAMPTON	

10Om 0 10 20 30m HORIZONTAL SCALE
1m 0 1 2 3m VERTICAL SCALE

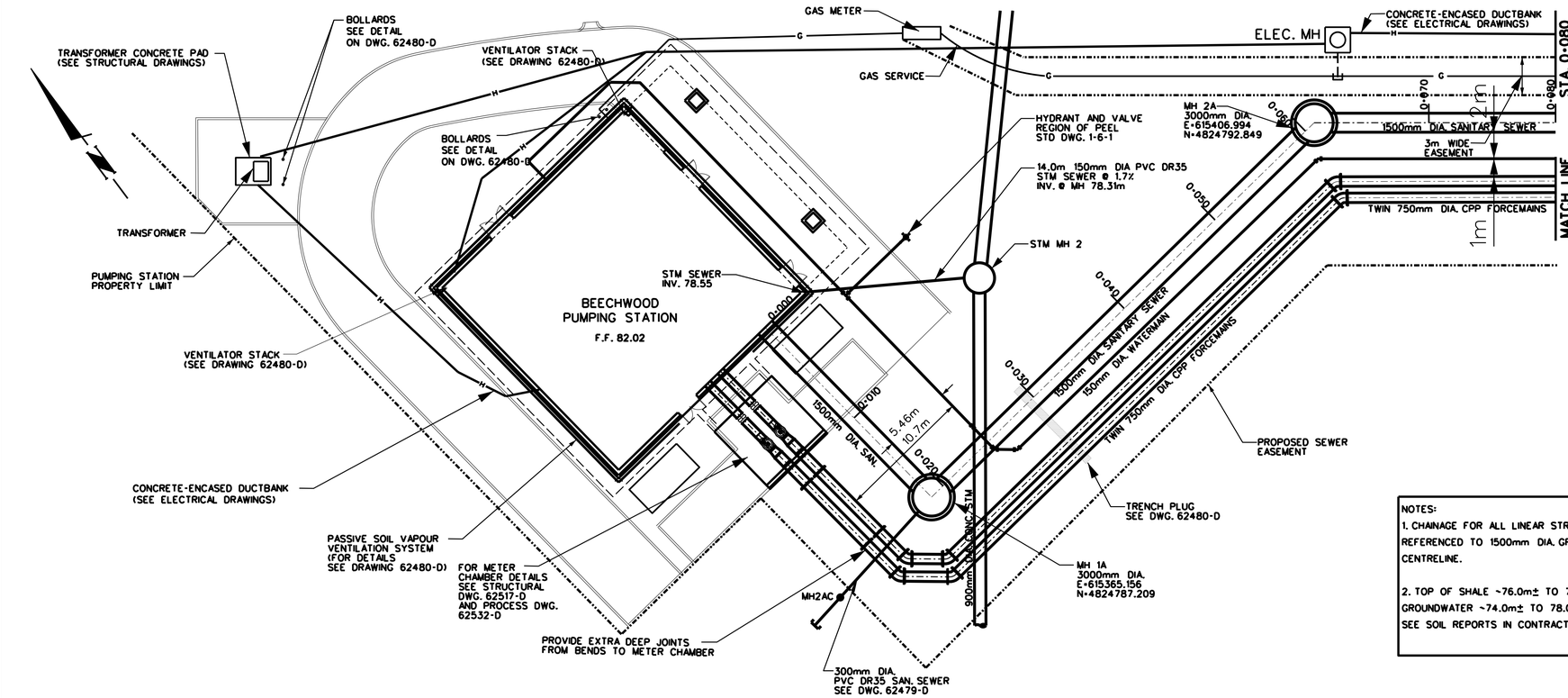
Region of Peel
Working for you

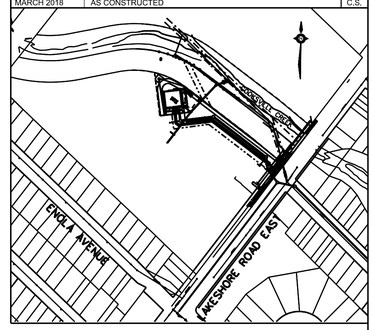
CONSTRUCTION OF BEECHWOOD SEWAGE PUMPING STATION

CIVIL GRADING PLAN

CAD Area	-	Area	Z-07
Checked by	I.F.	Drawn by	K.K./N.V.
Date	DEC. 2014	Sheet	4 of 127

Project No. 06-2935
Plan No. 62475-D





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REVISIONS

DATE	DETAILS	INIT.
MARCH 2018	AS CONSTRUCTED	C.S.

NOTES:
1. CHAINAGE FOR ALL LINEAR STRUCTURES IS REFERENCED TO 1500mm DIA. GRAVITY SEWER CENTRELINE.

2. TOP OF SHALE ~76.0m± TO 78.5m±. GROUNDWATER ~74.0m± TO 78.0m± (June 2013). SEE SOIL REPORTS IN CONTRACT DOCUMENTS.

General Notes

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20C Existing Water Service, Size In mm
WS20 Proposed Water Service, Size In mm
B.M. No, Elev.
Description
Location

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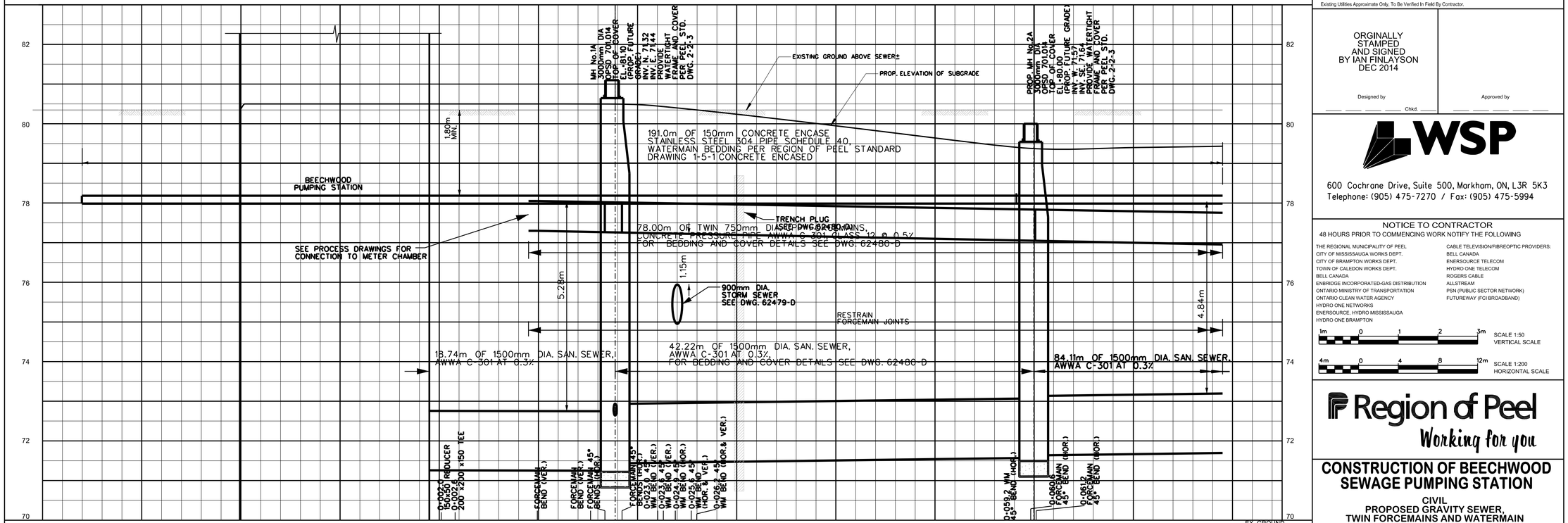

ORGINALLY STAMPED AND SIGNED BY IAN FINLAYSON DEC 2014

Designed by

Chkd.

Approved by

WSP
600 Cochrane Drive, Suite 500, Markham, ON, L3R 5K3
Telephone: (905) 475-7270 / Fax: (905) 475-5994

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

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ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

1m 0 1 2 3m — SCALE 1:50 VERTICAL SCALE

4m 0 4 8 12m — SCALE 1:200 HORIZONTAL SCALE

Region of Peel
Working for you

CONSTRUCTION OF BEECHWOOD SEWAGE PUMPING STATION

CIVIL
PROPOSED GRAVITY SEWER, TWIN FORCEMAINS AND WATERMAIN
PLAN & PROFILE

CAD Area	-	Area	Z-07	Project No.	06-2935
Checked by	M.A./I.F.	Drawn by	K.K./N.V.		
Date	DEC. 2014	Sheet	5 of 127	Plan No.	62476-D

SEE DWG No. 62476-D STA. 0+080

DUCT BANK (SEE ELECTRICAL DRAWINGS)

GAS SERVICE

1.08m

1.39m

3m WIDE EASEMENT

SEWER EASEMENT

0+090 0+100 0+110 0+120 0+130 0+140

TRENCH PLUG SEE DWG. 62480-D

1.05m

1.32m

EX. MH 6A 3000mm DIA.

45° BEND

1500mm DIA. SANITARY SEWER

150mm DIA. STEEL WATERMAIN

TWIN 750mm DIA. CPP FORCEMAINS

VALVE CHAMBER - 1500mm DIA. REGION OF PEEL STD DWG 1-1-5 AND 1-3-1
- 2-200mm CHECK VALVES MISSION DUO-CHECK SERIES 125 OR APPROVED EQUIVALENT WITH T-304 STAINLESS STEEL NUT AND BOLT, CORROSION PROTECTION SYSTEM
- 38mm VALVE AND CONNECTION TO TEMP PS
- 200mm DIA. VALVE

MH1AC

300mm DIA PVC DR35 SAN SEWER SEE DWG. 62479-D

EXISTING TRENCH PLUG TO BE REINSTATED

EX. 1500mm DIA. SAN SEWER

EX. MH 5A 3000mm DIA.

90°

EX. 150mm DIA. PVC WATERMAIN

EX. 600mm DIA. STORM SEWER

EX. VALVE & BOX AND CONNECT STEEL WATERMAIN DOWN STREAM OF THE VALVE & BOX.

EX. GAS

EX. GAS VALVE

EX. 1500mm DIA. SAN SEWER

EX. SIDEWALK

EX. 200mm DIA. WM ABANDONED

EX. 200mm DIA. STEEL GAS

EX. 300mm DIA. WATERMAIN

EX. 900mm DIA. SAN. SEWER

TRENCH PLUG SEE DWG. 62480-D

EX. 250mm DIA. SAN. SEWER

EX. 1350mm DIA. LINER

EX. SAN. SEWER 250mm DIA.

REMOVE EXISTING BULKHEAD AND RELOCATE TO TEMPORARY LOCATION AT STA 0+100

EX. MH 4A 3000mm DIA.

EX. 1200mm DIA SAN. SEWER

PLUG AND ABANDON EX. 250mm DIA. SAN SEWER

EX. SIDEWALK

EX. MH 3A

EX. 1200mm DIA. SAN. SEWER

EX. SAN. SEWER 250mm

BEECHWOOD AVENUE

EX. WATERMAIN

LAKESHORE ROAD

EX. 600mm DIA. CONC. WATERMAIN

300mm DIA STORM SEWER

EX. SIDEWALK

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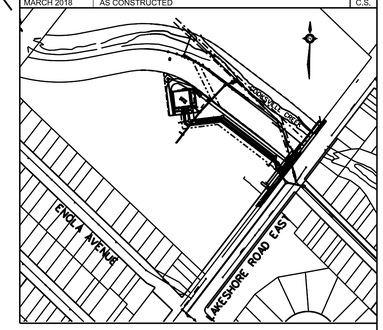

KEY PLAN (N.T.S.)

ELEVATIONS ARE REFERENCED TO CITY OF MISSISSAUGA BENCHMARK No.756 LOCATED ON THE SOUTH FACE AT THE WEST CORNER OF BEIGE BRICK PUMP STATION ON THE SOUTHEAST CORNER OF BEACH STREET AND AVIATION ROAD, HAVING A PUBLISHED ELEVATION OF 78.596m.

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PLAN & PROFILE

82 80 78 76 74 72 70

EX. MH No.6A 3000mm DIA. OPSD 701.014 INV. W. 73.70

EX. MH No.5A 3000mm DIA. OPSD 701.014

EX. TWIN 750mm DIA. FORCEMAINS IN TUNNEL

EX. 200mm DIA. WM ABANDONED

EX. 200mm DIA. STEEL GAS

EX. 300mm DIA. STEEL GAS

EX. 300mm DIA. WM

EX. MH No.4A 3000mm DIA. OPSD 701.014 (OVER EX. 1200mm DIA. SAN. SEWER) ELE. 80.08

EXISTING GROUND ABOVE SEWER±

PROPOSED ELEVATION OF SUBGRADE

155.0m OF 150mm CONCRETE ENCASE STAINLESS STEEL PIPE SCHEDULE 40 WATERMAIN BEDDING PER REGION OF PEEL STANDARD DRAWING 1-5-1 CONCRETE ENCASED

81.20m OF TWIN 750mm DIA. CPP FORCEMAINS, CONCRETE PRESSURE PIPE AWWA C-301 CLASS 12 @ 2.5% FOR BEDDING AND COVER DETAILS SEE DWG. 62480-D

TRENCH PLUG (SEE DWG. 62480-D)

RESTRAIN FORCEMAIN JOINTS

4.83m

84.11m OF 1500mm DIA. CONCRETE SAN. SEWER, AWWA C-301 AT 0.3%

FOR BEDDING AND COVER DETAILS, SEE DWG. 62480-D

INV. 73.152m

4.64m

EX. 1500mm DIA. SAN. SEWER

EX. 1500mm DIA. SAN. SEWER

EXISTING 750mm DIA CPP ELBOWS CPP AWWA C-301

EX. 150mm DIA. WM

EX. INV. EL. 76.60

EX. 1200mm DIA. SAN. SEWER

BREAK INTO AND CONNECT TO EX. MH AT ELEV. 71.89 BENCH PER REGION OF PEEL STD. DWG. 2-1-4

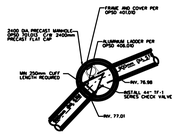
0+152.4 VCH
0+153.5 WM 45° BEND (HOR.)
0+156.6 SAN. 28.70 BEND (HOR.)
0+157.1 SAN. 28.70 BEND (HOR.)
0+160.5 WM 45° BEND (HOR.)

80.35

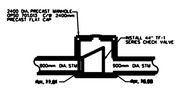
EX. GROUND ABOVE SEWER
TOP OF WATERMAIN
TOP OF FORCEMAIN

0+080 0+090 0+100 0+110 0+120 0+130 0+140 0+145.07 0+150 0+160 0+170 0+180 0+190 0+200 SEWER CHAINAGE

CAD Area	-	Area	Z-07	Project No.	06-2935
Checked by	M.A./I.F.	Drawn by	K.K./N.V.	Plan No.	62477-D
Date	JAN. 2014	Sheet	6 of 127		



STM MH1 BENCHING DETAIL
SCALE: 1:100



STM MH1 SECTION DETAIL
SCALE: 1:100

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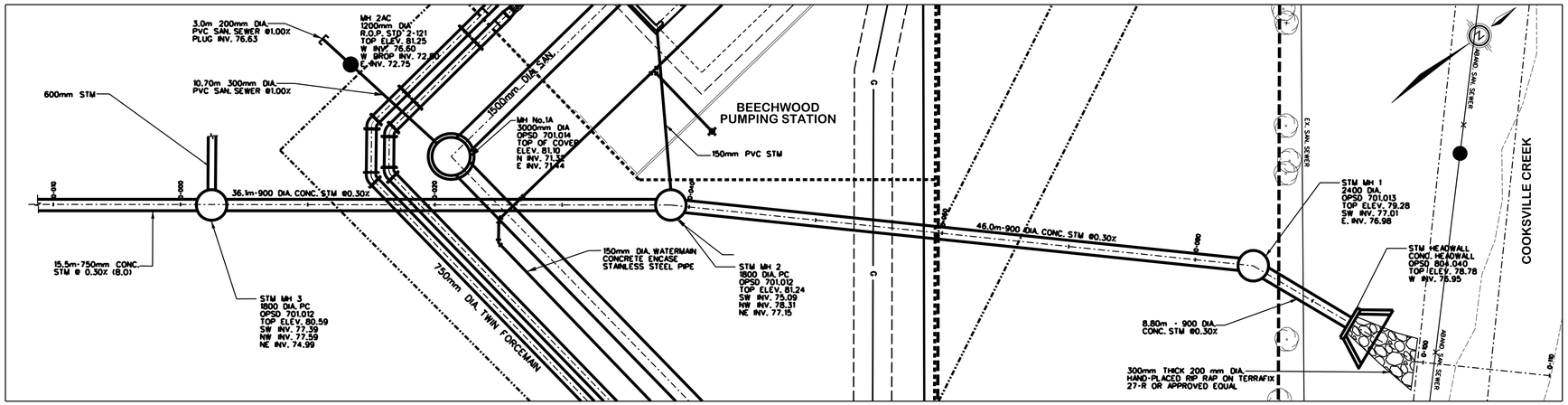

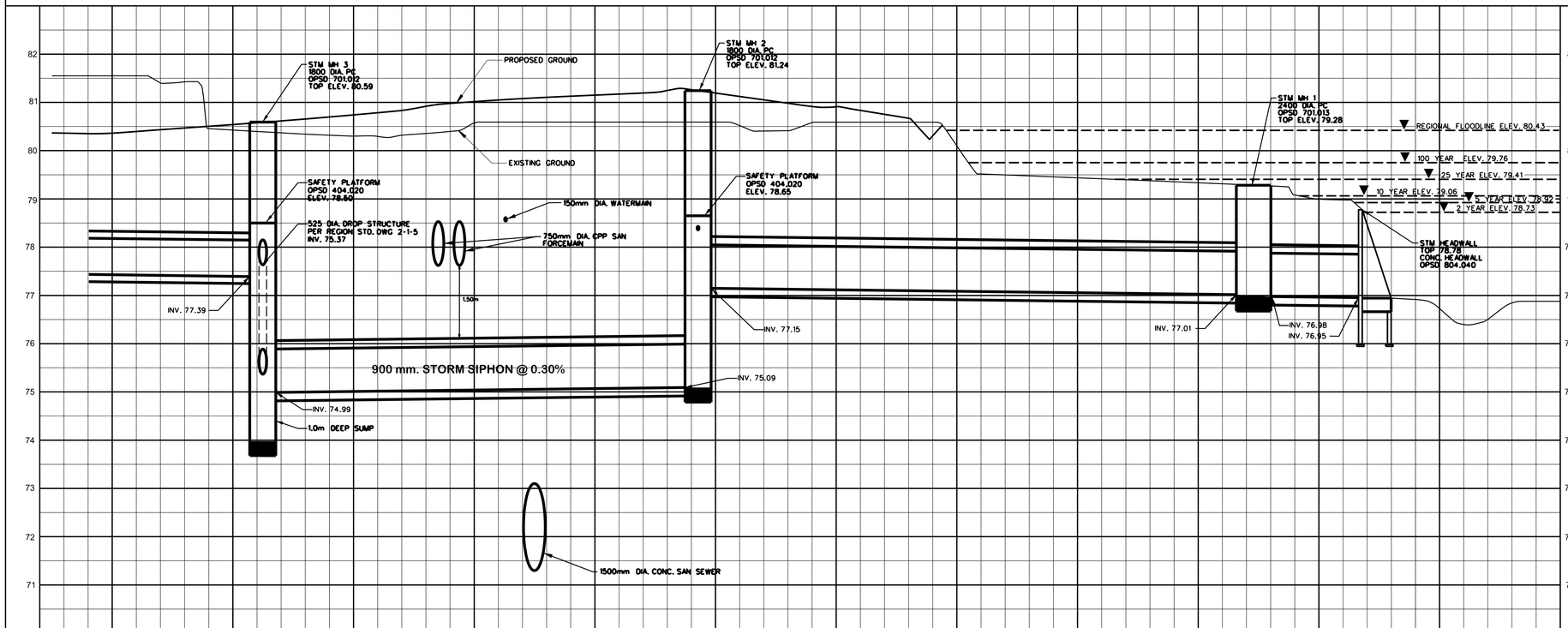

0-010 | 0+000 | 0+010 | 0+020 | 0+030 | 0+040 | 0+050 | 0+060 | 0+070 | 0+080 | 0+090 | 0+100 ROAD CHAINAGE

INV.ELEVATIONS

SERVICE DATA

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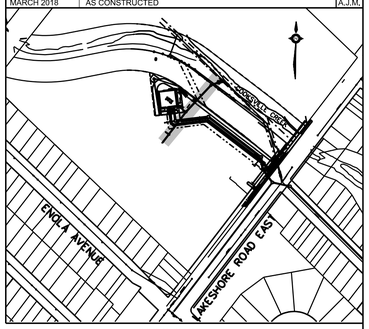
REVISIONS

DATE	DETAILS	INIT.
MARCH 2018	AS CONSTRUCTED	A.J.M.



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ORGINALLY STAMPED AND SIGNED BY AMANDA MOCK MAY 2015

Designed by

Chkd.

Approved by

MMM GROUP
100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1
t: 905.882.1100 f: 905.882.0055 www.mmm.ca

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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel
Working for you

CONSTRUCTION OF BEECHWOOD SEWAGE PUMPING STATION

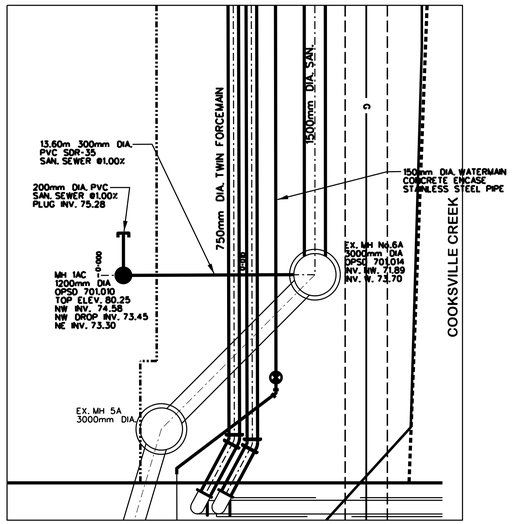
CIVIL
900mm STORM SEWER
PLAN AND PROFILE

STA. 0-010 TO STA. 0+100

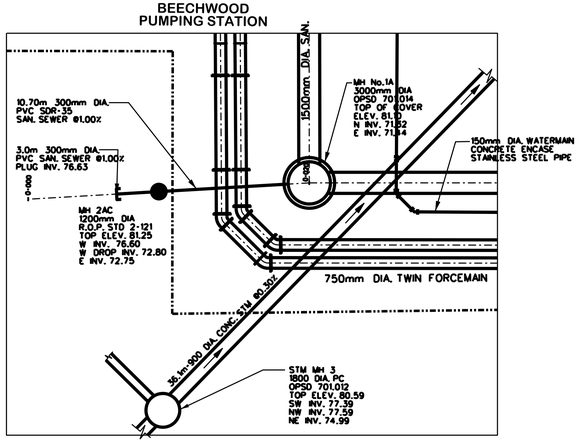
CAD Area	-	Area	Z-07
Checked by	A.J.M.	Drawn by	CAD 10/12
Date	DEC. 2014	Sheet	7 of 127

Project No. 06-2935

Plan No. **62478-D**



LAKESHORE ROAD EAST



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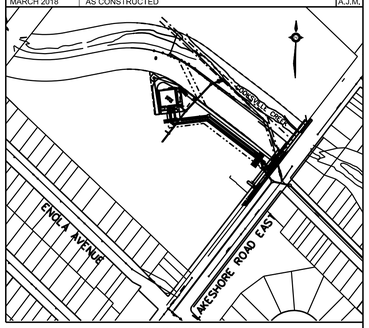

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ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

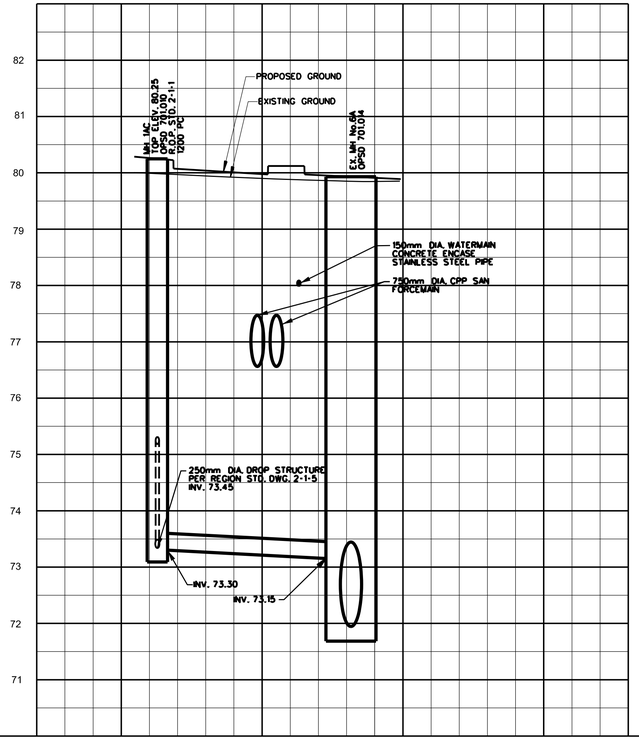
10m 0 10 20 30m 1:200 HORIZONTAL SCALE

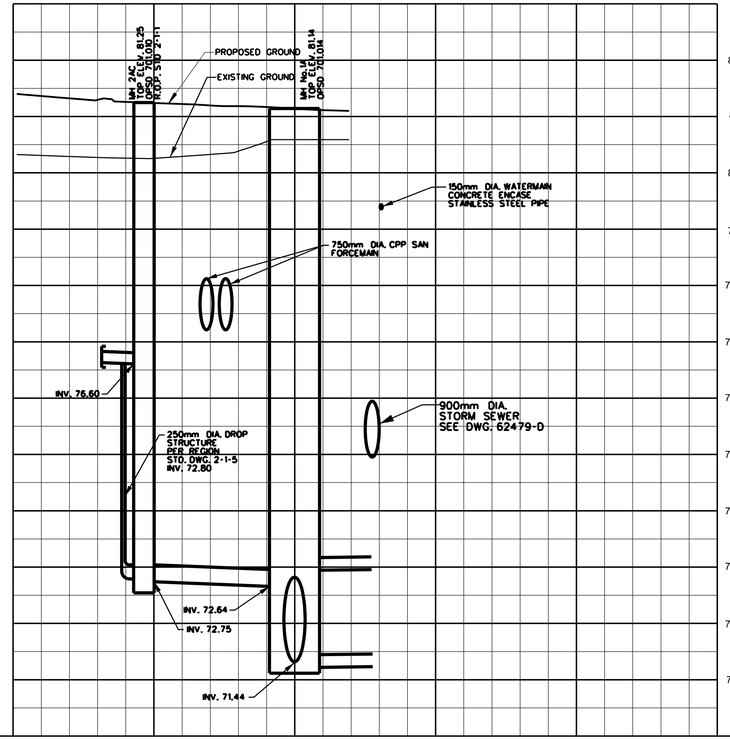
1m 0 1 2 3m 1:50 VERTICAL SCALE

Region of Peel
Working for you

CONSTRUCTION OF BEECHWOOD SEWAGE PUMPING STATION

CIVIL
PROPOSED 300mm SANITARY SEWER PLAN & PROFILE

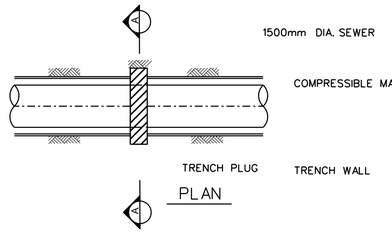




INV.ELEVATIONS

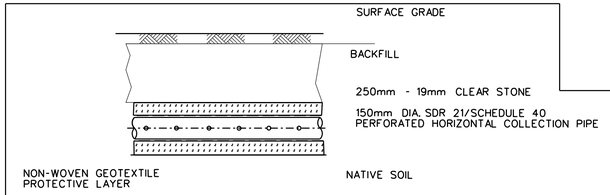
ROAD CHAINAGE

CAD Area	-	Area	Z-07	Project No.	06-2935
Checked by	A.J.M.	Drawn by	CAD 10/12		
Date	DEC. 2014	Sheet	8 of 127	Plan No.	62479-D

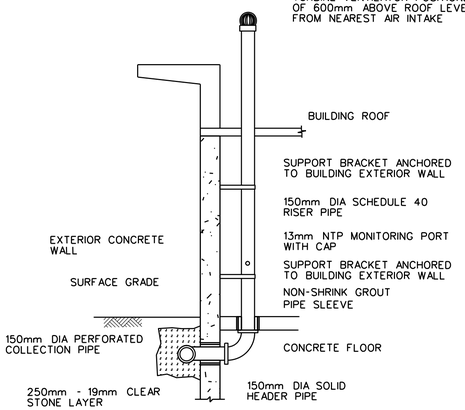


TRENCH PLUG DETAILS

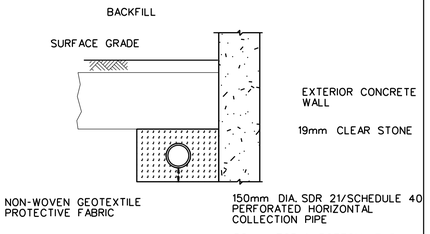
N.T.S.



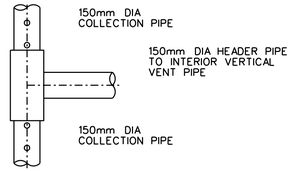
HORIZONTAL TRENCH SECTION



VERTICAL VENT RISER PIPE AND WIND TURBINE VENTILATOR TO PASSIVE SYSTEM



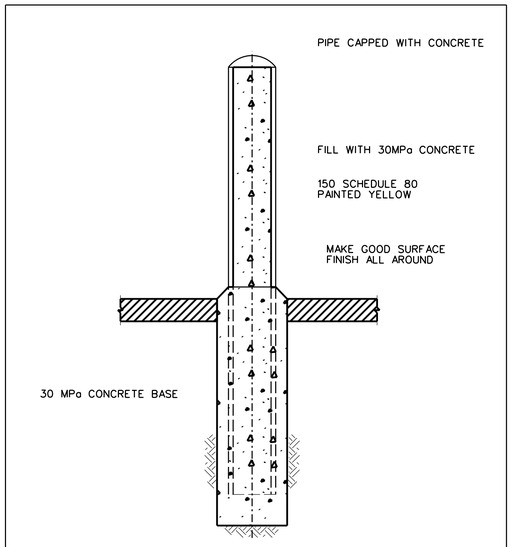
HORIZONTAL COLLECTION TRENCH CROSS SECTION



COLLECTION PIPE - HEADER PIPE BRANCH TEE CONNECTOR

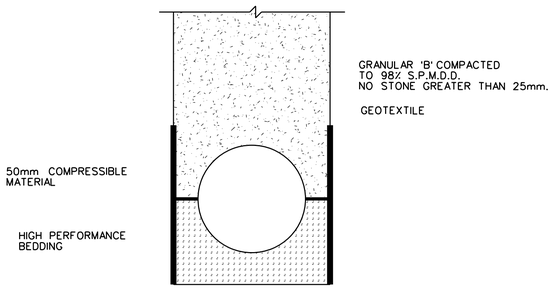
SEWAGE PUMPING STATION
PASSIVE SOIL VAPOUR VENTILATION SYSTEM DETAIL

N.T.S.



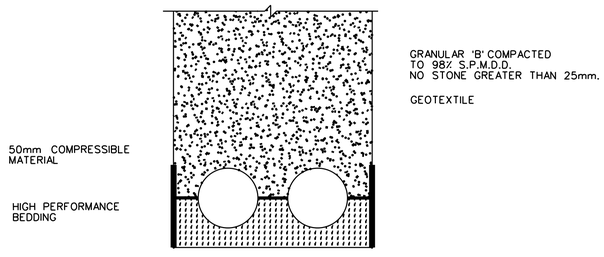
BOLLARD

N.T.S.



GRAVITY SEWER BEDDING DETAIL

N.T.S.



TWIN FORCEMAIN BEDDING DETAIL

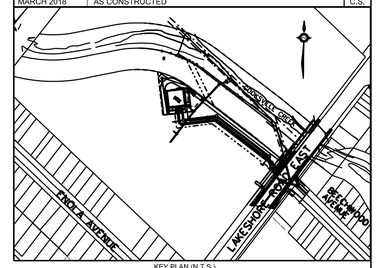
N.T.S.

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS	MAY 2017	J.M.	GAS MAINS	MAY 2017	J.M.
STORM SEWERS	MAY 2017	J.M.	BELL U/G CABLE	MAY 2017	J.M.
WATERMAINS	MAY 2017	J.M.	HYDRO U/G CABLE	MAY 2017	J.M.
TRANSIT	MAY 2017	J.M.	HYDRO ONE	MAY 2017	J.M.
PARKS & REC.	MAY 2017	J.M.	CTV	MAY 2017	J.M.
ONT. CLEAN WATER	MAY 2017	J.M.	COMMUNIC. CABLES	MAY 2017	J.M.

REVISIONS

DATE	DETAILS	INIT.
MARCH 2018	AS CONSTRUCTED	C.S.



KEY PLAN (N.T.S.)

ORGINALLY
STAMPED
AND SIGNED
BY IAN FINLAYSON
DEC 2014

Designed by

Approved by

Chkd.

WSP
600 Cochrane Drive, Suite 500, Markham, ON, L3R 5K3
Telephone: (905) 475-7270 / Fax: (905) 475-5994

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m — HORIZONTAL SCALE
1m 0 1 2 3m — VERTICAL SCALE

Region of Peel
Working for you

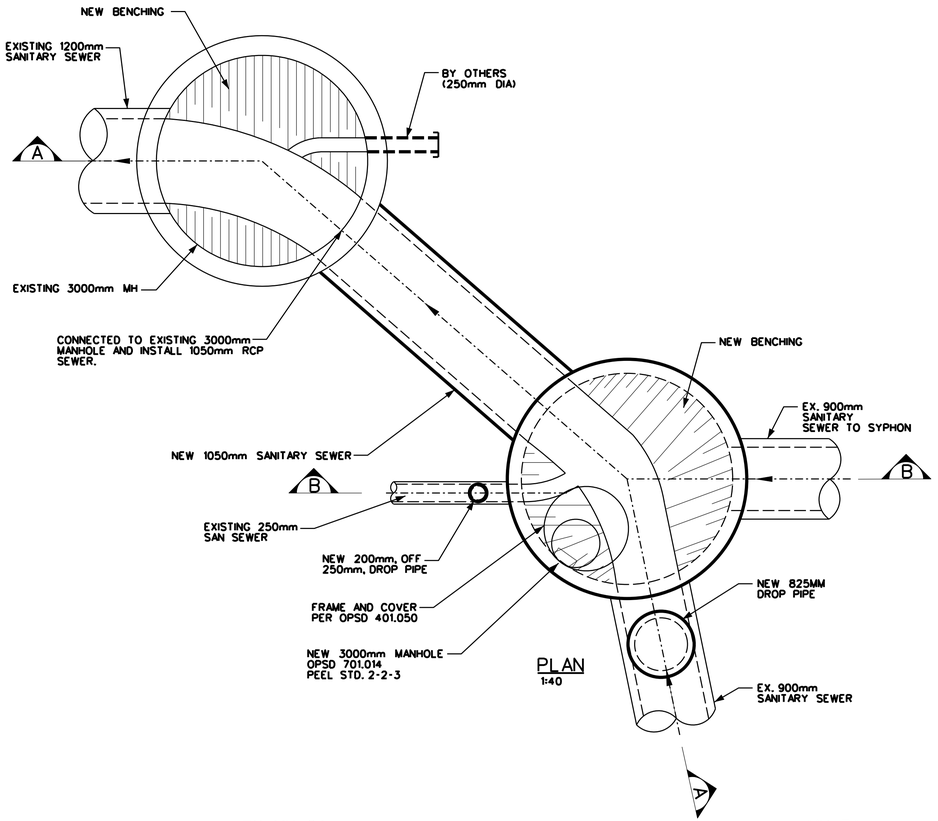
CONSTRUCTION OF BEECHWOOD SEWAGE PUMPING STATION

DETAILS

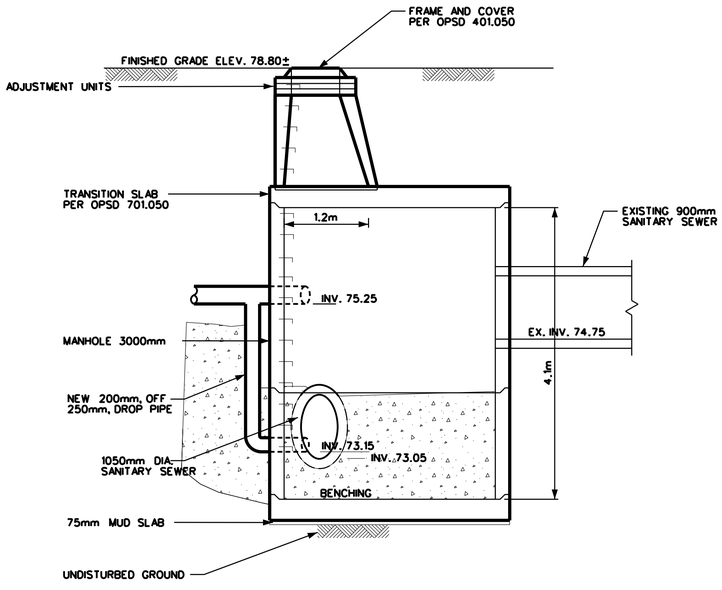
CAD Area	-	Area	Z-07
Checked by	I.F.	Drawn by	N.V.
Date	DEC. 2014	Sheet	9 of 127

Project No. 06-2935

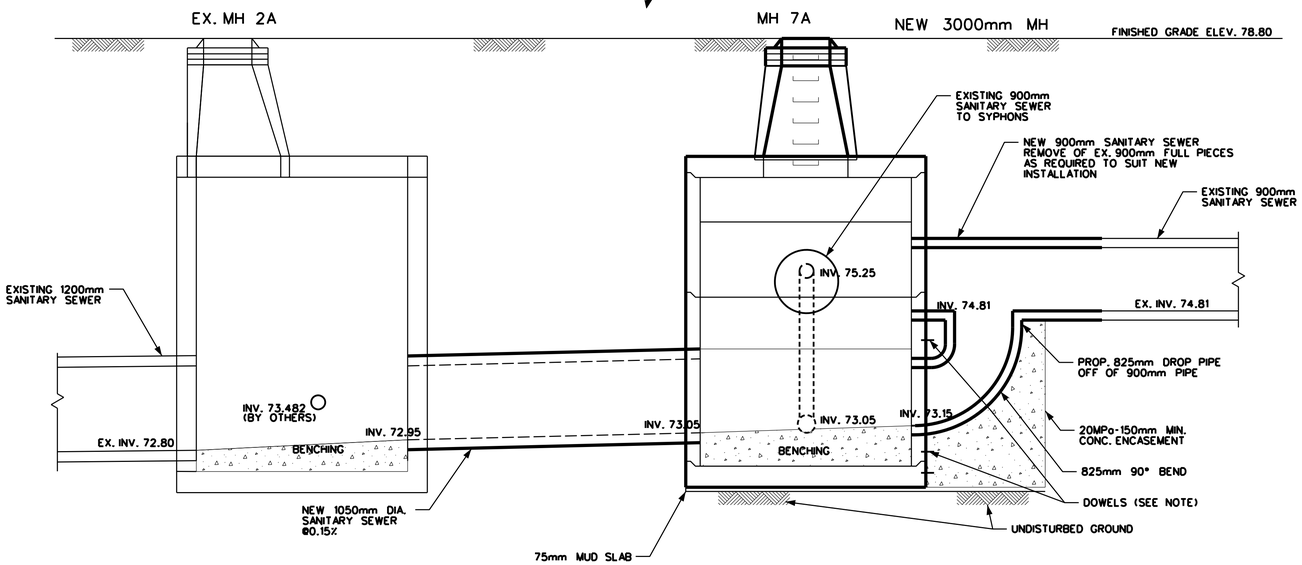
Plan No. **62480-D**



PLAN
1:40



SECTION B



SECTION A

NOTE:
DROP STRUCTURES TO BE ENCASED IN A MINIMUM OF 150mm OF 20MPa CONCRETE AND DOWELLED TO MANHOLE WITH 12mm DIA. DOWELS, 450mm LONG, EITHER SIDE OF DROP PIPE AND AT 300mm CENTER TO CENTER.

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS	MAY 2017	J.M.	GAS MAINS	MAY 2017	J.M.
STORM SEWERS	MAY 2017	J.M.	BELL U/G CABLE	MAY 2017	J.M.
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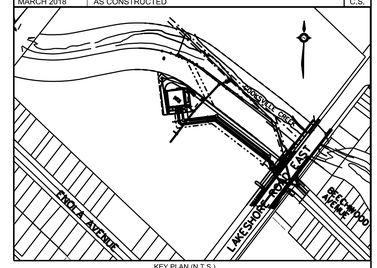
TRANSIT	MAY 2017	J.M.	HYDRO ONE	MAY 2017	J.M.
PARKS & REC.	MAY 2017	J.M.	CTV	MAY 2017	J.M.
ONT. CLEAN WATER	MAY 2017	J.M.	COMMUNIC. CABLES	MAY 2017	J.M.

REVISIONS

DATE	DETAILS	INIT.
MARCH 2018	AS CONSTRUCTED	C.S.



KEY PLAN (N.T.S.)

GENERAL NOTES:

1. PROVIDE TEMPORARY PUMPING TO ENSURE EXCAVATION AREA DRY DURING CONSTRUCTION.
2. DIMENSIONS IN MILLIMETERS: ELEVATION IN METERS.
3. ALL STRUCTURES TO BE FOUNDED ON UNDISTURBED GROUND.
4. CONTRACTOR TO CONFIRM INVERTS IN EX. MANHOLES AND HORIZONTAL DISTANCES. REPORT ANY DISCREPANCY TO THE CONSULTANT PRIOR TO STARTING WORK.
5. TRAFFIC AND DRIVEWAY ACCESS TO BE MAINTAINED AT ALL TIMES.
6. ALL EXISTING UTILITIES TO BE LOCATED AND PROTECTED DURING THE WORK.
7. ALL SUPPORT FOR EXISTING UTILITIES SHALL CONFORM TO THE STANDARDS OF THE OWNER OF THE UTILITY.
8. EXISTING SANITARY SERVICE TO BE MAINTAINED THROUGHOUT CONSTRUCTION.

ORGINALLY STAMPED AND SIGNED BY IAN FINLAYSON DEC 2014

Designed by

Chkd.

Approved by

WSP
600 Cochrane Drive, Suite 500, Markham, ON, L3R 5K3
Telephone: (905) 475-7270 / Fax: (905) 475-5994

NOTICE TO CONTRACTOR
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ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

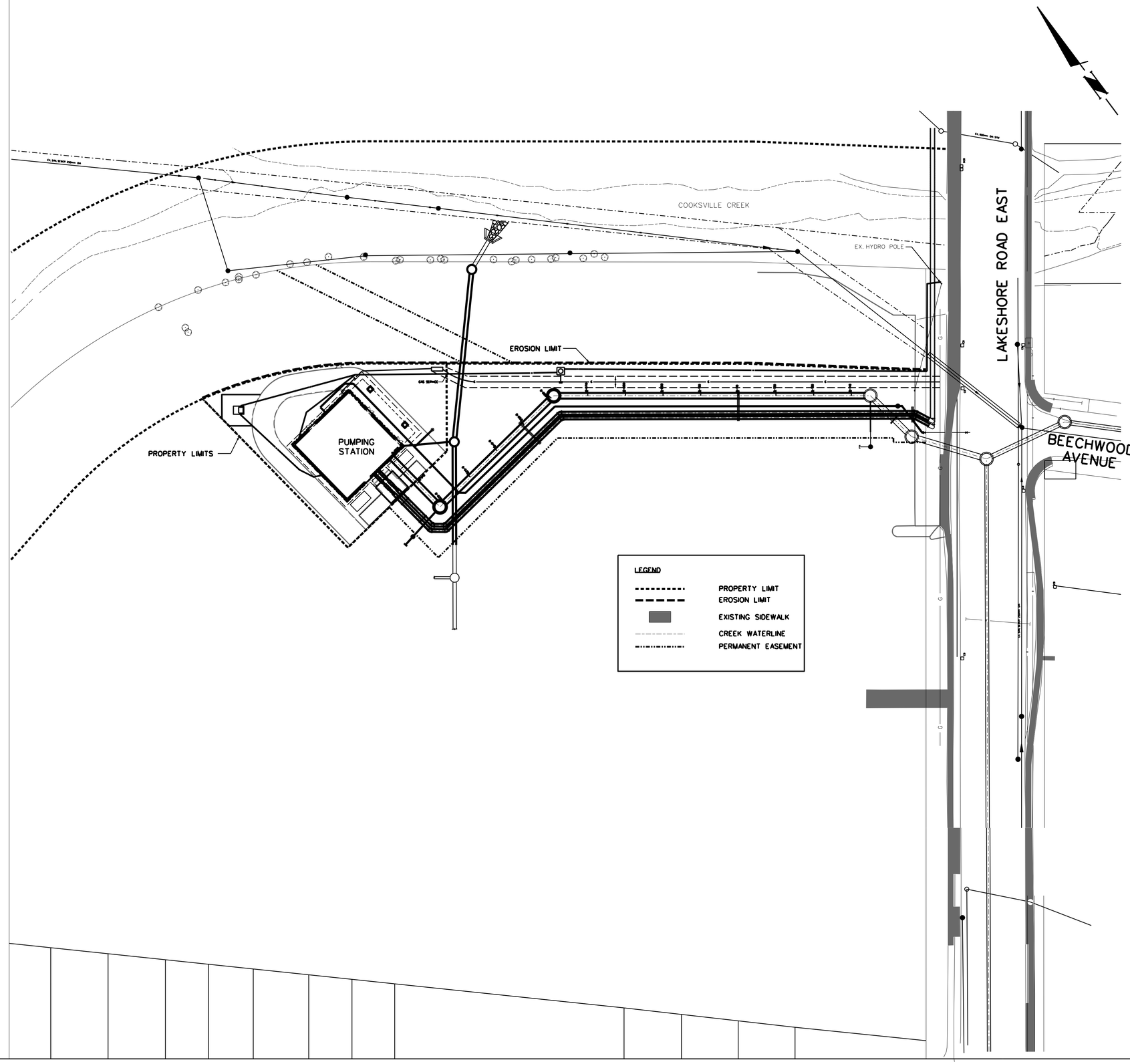
Region of Peel
Working for you

CIVIL

PROPOSED BEECHWOOD AVE. 3000mm MANHOLE 7A

CAD Area	-	Area	Z-07
Checked by	C.S.	Drawn by	B.P.
Date	JUNE 2016	Sheet	10 of 127

Project No. 06-2935
Plan No. 62481-D



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SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
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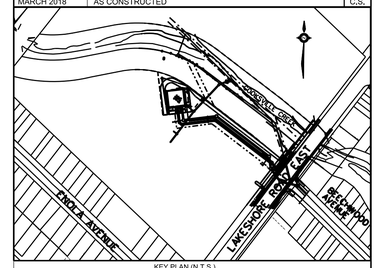
STORM SEWERS	MAY 2017	J.M.	BELL U/G CABLE	MAY 2017	J.M.
WATERMAINS	MAY 2017	J.M.	HYDRO U/G CABLE	MAY 2017	J.M.
TRANSIT	MAY 2017	J.M.	HYDRO ONE	MAY 2017	J.M.
PARKS & REC.	MAY 2017	J.M.	CTV	MAY 2017	J.M.
ONT. CLEAN WATER	MAY 2017	J.M.	COMMUNIC. CABLES	MAY 2017	J.M.

REVISIONS

DATE	DETAILS	INIT.
MARCH 2018	AS CONSTRUCTED	C.S.



KEY PLAN (N.T.S.)

ORGINALLY STAMPED AND SIGNED BY IAN FINLAYSON DEC. 2014

Designed by

Chkd.

Approved by

WSP
600 Cochrane Drive, Suite 500, Markham, ON, L3R 5K3
Telephone: (905) 475-7270 / Fax: (905) 475-5994

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ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m SCALE 1:500

Region of Peel
Working for you

BEECHWOOD SEWAGE PUMPING STATION

CIVIL OVERALL SITE PLAN

CAD Area	-	Area	Z-07
Checked by	M.A./C.C.	Drawn by	N.V./K.K.
Date	FEB. 2015	Sheet	11 of 127

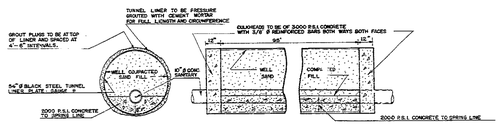
Project No. 06-2935

Plan No. 62482-D

APPENDIX

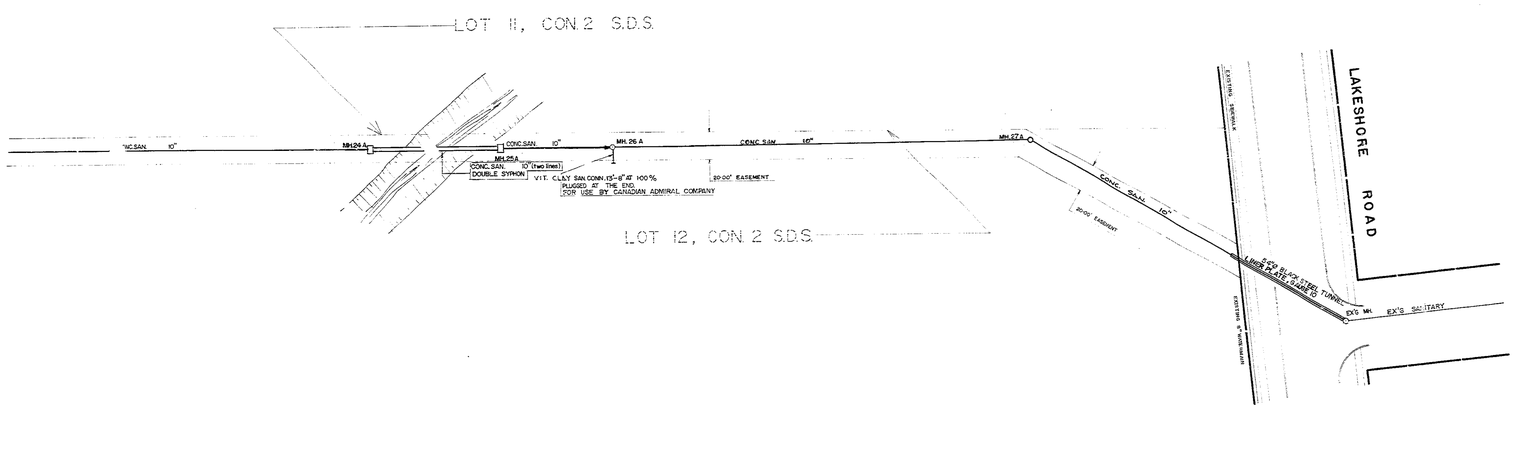
D-2 *AS-BUILT DRAWINGS FOR THE CLAREDALE SANITARY CATCHMENT AREA AND SIPHONS*

DETAIL OF BLACK STEEL TUNNEL LINER
FOR SANITARY SEWER UNDER LAKESHORE ROAD (HWY. Nº 2)



TUNNEL CROSS-SECTION
SHOWING PIPE BEDDING
SCALE: 1/4" = 1'-0"

LONGITUDINAL SECTION THROUGH TUNNEL
SHOWING BULKHEADS
SCALE: 1/4" = 1'-0"



SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		

REVISIONS

DATE	DETAILS	INIT.
JUNE 22/70	"AS CONSTRUCTED"	T.J.

SANITARY SEWER DATA

1. ALL CONCRETE PIPES SHALL BE A.S.T.M. C-14-61 EXTRA STRENGTH.
2. ALL A.C. PIPES SHALL BE CLASS 2400
3. ALL PIPES WITH PRIME RUBBER GASKETS WITHOUT MORTAR
4. BEDDING AS PER TWP. STD. DWG. A-5508, TYPE AS SHOWN ON THE PROFILE
5. MANHOLES AS SHOWN PROFILE

NOTE

(285·5) DENOTES EXISTING ELEVATIONS
285·5 DENOTES PROPOSED ELEVATIONS

GENERAL NOTES

— ALL DRIVEWAYS GRAVEL UNLESS OTHERWISE NOTED.
— ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
— ⊕ DENOTES BUILDING — NOT LOCATED.
— ℄ DENOTES BUILDING LOCATED.
— T.T.B.M. No. 76 ELEV. 285·16
— TEMP. BENCH MARK ELEV.
DESCRIPTION

DESIGNED BY | APPROVED BY
CHKD

F. SCHAEFFER & ASSOCIATES LIMITED
CONSULTING MUNICIPAL ENGINEERS
482 WILSON AVENUE, DOWNSVIEW, ONTARIO, PHONE 630-5484

TOWNSHIP OF TORONTO
COUNTY OF PEEL
ENGINEERING DEPARTMENT

PLAN AND PROFILE
ON
EASEMENT
STN. 0+00 TO STN. 7+70

PART OF LOT 12	CON. 2 S.D.S.	PROJECT NO. 42-65
SCALE HOR. 1"=40' VERT. 1"=4'	DRAWN BY S. MRACIC	CHECKED BY D.COTTLE/R.EES
DATE NOVEMBER, 1965	SHEET 10 OF 12	PLAN NO. C-8481

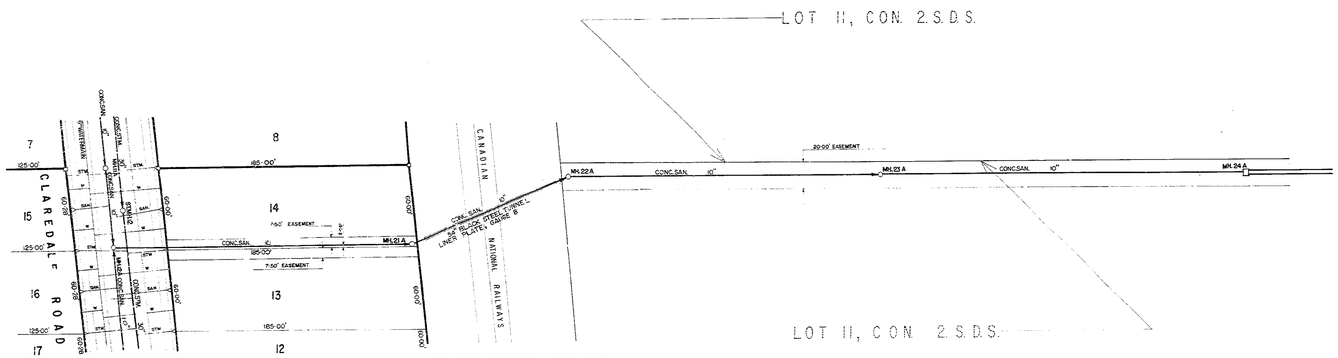
C-8481

SERVICE DATA

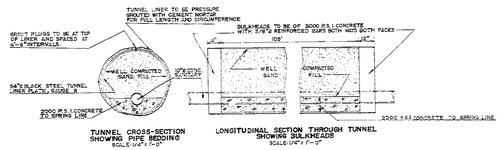
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		

REVISIONS

DATE	DETAILS	INIT.
JUNE 22/67	"AS CONSTRUCTED"	T.J.



DETAIL OF BLACK STEEL TUNNEL LINER
FOR SANITARY SEWER UNDER RAILWAY



TUNNEL CROSS-SECTION SHOWING PIPE BEDDING
SCALE: 1/4"= 1'-0"

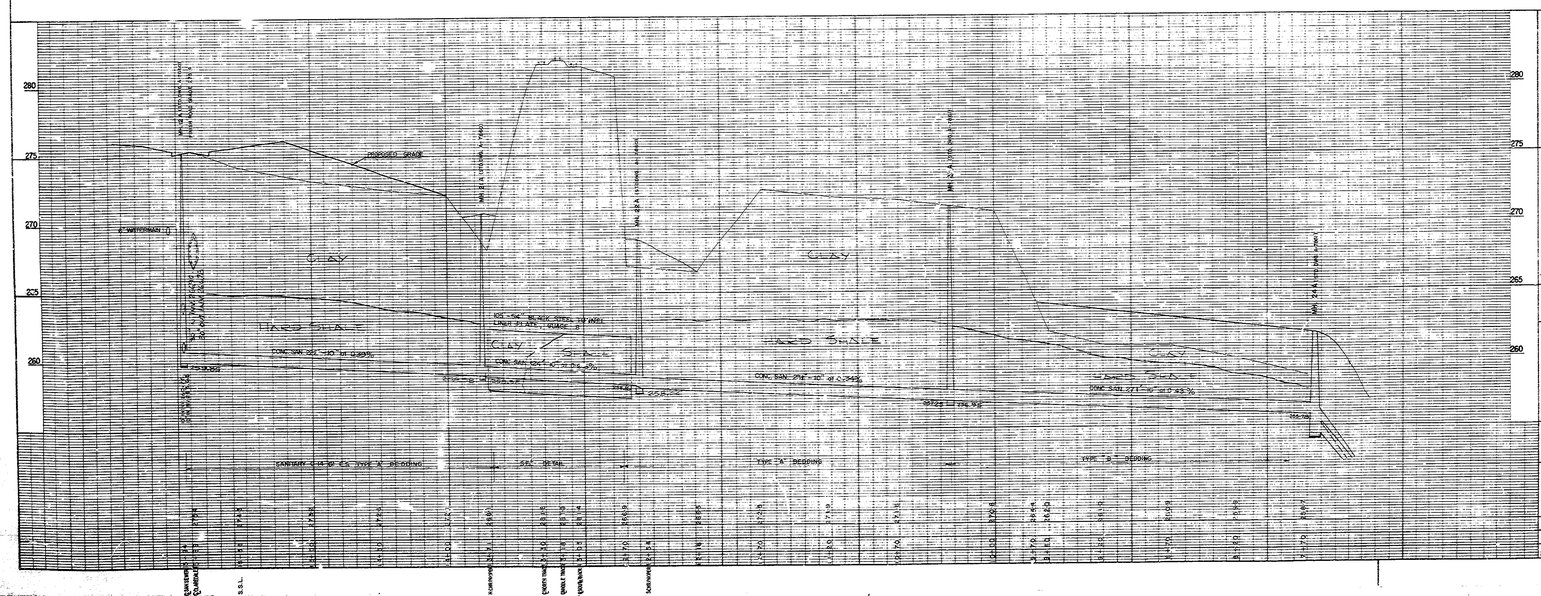
LONGITUDINAL SECTION THROUGH TUNNEL SHOWING BULKHEADS
SCALE: 1/4"= 1'-0"

SANITARY SEWER DATA

1. ALL CONCRETE PIPES SHALL BE A.S.T.M. C-14-61 EXTRA STRENGTH.
2. ALL A.C. PIPES SHALL BE CLASS 2400
3. ALL PIPES WITH PRIME RUBBER GASKETS WITHOUT MORTAR
4. BEDDING AS PER T.W.S.T.D. NO. 4-2001 TYPE AS SHOWN ON THE PROFILE.
5. MANHOLES AS SHOWN ON PROFILE.

NOTE

(285·5) DENOTES EXISTING ELEVATIONS
285·5 DENOTES PROPOSED ELEVATIONS



GENERAL NOTES

- ALL DRIVEWAYS GRAVEL UNLESS OTHERWISE NOTED.
- ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY ON FIELD.
- ● DENOTES BUILDING — NOT LOCATED.
- ■ DENOTES BUILDING LOCATED.
- T.T.B.M. No. 78 ELEV 285·18
- TEMP. BENCH MARK ELEV.
  DESCRIPTION

DESIGNED BY _____ CHKD. _____

APPROVED BY _____

F. SCHAEFFER & ASSOCIATES LIMITED
CONSULTING MUNICIPAL ENGINEERS
485 WILSON AVENUE, DOWNSVIEW, ONTARIO, PHONE 635-5424

TOWNSHIP OF TORONTO
COUNTY OF PEEL
ENGINEERING DEPARTMENT

PLAN AND PROFILE
ON
EASEMENT
STN. 7+70 TO STN. 15+94

PART OF LOT 12	CON. / S.D.S.	PROJECT NO. 42-65
SCALE HOR. 1"= 40' VERT. 1"= 4'	DRAWN BY E.M.MACK	CHECKED END.GOTTLIEB/PENG
DATE NOVEMBER, 1965	SHEET 9 OF 12	PLAN NO. C-8482

C-8482

SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		

REVISIONS		
DATE	DETAILS	INIT.
NOV/81	"AS CONST" STORM	VP
	MICROFILMED	

NORTH

SPUR TRACK

CANADIAN JOHNS MANSVILLE COMPANY LIMITED

TOPSOIL & SEED
STA 30+00 TO STA 32+70

30+00

℄ 10'.0 x 5'.0 TWIN BOX CULVERT

INSTALL GABION BASKETS (1'.0 THICK) TO MATCH EXISTING CREEK BANK AND FLOOR

ACCESS ROAD

LAKSHORE ROAD

T/E

P/E

R/W

48 49 50 51 52

17'.5

17'.5

B' C.L.F.

ABANDONED SANITARY SEWER

TRANSITION
7'.0 x 7'.0 to 10'.0 x 5'.0

B.C. 32+33
100'R
E.C. 32+70

COOKSVILLE CREEK

THE CANADIAN ADMIRAL CORP. LTD.

B.M. No.4 Elev. 268.81
Nail in 0'.5 Maple stump
Sta 30+80 o/s 33' Lt.

LIMIT OF CONTRACT
STA 33+50

EXISTING GROUND

TRANSITION
7'.0 x 7'.0 to 10'.0 x 5'.0

EXP. JT.

10'.0 x 5'.0 TWIN-BOX CULVERT

APPROX. ROCK LINE

COOKSVILLE CREEK

275 270 265 260 255 250 245

℄ INVERT ELEVATIONS TWIN BOX CULVERT

	261.65		259.45		255.65				
+	30+00	31+00		32+00	33+00	34+00	35+00	36+00	+

GENERAL NOTES

- ALL DRIVEWAYS GRAVEL UNLESS OTHERWISE NOTED.
- ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
- ● DENOTES BUILDING - NOT LOCATED
- □ DENOTES BUILDING LOCATED
- T.T.B.M. No. ELEV.
- TEMP BENCH MARK ELEV. DESCRIPTION.

REGISTERED PROFESSIONAL ENGINEER
J. L. MALCOLM
PROVINCE OF ONTARIO

DESIGNED BY | APPROVED BY

CHKD.

McCORMICK, RANKIN & ASSOCIATES
LIMITED
CONSULTING ENGINEERS
MISSISSAUGA OTTAWA

CAWTHRA CREEK DIVERSION
ATWATER AVENUE TO LAKESHORE ROAD

CITY OF MISSISSAUGA
ENGINEERING DEPARTMENT

PLAN AND PROFILE

STN. 30+00 TO STN. 33+00

SCALE HOR 1" = 40' VERT 1" = 4'	AREA	PROJECT NO. PN76-054	
DRAWN BY B.J.H.	CHECKED BY B.J.H.	PLAN NO. C-14 575	
DATE APRIL 1976	SHEET 4 OF 27		

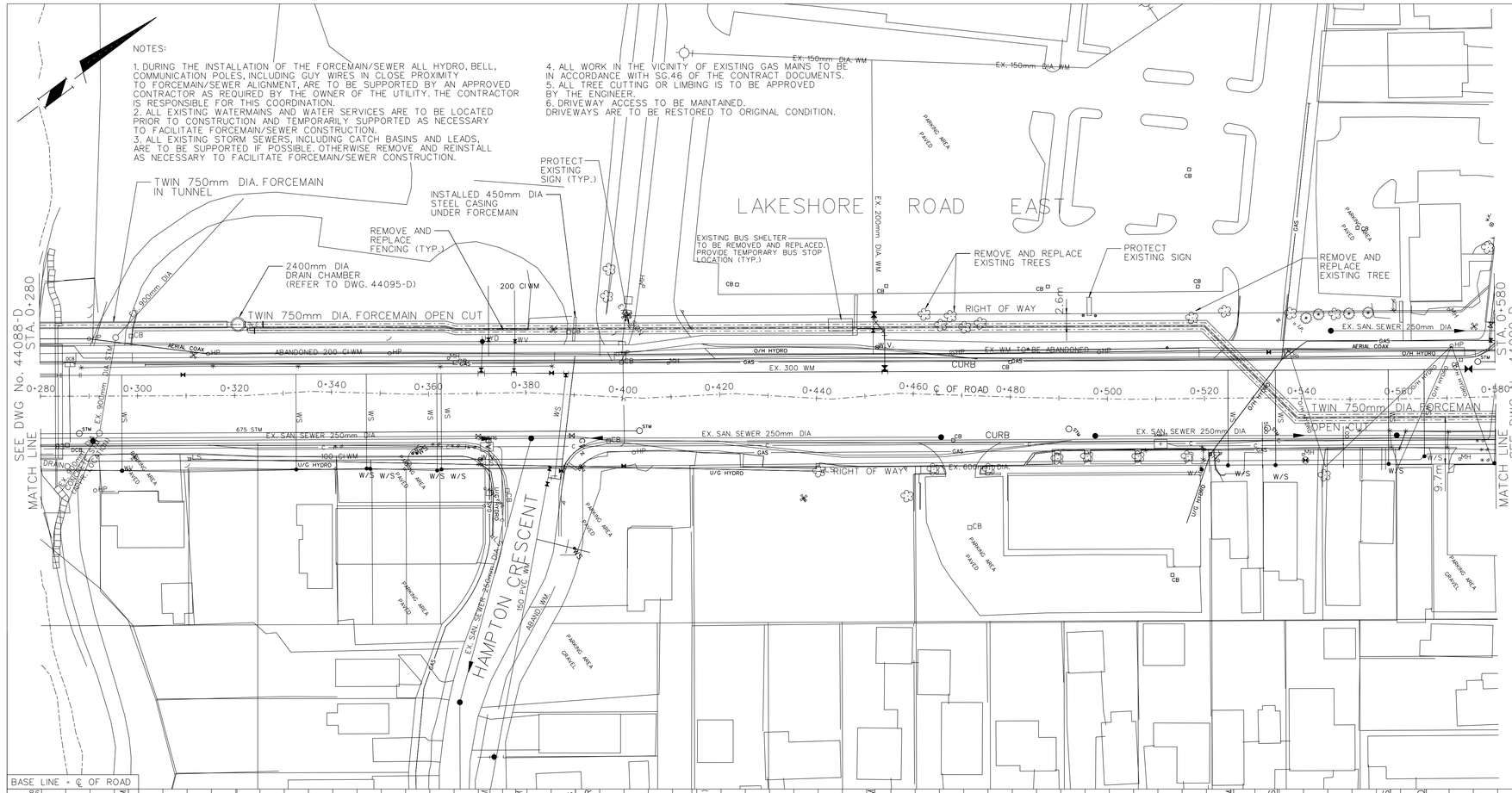
J. 1575

APPENDIX

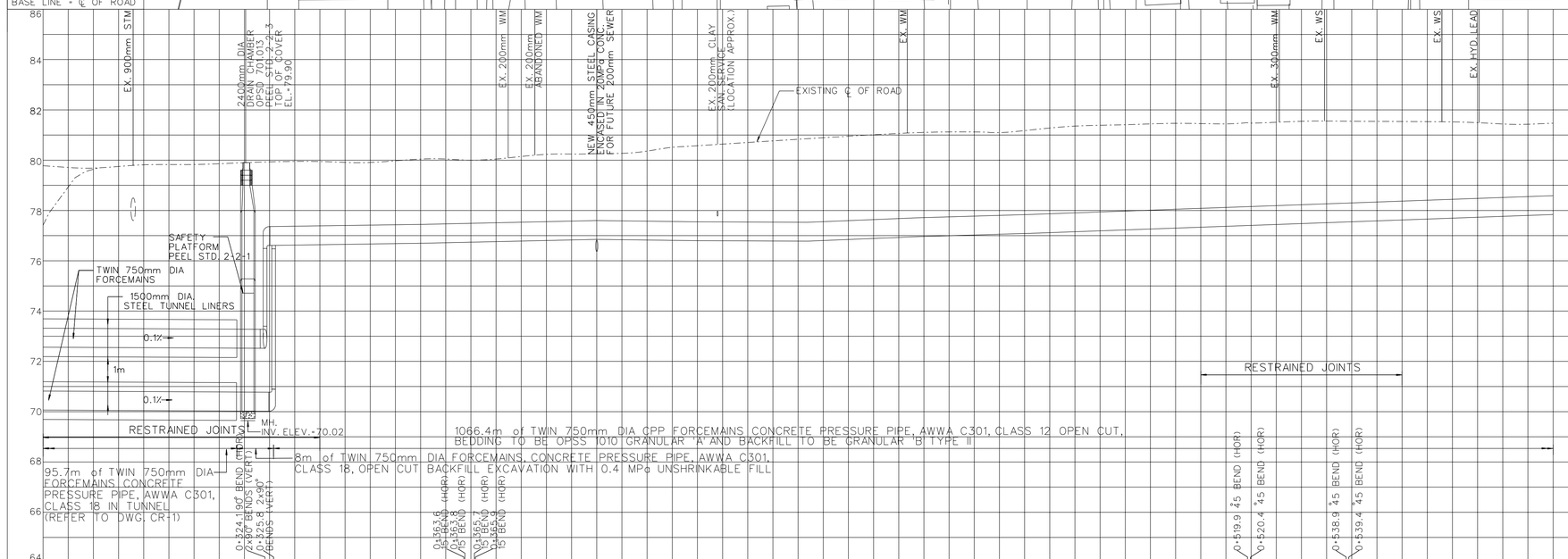
D-3 *AS-BUILT DRAWINGS FOR LAKESHORE ROAD EAST*

NOTES:

1. DURING THE INSTALLATION OF THE FORCEMAIN/SEWER ALL HYDRO, BELL, COMMUNICATION POLES, INCLUDING GUY WIRES IN CLOSE PROXIMITY TO FORCEMAIN/SEWER ALIGNMENT, ARE TO BE SUPPORTED BY AN APPROVED CONTRACTOR AS REQUIRED BY THE OWNER OF THE UTILITY. THE CONTRACTOR IS RESPONSIBLE FOR THIS COORDINATION.
2. ALL EXISTING WATERMAINS AND WATER SERVICES ARE TO BE LOCATED PRIOR TO CONSTRUCTION AND TEMPORARILY SUPPORTED AS NECESSARY TO FACILITATE FORCEMAIN/SEWER CONSTRUCTION.
3. ALL EXISTING STORM SEWERS, INCLUDING CATCH BASINS AND LEADS, ARE TO BE SUPPORTED. IF POSSIBLE, OTHERWISE REMOVE AND REINSTALL AS NECESSARY TO FACILITATE FORCEMAIN/SEWER CONSTRUCTION.
4. ALL WORK IN THE VICINITY OF EXISTING GAS MAINS TO BE IN ACCORDANCE WITH SG.46 OF THE CONTRACT DOCUMENTS.
5. ALL TREE CUTTING OR LIMBING IS TO BE APPROVED BY THE ENGINEER.
6. DRIVEWAY ACCESS TO BE MAINTAINED. DRIVEWAYS ARE TO BE RESTORED TO ORIGINAL CONDITION.



BASE LINE - ℄ OF ROAD



79.78		79.90 79.93 79.94														81.47 EXISTING GROUND
72.56 70.06		70.02 70.02 72.52														77.88 SEWER INVERT
0+280	0+300	0+320	0+340	0+360	0+380	0+400	0+420	0+440	0+460	0+480	0+500	0+520	0+540	0+560	0+580	℄ OF ROAD CHAINAGE

KEY PLAN - N.T.S.

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			ONT. HYDRO		
PARKS & REC.			CTV		
ONT. CLEAN WATER					

REVISIONS

DATE	DETAILS	INIT.
NOV. 2009	ISSUED FOR TENDER	C.S.
APR. 2012	AS CONSTRUCTED	C.S.

General Notes

- ALL DRIVEWAYS ASPHALT UNLESS OTHERWISE NOTED.
- ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN THE FIELD
- DENOTES BUILDING - NOT LOCATED
- DENOTES BUILDING LOCATED
- TYPE 'B' BEDDING UNLESS OTHERWISE NOTED (SAN)

ELEVATIONS ARE BASED ON CITY OF MISSISSAUGA DATUM AND WERE DERIVED FROM CITY OF MISSISSAUGA BENCH 805, HAVING A PUBLISHED ELEVATION OF 80.528m. TO OBTAIN GEODETIC ELEVATIONS (1978 G.S.C. RE -ADJUSTMENT) SUBTRACT (0.121m) FROM VALUES SHOWN HERE IN.

BENCH MARK LOCATION
ON THE NORTH FACE AT THE EAST CORNER OF CONCRETE CORNER POST OF A BRIDGE OVER COOKSVILLE CREEK, NORTH SIDE OF LAKESHORE ROAD (HIGHWAY ROAD No.2), 45.72m EAST OF BEECHWOOD AVENUE.

THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO AND DURING CONSTRUCTION. LOCATION OF EXISTING UTILITIES APPROXIMATE ONLY, TO BE VERIFIED IN FIELD BY CONTRACTOR

GENIVAR

600 Cochrane Drive, Suite 500, Markham, ON, L3R 5K3
Telephone: (905) 475-7270 / Fax: (905) 475-5994

ORIGINALLY STAMPED BY C.G. STEPHEN ON NOV. 16, 2009

Designed by ____ Chkd. ____

Approved by ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL	CABLE TELEVISION/FIBREOPTIC PROVIDERS:
CITY OF MISSISSAUGA WORKS DEPT.	BELL CANADA
BELL CANADA	ENERSOURCE TELECOM
ENBRIDGE INCORPORATED-GAS DISTRIBUTION	HYDRO ONE TELECOM
ONTARIO MINISTRY OF TRANSPORTATION	ROGERS CABLE
ONTARIO CLEAN WATER AGENCY	ALLSTREAM
HYDRO ONE NETWORKS	PSN (PUBLIC SECTOR NETWORK)
ENERSOURCE, HYDRO MISSISSAUGA	FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

2m 0 2 4 6m VERTICAL SCALE

Region of Peel
Working for you

PORT CREDIT
TRUNK SEWERS AND FORCEMAINS

LAKESHORE ROAD EAST
Sta. 0+280 To Sta. 0+580

CAD Area	Area Z-07	Project No.	09-2406S
Checked by CGS	Drawn by KK	Plan No.	44089-D
Date MARCH 2008	Sheet 2 of 7		