



Drainage and Stormwater Management Report

North Halton Coordinated Municipal Class
Environmental Assessment Study

James Snow Parkway from Britannia Road to
Highway 401, Town of Milton

*Regional Municipality of Halton
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1 Introduction

The Regional Municipality of Halton is undertaking a Schedule 'C' Municipal Class Environmental Assessment (MCEA) Study to review the transportation improvements along three roadway corridors:

- James Snow Parkway (Regional Road 4) from Britannia Road (Regional Road 6) to just south of Highway 401;
- Regional Road 25 from Fifth Side Road to Tenth Side Road; and
- Steeles Avenue (Regional Road 8) from Regional Road 25 to Trafalgar Road (Regional Road 3).

This Drainage and Stormwater Management Report has been prepared for the segment 'James Snow Parkway (Regional Road 4) from Britannia Road (Regional Road 6) to just south of Highway 401' in support of the MCEA Study and complies with the Ministry of the Environment, Conservation and Parks (MECP), Conservation Halton (CH), Regional Municipality of Halton, and the Town of Milton Policies and Standards. The study limits are illustrated in **Figure 1-1**.

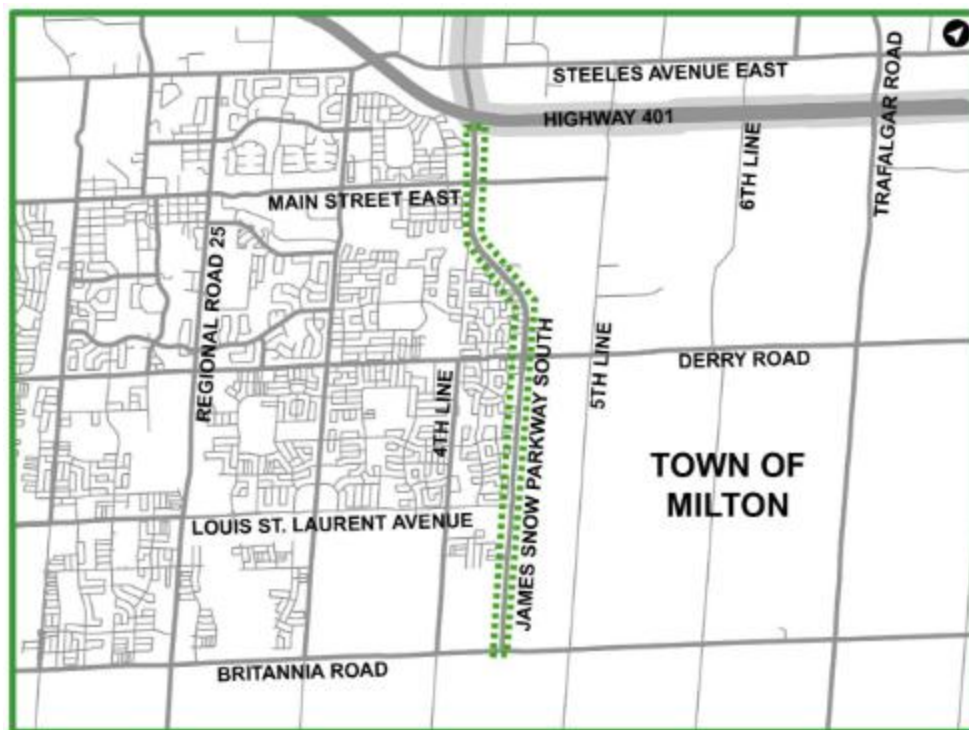


Figure 1-1. Study Area

Within the study limits, James Snow Parkway is currently a 5.8 km north-south urban arterial road. The current right-of-way includes:

- Two lanes (one in each direction) from Britannia Road to Derry Road;
- Four lanes (two in each direction) from Derry Road to Highway 401; and

- Multi-use trail (MUT) on the west-side of the corridor from Louis St. Laurent Avenue to Highway 401 with the remaining corridor without AT facilities.

The objective of the Drainage and Stormwater Management Report is to:

- Review available drainage information for existing conditions, including storm drainage area plans, reports and previous studies, plan-and-profile drawings and hydraulic and hydrologic models;
- Identify and evaluate existing drainage patterns and transverse culvert locations;
- Identify local hydrologic and hydraulic constraints;
- Establish design criteria for stormwater management to meet the requirements of the various Regulatory and approval agencies, and guidance from governing studies;
- Identify potential stormwater runoff quality and quantity impacts to the receiving watercourses/storm sewer system resulting from changes to the roadway cross-section (i.e. increased pavement area); and
- Propose an appropriate drainage system, transverse culvert upgrades, and a stormwater management strategy in conjunction with the proposed road widening to mitigate any potential impact.

1.1 Background information

In preparation of the James Snow Parkway MCEA Drainage and Stormwater Management Report, the following documents were obtained and reviewed:

1. Regional Municipality of Halton SWM CLI ECA, July 2022;
2. Ministry of the Environment, Conservation and Parks Low Impact Development Stormwater Management Guidance Manual, January 2022 (Draft for Consultation)
3. Ministry of the Environment, Conservation and Parks (MECP) Stormwater Management Practices Planning and Design Manual, March 2003;
4. Ministry of Transportation (MTO) Highway Drainage Design Standards, November 2023;
5. Town of Milton, Engineering and Parks Standards Manual, Part 4 – Grading and Stormwater Management, September 2024;
6. Conservation Halton Guidelines for Stormwater Management Engineering Submissions, November 2021;
7. Sustainable Technologies Evaluation Program (STEP) Low Impact Development Stormwater Management (LID SWM) Planning and Design Guide, 2020;
8. North Halton Environmental Assessment Fluvial Geomorphology Assessment Report, prepared by Matrix Solutions Inc., July 2024;
9. Preliminary Hydrogeological Investigation Report, North Halton Coordinated Municipal Class Environmental Assessment Study, Halton Regional Road 4 (James

Snow Parkway) From Britannia Road to Highway 401, prepared by Thurber Engineering Ltd., February 2025;

10. Preliminary Geotechnical Investigation Report, North Halton Coordinated Municipal Class Environmental Assessment Study, Halton Regional Road 4 (James Snow Parkway) From Britannia Road to Highway 401, prepared by Thurber Engineering Ltd., February 2025;
11. James Snow Parkway from Britannia Road to Derry Road, As-Constructed, SRM Associates, February 2013;
12. James Snow Parkway from Derry Road to Main Street, As-Constructed, Halton, December 2008;
13. James Snow Parkway from Main Street to Highway 401, As-Constructed, Azurix, March 2005;
14. Topographic surveys, prepared by Tham Surveying Limited, dated June 2024;
15. Ortho imagery, received from Halton Region;
16. North Halton Coordinated EA – James Snow Parkway Improvements Natural Environment Report Draft, prepared by Natural Resource Solutions Inc. (NRSI), dated August 2025;
17. Ontario Structure Inspection Manual (OSIM) reports, received from Halton Region;
18. Sixteen Mile Creek, Areas 2 & 7 Subwatershed Update Study (SUS) Final Report, AMEC Environment & Infrastructure, November 2015;
19. Technical Appendix: Functional Stormwater and Environmental Management Strategy, Boyne Survey Secondary Plan Area Final Report, AMEC Environment & Infrastructure, November 2015;
20. Technical Appendix: Functional Stormwater and Environmental Management Strategy, Derry Green Secondary Plan Area Final Report, AMEC Environment & Infrastructure, November 2015;
21. Sixteen Mile Creek Subwatershed Areas 2 & 7 Study. General Report and Appendices, Philips Planning and Engineering Limited, 2000; and
22. Scoped Impact Study Oxford development, Crozier et al., May 2022.

The following model was also provided by Conservation Halton for the watercourse crossing James Snow Parkway:

- Conservation Halton GIS Data Viewing Geodatabase; and
- Derry Green HEC-RAS – crossing James Snow Parkway, dated 2019.

Refer to Section 4.6 for additional information on the adjacent developments identified by the Town of Milton.

2 Existing Drainage Conditions

2.1 Watershed and Subwatershed

The James Snow Parkway study corridor is located in the lower reaches of the Lower Middle Branch subwatershed, also referred to as Subwatershed 7, within the Sixteen Mile Creek watershed. The Sixteen Mile Creek Watershed lies within Conservation Halton (CH) jurisdiction. The study corridor includes a crossing of the Sixteen Mile Creek Centre Tributary, which is further discussed in **Section 2.6** below.

2.2 Land Use

The area surrounding the study corridor is within or adjacent to a number of Secondary Plans including the Bristol Secondary Plan Area, Derry Green Secondary Plan Area, Boyne Survey Secondary Plan Area, and Britannia Secondary Plan Area. The adjacent lands include existing residential and agricultural uses to the west, where future development is planned to continue as residential. To the east, planned land uses include industrial and warehousing. Commercial uses are present to the northeast, with agricultural lands extending toward the southeast. Key features and landmarks in the area include an underpass below a Canadian Pacific Kansas City (CPKC) railway, the James Snow Business Park, and a tributary of Sixteen Mile Creek conveyed across the road via a bridge structure..

2.3 Hydrogeological Conditions

Preliminary geotechnical and hydrogeological investigations were conducted by Thurber Engineering Ltd. A field investigation program was carried out between September and October 2023, and included the drilling of fifteen (15) boreholes, five (5) of which were equipped with monitoring wells. Groundwater levels were measured manually between October 25 and December 21, 2023.

The borehole investigation along James Snow Parkway indicated that the subsurface stratigraphy typically consisted of a pavement structure (175 mm to 300 mm of asphalt over a 710 mm to 1150 mm granular base), underlain by discontinuous layers of fill and native silty clay. Beneath these layers, silty clay till was encountered, which in some locations graded into deposits containing higher proportions of silt and sand with depth.

Measured groundwater levels in the monitoring wells ranged from 2.2 mbgs to 5.4 mbgs (elevations ranging from 190.5 m to 200.0 m). Prior to conducting in-situ infiltration testing, a preliminary assessment of the infiltration potential of the native soils should be completed. This can be based on available geotechnical data, soil surveys, or field observations.

During the detailed design stage, in-situ infiltration rate measurements should be completed at any and all proposed LID locations to confirm the soil infiltration rates and groundwater levels.

2.4 Existing Drainage Pattern

From Britannia Road to Derry Road, James Snow Parkway features an urban cross-section with catchbasins and storm sewers on the west side, and a roadside ditch on the east side. From Derry Road to Main Street East, James Snow Parkway continues with an urban cross-section that includes catchbasins and storm sewers and urban development on adjacent lands. These storm sewers and ditches discharge to existing watercourse crossings or surface drainage outlets. The segment between Main Street East and Highway 401 has a rural cross-section and is drained by roadside ditches, which convey flows to drainage outlets. **Table 2-1** summarizes the existing drainage outlet locations.

Table 2-1. Summary of Existing Drainage Outlets

Drainage Outlet ID	Location	Description
OUT-1	West side, Britannia Road	Existing grass swale on Britannia Road
OUT-2	East side, Middle Sixteen Mile Creek Tributary	The installation of two oil grit separators prior to discharge into the Middle Sixteen Mile Creek Tributary was previously accounted for in the design by others, as part of the ultimate condition.
OUT-3	East side	One oil grit separator and one hydrodynamic separator (Vortechs) have been installed prior to discharge into the existing grass swale, which ultimately discharges into the Middle Sixteen Mile Creek Tributary.
OUT-4	West side	Stormwater Management Pond
OUT-5	East side	The installation of one oil grit separator prior to discharge into the Creek Tributary was previously accounted for in the design by others, as part of the ultimate condition.
OUT-6	West side	Stormwater Management Pond
OUT-7	East side	The pump station discharges to a storm sewer (1050 mm) under James Snow Parkway, which ultimately discharges into the Stormwater Management Pond at OUT-6.
OUT-8	West side, East Branch Sixteen Mile Creek	East Branch Sixteen Mile Creek
OUT-9	West side, East Branch Sixteen Mile Creek	East Branch Sixteen Mile Creek, adjacent to the offline Stormwater Management Pond
OUT-10	East side	A grassed swale (crosses James Snow Parkway and discharges into the East Branch of Sixteen Mile Creek, adjacent to the offline Stormwater Management Pond).

The existing drainage outlet locations are illustrated in **Figure 2-1**.



Figure 2-1. Existing Drainage Outlets Locations

Based on the information reviewed, it is our understanding that the existing stormwater management system within and adjacent to the James Snow Parkway right-of-way was developed by others for the ultimate condition (e.g., when James Snow Parkway is fully urbanized and widened). The outlet locations presented above will be confirmed during future design stages.

2.4.1 External Areas

Due to the urbanized condition within the external lands, the subject segment of James Snow Parkway receives and conveys runoff from external lands both across and along the right of way, via the major and minor drainage systems. For the most part, runoff is conveyed across the right-of-way from west to east. This is notably observed at the outfalls of the two stormwater management (SWM) facilities near Derry Road (OUT-6 and OUT-5) and at the bridge crossing of the central Middle Sixteen Mile Creek Tributary (OUT-2). However, design information indicates that the minor system from Louis St. Laurent Avenue is connected to the minor system along James Snow Parkway, receiving and conveying runoff accordingly.

2.5 Aquatic Resources and Wetlands

A Natural Environment Report Draft was prepared by NRSI (NRSI, 2025) to document the existing conditions and constraints.

The study area includes several headwater tributaries mainly originating west of James Snow Parkway and flowing eastward. Only one documented watercourse crossing of James Snow Parkway exists within the study area. This section has been recently restored with a natural channel design and provides permanent warmwater fish habitat, although no aquatic Species at Risk (SAR) have been identified there.

Some watercourses to the east are mapped as potential Silver Shiner habitat, but these are mostly ephemeral and deemed unsuitable for the species.

Additionally, fish habitat is regulated federally by the Fisheries Act, and any Harmful Alteration, Disruption or Destruction (HADD) may be reviewed by Fisheries and Oceans Canada (DFO). Conservation Halton also regulates watercourses under Ontario Regulation 41/24, and any development requires explicit permission.

Provincial Land Information Ontario (LIO) mapping has identified unevaluated wetlands along riparian corridors within the study area, some of which serve as headwater features contributing to the Middle Sixteen Mile Creek watershed. NRSI biologists delineated wetland boundaries using the Ontario Wetland Evaluation System, with surveyed boundaries confirmed by Tham Surveying.

The updated wetland mapping aligns with, and in some cases refines, the 2017 OMNR mapping. While many of the wetlands in the study area are identified as Significant Wetlands—based on factors such as size, proximity to riparian corridors, or their contribution to restoration initiatives, others are smaller and more isolated. These non-significant wetlands are still identified as Key Features within the Regional Natural Heritage System (NHS).

It is important to acknowledge that wetland management policies and delineations have been informed by prior studies undertaken in the area, with input from the Region before the dissolution of its planning authority. These studies, which include guidance relevant to wetland evaluation and management, remain subject to review and approval by both the Town and Conservation Halton.

Based on background information provided by Conservation Halton, there is potential presence of Jefferson Salamander within the study area. Additional consultation with Conservation Halton and MECP will be required during detailed design to confirm no impacts to this species or its habitat as a result of the proposed works.

2.6 Transverse Crossings

Under existing conditions, James Snow Parkway crosses a single watercourse, a tributary of Sixteen Mile Creek regulated by Conservation Halton that has a defined flood hazard. **Table 2-2** summarizes the size, type, and location of the hydraulic structure at the James Snow Parkway crossing. Furthermore, based on the information reviewed, it is our understanding that the size of the existing crossing was originally designed and constructed to accommodate the ultimate widening of James Snow Parkway.

Table 2-2. Summary of Watercourse Crossings

Crossing ID	Watercourse Crossing	Location of Crossing	Culvert/Bridge Description	Crossing Length (m)
04-1068770 BR01	Middle Sixteen Mile Creek Tributary A	0.45 km South of Louis St. Laurent	20 m span, approx. 1.5 m rise bridge	35 m

A Municipal Structure Inspection Report (AUE Structural Inc., August 2022) indicated that the concrete bridge at Crossing 04-1068770 BR01 is generally in good condition, and no special investigations or capital works recommendations were recommended at the time of the investigation.

There are other hydraulic structures located along the right-of-way that provide minor drainage and function as outfalls to the stormwater management (SWM) facility.

2.6.1 Hydraulic Criteria

In view of the proposed improvements, a hydraulic assessment of the existing transverse crossings within the study corridor was undertaken to confirm whether the existing structures satisfy the hydraulic criteria per the Ontario Ministry of Transportation's Highway Drainage Design Standards (2023). Since James Snow Parkway is currently classified as an Urban Arterial Road, the hydraulic assessment was conducted using the Urban Arterial design flow criteria. The transverse culverts within the project limits can also be classified as culverts not on a watercourse and culverts on a watercourse as per the MTO Drainage Design Standards. A summary of the design criteria is provided in **Table 2-3**.

Table 2-3. Summary of Design Criteria

Criteria	MTO Drainage Design Standard		Town of Milton
	Watercourse	Headwater Drainage Feature	Watercourse
Design Flow	Based on the MTO Drainage Standard WC-1, the design flow for structures crossing Urban Arterial roadways with a total span less than 6.0 m is the 50-year flow, and greater than 6.0 m is the 100-year flow. The Check Flow for scour is specified as 130% of the 100-year flow.	Based on MTO Drainage Standard SD-13, culverts under roadways that are associated with runoff from roadways and local external catchment areas (i.e. not on a watercourse) shall be designed to convey the Minor and Major System design flows. Standard SD-1 defines the Minor and Major System design flows as the 10-year and 100-year storm events peak flows, respectively.	The design flood frequency for arterial roads is the 100-year to Regional storm event. For these events, the maximum depth at the crown of road is 0.15 m and the maximum allowable velocity is 0.4 m/s.

Table 2-3. Summary of Design Criteria

Criteria	MTO Drainage Design Standard		Town of Milton
	Watercourse	Headwater Drainage Feature	Watercourse
Freeboard	The minimum required freeboard for culvert crossings of Urban Arterial roadways is specified as 1.0 m between the design high water level and the edge of the travelled way as per the MTO Drainage Standard WC-7. As per the MTO Drainage Standard WC-7, the upstream water level generated by the Check Flow shall not exceed the elevation of the edge of the traveled lane.	In accordance with Standard SD-13 of the Highway Drainage Design Standards, the minimum freeboard requirement for culverts not on a watercourse is 0.3 m from the high water level to the top of sub-grade upstream of the culvert under the Minor System design flow. There is no minimum freeboard associated with the Major System design flow.	Freeboard and clearance criteria are as per the MTO Highway Drainage Design Standards
Clearance	For open footing culverts, a minimum clearance of 0.3 m between the design high water level and the top of the culvert opening is specified as per MTO Drainage Standard WC-7. For closed footing culverts with a maximum diameter or rise of 3.0 m on Freeways, Arterials, and Collector roadways, a maximum ratio of flood depth to the diameter or rise of the culvert (HW/D) of 1.5 is specified as per WC-7.	N/A	Freeboard and clearance criteria are as per the MTO Highway Drainage Design Standards
Minimum Culvert Size	As per standard WC-8, the minimum culvert size crossing an urban arterial is 800 mm diameter for circular culverts or 900 mm rise for box culverts. For local roads and private entrances, the minimum culvert size is 500 mm diameter if the length > 10 m, or 400 mm diameter if the length < 10 m.	N/A	The minimum driveway culvert size is 375 mm.

2.6.2 Hydraulic Assessment of Existing Watercourse Crossings

Extracted information from the currently approved HEC-RAS hydraulic model was used to assess the performance of the existing transverse crossing in terms of freeboard, clearance, and depth of overtopping. The latest model was obtained from Conservation Halton for the regulated watercourse and includes the peak flows draining to each crossing.

Design Flows

The design flows at the bridge structure have been retained from the steady flow data within the Derry Green HEC-RAS model (dated 2019) provided by the Conservation Halton. A summary table of the storm design peak flows of the transverse crossing is presented in **Table 2-4**.

Table 2-4. Design Peak Flow for Transverse Crossings

Crossing ID	Watercourse Crossing	Peak Flow (m ³ /s)		
		50-year frequency flows	100- year frequency flows	Regional storm
04-1068770 BR01	Middle Sixteen Mile Creek Tributary A	6.26	7.60	31.90

Note Obtained from Derry Green HEC-RAS model from Conservation Halton

It is recommended that during detailed design, the assessment results be reviewed and verified to confirm any changes to the land-use and associated hydrologic information that may affect the peak flow presented in this MCEA study.

Hydraulic Assessment

As per the MTO Highway Drainage Design Standards, hydraulic capacities were assessed based on the 100-year storm event peak flow for structures with spans greater than 6.0 m to determine the available freeboard and clearance.

Table 2-5 summarizes the hydraulic analysis results for the Middle Sixteen Mile Creek Tributary along the study corridor. The HEC-RAS model output files are provided in **Appendix A**.

Table 2-5. Hydraulic Analysis Results for Transverse Bridge (Existing Condition)

Crossing ID and Description	Top of Road Elev. (m)	Soffit Elev. (m)	Freeboard (m)		Clearance 100-Yr (m)	HW/D	Remarks
			100-Yr	Reg.			
04-1068770 BR01 20 m span, approx. 1.5 m rise 35 m long bridge	194.1	192.81	2.33	1.87	1.09	N/A	Meets MTO freeboard and clearance criteria. Regional storm does not overtop road.

The results presented in **Table 2-5** indicate that the Middle Sixteen Mile Creek Tributary crossing meets the MTO freeboard and clearance criteria and does not overtop the road under all conditions up to and including the Regional Storm event.

3 Proposed Conditions

The preferred design concept for the James Snow Parkway widening project proposes expanding the roadway from 4 lanes to 6 lanes along its entire length. To minimize property impacts and enhance transportation options, the location of the widening varies depending on the road segment:

- From Britannia Road to Louis St. Laurent Avenue and from Derry Road to just south of the Highway 401 interchange: Widening is recommended about the centerline. This approach balances impacts on both sides of the roadway and reduces the need for property acquisition, particularly near sensitive areas such as the CPKC rail underpass.
- From Louis St. Laurent Avenue to Derry Road: Widening is proposed to the east side of the roadway to avoid impacts on existing residential neighborhoods located on the west side.

Throughout the corridor, one-way cycle tracks and sidewalks on both sides are proposed to provide physical separation from vehicles, reduce conflict points at intersections and driveways, provide direct access to adjacent destinations, and maintain active transportation continuity through constrained areas. The typical cross-section will include six general-purpose lanes (three in each direction), a 2.0 to 5.0 meter center median, 5.0 meter left-turn lanes (including islands), 1.8 meter boulevard cycle tracks and sidewalks on both sides, AODA-compliant intersections with cross rides, street lighting, utility relocations, and opportunities for boulevard streetscaping. Temporary and permanent property easements will also be required for construction, maintenance, and grading.

3.1 Proposed Drainage Pattern

The overall drainage pattern following the proposed widening will generally be consistent with the existing conditions. To accommodate the proposed roadway urbanization and widening, the proposed roadway runoff will be collected by a series of catchbasins and will be conveyed by curb and gutter and storm sewers to the existing drainage outlet locations.

The proposed drainage areas were delineated based on the proposed road profile and right-of-way width. The proposed discharge locations were determined using the existing outlet locations discussed in **Section 2.4**.

Refer to the Drainage Plans in **Appendix B** for additional details. **Table 3-1** summarizes the locations and areas for each of the drainage areas.

Table 3-1. Summary of Proposed Drainage Areas

Drainage Area ID	Description	Drainage Area (ha)	From Station	To Station	Discharge Location
J-1	Britannia Road to 480 m north of Britannia Road	2.39	10+000	10+480	Existing grass swale on Britannia Road (West side).
J-2	480 m north of Britannia Road to 360 m south of Louis St. Laurent Avenue	3.26	10+480	11+160	The installation of two oil grit separators prior to discharge into the Middle Sixteen Mile Creek Tributary was previously accounted for in the design by others, as part of the ultimate condition (East side).
J-3	360 m south of Louis St. Laurent Avenue to Clark Boulevard	5.33	11+160	12+240	One oil grit separator and one hydrodynamic separator (Vortechs) have been installed prior to discharge into the existing grass swale, which ultimately discharges into the Middle Sixteen Mile Creek Tributary (East side).
J-4	Clark Boulevard to 360 m north of Clark Boulevard	1.73	12+240	12+600	Stormwater Management Pond (West side)
J-5	360 m north of Clark Boulevard to 200 m south of Derry Road	1.34	12+600	12+880	The installation of one oil grit separator prior to discharge into the Creek Tributary was previously accounted for in the design by others, as part of the ultimate condition (East side).
J-6	200 m south of Derry Road to Trudeau Drive	6.16	12+880	14+140	Stormwater Management Pond (West side)
J-7	Trudeau Drive to 370 m south of Main Street East	3.92	14+140	14+710	The pump station discharges to a storm sewer (1050 mm) under James Snow Parkway, which ultimately discharges into the Stormwater Management Pond at OUT-6 (East side).
J-8	370 m south of Main Street East to 120 m north of Main Street East	2.54	14+710	15+220	East Branch Sixteen Mile Creek (West side)
J-9	120 m north of Main Street East to Highway 401 (west side)	0.85	15+220	15+770	East Branch Sixteen Mile Creek, adjacent to the offline Stormwater Management Pond (West side)
J-10	120 m north of Main Street East to Highway 401 (east side)	0.90	15+220	15+770	A grassed swale (crosses James Snow Parkway and discharges into the East Branch of Sixteen Mile Creek, adjacent to the offline Stormwater Management Pond East side).
Total		28.42			

Based on the information reviewed, it is understood that the existing stormwater management system was developed by others for the ultimate condition (e.g., when James Snow Parkway is fully urbanized and widened). Discharge outlets will be confirmed during future design stages.

3.2 Watercourse Crossings

Based on the existing condition assessment, natural heritage considerations, fluvial geomorphologic assessments, proposed roadway geometry, grading impacts, and hydraulic performance, no upgrades or extensions are required for the Middle Sixteen Mile Creek structure crossing to support the proposed roadway improvements. As a result, no changes to the hydraulic conditions at this crossing location are anticipated. Furthermore, based on the information reviewed, it is understood that the size of the existing crossing was originally designed to accommodate the ultimate condition.

4 Stormwater Management Plan

The stormwater management plan for the study area within the Sixteen Mile Creek watershed shall be developed to comply with the Regional Municipality of Halton SWM CLI-ECA, Conservation Halton (CH) Guidelines for Stormwater Management Engineering Submissions, and MECP Stormwater Management Guidelines.

4.1 Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA) Criteria

Regional Municipality of Halton CLI-ECA was issued on July 27, 2022, and includes performance criteria for development and retrofit scenarios for any stormwater management works within the Region. The proposed works for the James Snow Parkway MCEA Study includes the conversion of a rural right-of-way to an urban cross-section, and is categorized as development under the CLI-ECA.

Stormwater management for the James Snow Parkway expansion will be designed to address the requirements of Town of Milton CLI-ECA No. 333-S701, which governs conditions where the Town's drainage and stormwater infrastructure receives storm runoff from the Region's right-of-way.

The Draft Low Impact Development Stormwater Management Guidance Manual (2022) was released by the Ministry of the Environment, Conservation and Parks in January of 2022 for consultation. This manual is intended to be used as a baseline reference document in the review of stormwater management applications for approval, providing flexible guidance for implementing a holistic treatment train approach to stormwater management in Ontario.

Runoff volume control targets in Ontario, which are the local 90th percentile precipitation event, have been established within the Draft Guidelines (2022) to maintain the natural hydrologic cycle to the greatest extent possible. These criteria are also referenced in the CLI-ECA, hence are considered applicable and governing for the proposed works. The Draft Guidelines outline a hierarchical approach to the application of measures to achieve the Runoff Volume Control Target for new development, redevelopment, linear development, and stormwater retrofit projects. The steps for applying the Runoff Volume Control Target are described as follows:

1. Control Hierarchy Priority 1 Retention – LID retention practices which utilize the mechanisms of infiltration and/or evaporation to recharge groundwater and return collected rainwater to the atmosphere. The target volume is controlled and does not become runoff.
2. Control Hierarchy Priority 2 LID Filtration – LID technologies which utilize appropriate filter media. The controlled volume is filtered and released to municipal sewer networks or surface waters at a reduced rate and volume.
3. Control Hierarchy Priority 3 Conventional Treatment – other stormwater technologies which utilize filtration, hydrodynamic separation and/or sedimentation to detain and treat runoff. The controlled volume is treated and released to municipal sewer networks or surface waters at a reduced rate.

In recognition of potential site conditions that pose challenges for LID practices, the Draft Guidelines (2022) acknowledge that stormwater management for constrained sites are to be provided to the maximum extent possible (MEP). For linear development sites with restrictions, where management of 100% of the geographically specific 90th percentile precipitation event is not feasible through Better Site Design, Pollution Prevention, and Control Hierarchy Priorities 1 and 2, the alternative is to achieve volume control to the MEP. After the application of LID retention and filtration practices to the MEP, Control Hierarchy Priority 3 measures can be applied to meet the remaining stormwater control requirements.

4.2 Runoff Volume Control Criteria

It is understood that the Draft LID Stormwater Management Guidance Manual (2022) indicates a runoff volume control target of 27 mm – 28 mm, which is the regionally specific 90th percentile precipitation event depth. A depth of 28 mm is used for stormwater management calculation purposes for Halton Region.

4.2.1 Water Quality Control

Watercourses within the CH's jurisdiction are classified as requiring an “Enhanced” level of protection, which equates to 80% Total Suspended Solids (TSS) removal.

Based on the Regional Municipality of Halton SWM CLI-ECA for water quality control, the following criteria are applicable, in consideration of the hierarchical approach and MEP, as per the MECP Draft LID Guidelines (2022):

- Water quality control for the 90th percentile storm event is to be provided for all surfaces (i.e. existing and new pavement area) to the maximum extent possible;
- Water quality control to an “Enhanced” standard is to be provided for an area of pavement equal to or exceeding the area of new pavement for the 90th percentile event; and
- Water quality control for the existing pavement is to be provided to the maximum extent possible for the 90th percentile event.

4.2.2 Water Balance

Based on the Regional Municipality of Halton SWM CLI-ECA for water balance, the following criteria are applicable, in consideration of the hierarchical approach and MEP, as per the MECP Draft LID Guidelines (2022):

- Water balance for the 90th percentile event is to be provided for all surfaces (i.e. existing and new pavement) to the maximum extent possible;
- Water balance is to be provided for new pavement areas to maintain existing groundwater recharge to the maximum extent possible; and
- Water balance is to be provided for existing pavement to the maximum extent possible.

4.2.3 Erosion Control

Based on the Regional Municipality of Halton SWM CLI-ECA for erosion control, the following criteria are applicable:

- As per erosion assessment completed in watershed/subwatershed plan, Master Stormwater Management Plan, Master Environmental Servicing Plan, Drainage Plan, MCEA, local site study, geomorphologic study, or erosion analysis;
- As per the Detailed Design Approach or Simplified Design Approach methods described in the Stormwater Management Planning and Design Manual; and
- In the absence of separate assessments or guiding studies, 24 to 48 hour detention of runoff from the 25 mm storm event is to be provided.

As noted previously, the subject segment of James Snow Parkway extends through the Bristol Survey Area, the Boyne Survey Area, and the Derry Green Secondary Plan Area in the Town of Milton. The Secondary Plans for each area were supported by Subwatershed Studies, which established erosion control criteria for all future development, including roadway expansions or construction. As such, the erosion control criteria for the subject segment of James Snow Parkway is required to comply with the unitary extended detention storage and discharge criteria for end-of-pipe facilities, as provided in the respective subwatershed studies for the Secondary Plan Areas.

4.2.4 Water Quantity Control

For locations where the runoff discharges into an existing system, the minor system design storm (5-year storm) peak flows must be controlled to the existing peak flows, for which the receiving system was designed. In accordance with the Regional Municipality of Halton SWM CLI-ECA, post-development flows are to be controlled to pre-development levels along the receiving watercourses. Unitary storage and discharge rates for end-of-pipe facilities to provide stormwater quantity control for the subject segment of James Snow Parkway have been established as part of the Subwatershed Studies completed for the Bristol Secondary Plan Area, Boyne Secondary Plan Area, and Derry Green Secondary Plan Area.

4.3 Conveyance and Overland Flow Routing Criteria

4.3.1 Major Drainage System

Roadway design must be capable of conveying runoff from storm events up to the 100-year return period entirely within the right-of-way limits. Roadways may be used to convey major overland flow during the 100-year or Regional Storm event, whichever produces the greater flow, subject to depth and spread constraints, as per the Town of Milton Engineering and Parks Standards Manual (Town of Milton, September 2024) and Halton Region standards. Under no circumstances shall flooding exceed 150 mm in depth above the crown of the road during a 100-year event, and it is preferred that ponding remain within the designated right-of-way without overtopping curbs. In all cases, water depth must not extend onto private property. Blocks dedicated to the Town by easement or ownership are required to convey overland flow from roadways to open

watercourse systems and must be designed for stability and safety to the Town's satisfaction. Major system will capture the greater of the 100-year or Regional storm flows and direct them to proposed outfalls. A spread analysis shall be conducted during the detailed design phase to ensure ponding at low points does not exceed the specified depth limits and remains within the right-of-way. For collector and urban arterial roads, designs must ensure that the flow spread leaves at least one traffic lane free of water, with flow spread confined to the width of a single lane over the centerline of the road.

4.3.2 Minor Drainage System

The storm sewer system for the ultimate roadway configuration is to be designed for a 5-year storm event and shall not surcharge, as per the Town of Milton Engineering and Parks Standards Manual (Town of Milton, September 2024) and Halton Region requirements.

4.4 Proposed Stormwater Management Strategy

Based on the information reviewed, it is understood that the existing stormwater management (SWM) system for the subject segments of James Snow Parkway was developed by others with consideration for the ultimate condition, which includes the full urbanization and widening of James Snow Parkway.

The infrastructure currently in place – including adjacent stormwater ponds, storm sewer systems, and oil-grit separators (OGS) – was planned and sized to accommodate this ultimate scenario. In particular, the southern portion of the stormwater management system operates as a standalone facility. The associated ponds and OGS units were constructed to support anticipated future development, including roadway expansion.

4.4.1 Key Features and Considerations

Storm sewer stubs on the east side of the corridor are in place for future connections under ultimate condition.

Quantity and Quality Controls

The stormwater management system incorporates both quantity and quality controls through adjacent Stormwater Management (SWM) facilities. These include Oil-Grit Separators, Vortechs® Stormwater Treatment Units and oversized stormwater ponds, designed to manage runoff for both existing and ultimate conditions. The adjacent ponds provide additional capacity to accommodate and manage runoff from James Snow Parkway, eliminating the need for dedicated road-related ponds. If additional pond storage is required, any necessary modifications – such as regrading – will be addressed during the detailed design stage. Quality control is achieved through a combination of existing Oil-Grit Separator (OGS) units in some areas and Vortechs® units in others. The proposed discharge locations and associated Stormwater Management facilities are summarized in **Section 2.4** and **Section 3.1**.

Erosion and Water Balance

It is understood that the erosion control requirements for the subject segment of James Snow Parkway were incorporated at a high level during initial planning for ultimate condition by others. These elements are to be reviewed and confirmed during the detailed design stage. The subject segment of James Snow Parkway and the associated stormwater management system were implemented prior to current requirements for water balance. Consequently, Low Impact Development Best Management Practices (LID BMPs) are recommended to address current requirements for providing water balance. Further details are provided below.

4.4.2 Low Impact Development (LID) Opportunities

LID measures (e.g., bioswales with underdrains, rain gardens, infiltration trenches etc.) will be considered during the detailed design phase to address residual environmental impacts and to support compliance with current stormwater management objectives under the CLI-ECA. A summary of the segment lengths for LID features is provided in **Appendix C**.

4.4.3 Future Review and Confirmation:

All assumptions and preliminary findings outlined in this report are to be reviewed and confirmed during the detailed design phase. Key areas for confirmation include:

- Review of design briefs for stormwater management facilities to confirm assumed impervious coverage for James Snow Parkway to receive stormwater management;
- Assessment and potential regrading or modification of existing ponds, if required, to address any deficit in permanent pool or detention storage requirements for James Snow Parkway;
- Evaluation of opportunities for implementing Low Impact Development (LID) measures;
- Updating water balance analyses and confirming erosion mitigation; and
- Formulation of final recommendations based on detailed findings.

During the detailed design stage, it is essential to obtain and review all applicable design briefs and stormwater design documentation from the Town of Milton. This will confirm whether the existing wet pond facilities provide sufficient permanent pool and detention storage to accommodate the full expansion of James Snow Parkway, or if minor regrading is necessary to address any deficits in this regard.

Furthermore, the potential for integrating LID measures should be carefully evaluated to address any residual environmental impacts and to comply with current regulatory standards.

4.5 Erosion and Sediment Control During Construction

Erosion and sediment control measures should be implemented and monitored throughout the construction period. Construction activities should be conducted during periods that are least likely to result in in-stream impacts to fish habitat.

Detailed erosion and sediment control plans will be required as part of the detail design component for all phases of the construction. The erosion and sediment control plans will be subject to review and approval by the various external agencies involved in the project, including the CH.

During construction, disturbances to watercourse riparian vegetation should be minimized. If riparian vegetation is removed or disturbed, erosion and sediment control measures such as silt fences, rock flow check dams and sedimentation ponds should be utilized to provide a maximum protection of local and downstream aquatic resources. These measures should be maintained during construction and until disturbed areas have been stabilized with seed and mulch. Additionally, topsoil should not be stockpiled close to the watercourses and water should not be withdrawn from these sensitive streams for construction purposes.

The site engineer and contractor will be responsible for delineating work areas and ensuring that erosion and sediment control measures are functional. In addition, the engineer will ensure that provisions related to fisheries and watercourse protection is met and that any required fish habitat compensation measures are implemented in accordance with the terms and conditions of the Fisheries Act Authorization.

4.6 Future Drainage and Stormwater Management Assessments

During the next phase of design, drainage and stormwater management assessments will be further developed based on the detailed design plan, in consultation with the Town of Milton and Conservation Halton. This will include:

- Further detailed calculations and analyses will be undertaken at the detailed design stage to confirm potential impacts on the performance and capacity of receiving drainage and stormwater infrastructure, including impacts to floodplain hazard areas. Based on these findings, appropriate system modifications will be developed to mitigate identified impacts and achieve subwatershed impact (SIS) targets for flow and erosion control. Where required, analyses will be completed in accordance with the Town's hydrologic verification process; and
- The detailed design for James Snow Parkway is to be coordinated with the planning and design for the adjacent properties, and is to incorporate as-built and approved design information for adjacent properties accordingly. A detailed list of supplemental information as provided by the Town of Milton related to adjacent developments along the James Snow Parkway corridor is provided below.

As noted previously, the lands adjacent to the subject segment of James Snow Parkway extents are largely in a state of transition. Although lands on the west and toward the north limit of the subject segment have been developed for 25 years +/-, the lands to the east and south are currently under development. Consequently, the future design stages for James Snow Parkway will necessarily need to integrate the drainage and stormwater management system planning and design for the roadway with that being undertaken for the adjacent development being planned and currently underway. The following summarizes the additional information from the adjacent developments which have been identified by the Town of Milton, which will need to be reviewed as part of the detailed design for James Snow Parkway:

- As-built design drawings for Louis St. Laurent Avenue and the intersection of James Snow Parkway;
- 24T-21006/MSUNDIAL HOMES (4TH LINE) LIMITED - PH1 Drainage Plans;
- OPG Derry Green PH 2 (24T-20002 M) Derry Green (Oxford) SIS 1&2 drainage and stormwater management plans;
- MATTAMY, BAYVIEW LEXIS PHASE 2 (Z-01-20) drainage and stormwater management plans;
- Block 4 (Oxford) drainage outlet;
- MATTAMY (BROWNRIDGE) LIMITED - KUNICA PHASE 4 drainage and stormwater management plan;
- SUN LIFE BROCCOLINI 24T-21001/Derry Green SIS 3A drainage and stormwater management plans;
- WM Pond ID: 06 Subdivision: MATTAMY S. as-built drawings and hydrologic verification;
- MATTAMY (WELLWOOD) LTD.- NORTH PHASE 1 drainage and stormwater management plan;
- SWM POND #11 SHIPP N. PH 2 as-built drawings and hydrologic verification;
- Sixteen Mile Creek Watershed Plan (Gore and Storrie, 1996);
- Sixteen Mile Creek Subwatershed Planning Study – Areas 2&7 (Phillips Engineering, 2000);
- Indian Creek/Sixteen Mile Creek, Sherwood Survey, Subwatershed Management Study (Phillips Engineering, 2004);
- Sixteen Mile Creek, Area 2&7 Subwatershed Update Study (AMEC, 2015); and
- South Milton Subwatershed Study (AMEC, August 31, 2021, revised February 28, 2023).

Consistent with the practice of the Town of Milton, the hydrologic verification of the drainage and stormwater management plan for James Snow Parkway is to be completed using the currently approved HSP-F hydrologic model for the Sixteen Mile Creek

Watershed. Furthermore, the stormwater management plan for James Snow Parkway is to demonstrate conformance with the Town of Milton's CLI-ECA (ref. ECA Number 333-S701 issue Number 2 or as subsequently revised and approved) for the segments of James Snow Parkway which discharge to the Town's storm drainage and/or stormwater management infrastructure. Detailed calculations and analyses are to be completed at detailed design, in accordance with the Town's hydrologic verification process, to determine any impacts to the performance and capacity of receiving drainage and stormwater infrastructure, and modifications to the system are to be established accordingly to mitigate these impacts. Specific components of the analyses and verification, as identified by the Town include:

- Confirmation that the grass swale has sufficient capacity to accommodate the full catchment area of J1, including all external inflows draining to J1;
- Coordination of the Sundial drainage plan, specifically to determine requirements to convert the ditch into storm sewer when the Node Block develops;
- Confirmation of contributing flows from Sundial development;
- Confirmation of requirements to upgrade the existing triple culverts to a box structure adjacent to the Sundial lands, to accommodate the manhole connection proposed by Sundial;
- Confirmation of external drainage from Bayview/Lexus Phase 2 lands discharging to Outlet 2 and Outlet 3;
- Confirmation of design conditions and treatment efficiency of the two oil grit separators which discharge into the Middle Sixteen Mile Creek Tributary;
- Drainage coordination of Outlet 3 with Block 4 (Oxford);
- Confirmation of major system flows entering James Snow Parkway right-of-way from Louis St. Laurent Avenue;
- Confirmation of total contributing drainage areas and hydrologic verifications of Town-owned stormwater management facilities proposed to receive runoff from James Snow Parkway, including the pump station discharge to 1050 mm storm sewer under James Snow Parkway which ultimately discharges into the stormwater management facility at Outlet 6;
- Confirmation of discharge locations for grassed swales proposed to receive discharge from James Snow Parkway;
- Delineation of major overland flow routes;
- Confirmation of permanent pool volume requirements for Town-owned stormwater management facilities; and
- Confirmation of erosion control criteria for regulated watercourses.

5 Conclusions

The James Snow Parkway corridor, from Britannia Road (Regional Road 6) to just south of Highway 401, is proposed to be fully urbanized, including the addition of one-way cycle tracks and sidewalks on both sides of the roadway. Based on the information reviewed, it is understood that the existing stormwater management system was originally designed by others to accommodate the ultimate condition – i.e., the full urbanization and widening of James Snow Parkway. Storm sewer stubs have already been installed along the east side of the corridor to facilitate future connections under these ultimate conditions.

As part of the proposed design, the subsurface road drainage system will be completed. This will include the installation of storm sewer systems with catchbasins along the curb lines to capture and convey stormwater runoff to designated outfall locations along the corridor. The locations of existing outlets will be confirmed during subsequent design stages.

No extension or replacement is anticipated for the Middle Sixteen Mile Creek structure crossing (Bridge 04-1068770 BR01; 20 m span, approximately 1.5 m rise, and 35 m length) to accommodate the proposed roadway improvements within the study area, which is regulated by Conservation Halton. The determination is based on the existing condition assessment, natural heritage considerations, fluvial geomorphologic evaluations, proposed roadway geometry, grading constraints, and hydraulic performance of the structure. Hydraulic analyses were completed for existing conditions to ensure that the structure conveys design flows without negatively impacting upstream flood levels and in accordance with MTO Highway Drainage Design Standards. It is also understood that the existing crossing was originally sized to accommodate ultimate development conditions. As such, no changes to the hydraulic conditions at this crossing are anticipated as part of the current improvements. However, it is recommended that the hydraulic model for the bridge be reviewed and verified during the detailed design stage to reflect any changes in land use or hydrologic parameters that may influence peak flow estimates presented in this MCEA study.

The report concludes that the stormwater management strategy includes both quantity and quality controls through existing and proposed facilities such as Oil-Grit Separators (OGS), Vortechs® treatment units, and oversized stormwater ponds. These facilities were designed to manage runoff for current and future (ultimate) conditions, with flexibility for modifications (e.g., regrading) during the detailed design stage if needed.

Erosion and water balance considerations were initially addressed at a high level and will require confirmation during the detailed design phase. Additionally, Low Impact Development (LID) measures—such as bioswales, rain gardens, and infiltration trenches—will be explored to mitigate environmental impacts and ensure compliance with stormwater regulations.

Key elements to be reviewed and confirmed in the next phase include:

- Review of stormwater management facility design briefs and assumptions to confirm any residual stormwater management requirements for the road expansion;

- Required adjustments to stormwater ponds;
- Feasibility and integration of LID features; and
- Updated erosion and water balance strategies.

Coordination with the Town of Milton is essential to ensure all stormwater design efforts align with municipal standards. The report emphasizes that all current findings are preliminary and must be validated through detailed engineering and municipal consultation. Specific components of the analyses and verification, as identified by the Town, as well as additional information from the adjacent developments which will need to be reviewed as part of the detailed design for James Snow Parkway are listed in Section 4.6 of this report.