Stormwater Management Report

Environmental Assessment Derry Road and Argentia Road Intersection

Project 11-4295

City of Mississauga, Region of Peel

October 15, 2014

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Introduction

The Regional Municipality of Peel (the Region) is conducting a Schedule 'B' Municipal Class Environmental Assessment (EA) for the intersection of Derry Road and Argentia Road in the City of Mississauga, Region of Peel. For the purposes of this study, Derry Road is considered to run east-west and Argentia Road is considered to run north-south. The Study Area is shown in **Figure 1**.

This report was prepared to document the Stormwater Management Strategy associated with the proposed intersection improvement at the Derry Road and Argentia Road Intersection.

Figure 1: Study Area Key Map

Description of the Proposed Roadway Improvements

The project team evaluated a number of intersection improvement alternatives based on an analysis using a series of environmental, social, engineering and other technical factors. As a result of this analysis a preferred alternative was selected and includes the following main components:

- Addition of one northbound through lane on Argentia Road.
- Addition of one southbound through lane on Argentia Road.

- Addition of a westbound dual left-turn lane on Derry Road.
- Accommodation of multi-use trail along the south side of the intersection.
- Improvements to the existing sidewalk network.

The improvements will require the relocation of utilities that are in conflict with the proposed work.

Objectives of the Drainage and Stormwater Management Study

The purpose of this Stormwater Management Report was to develop a stormwater management plan for the Derry Road and Argentia Road intersection that will address both water quantity and quality issues. The objectives of the Drainage and Stormwater Management Report are to develop a strategy for the project that will:

- Identify potential stormwater runoff quality and quantity impacts to the receiving watercourses from the increased pavement area in comparison with the existing condition;
- Address concerns from the review agencies including the Credit Valley Conservation Authority (CVC), Ministry of Natural Resources (MNR), as well as the development community, and any public interest groups; and
- Propose an appropriate pavement drainage system for roadway operation and safety.

Background Information

Land Use

The intersection is located in north Mississauga, south of Highway 401 and north of the Milton GO Train rail corridor. Derry Road is a regional arterial road that runs continuously across Mississauga from Halton Region in the west to the City of Toronto in the east. Derry Road also passes through Pearson Airport. Argentia Road is a Major Collector that begins at Creditview Road in the east and terminates at 10th Line Road in the west at the entrance to the Lisgar GO Station parking lot.

According to the Official Plan this area is zoned as a commercial business and industrial area and the land use is reflective of this designation. The following properties are located within the vicinity of the intersection:

- A Four Points Sheraton hotel and a Bank of Montreal (BMO) office building are on the southeast corner of the intersection.
- At the southwest corner of the intersection, First Gulf is constructing a new office building with an approximate Gross Floor Area (GFA) of 11,430 square metres.
- A Holiday Inn Express is located in the northeast corner of the intersection.
- A low-rise office building named the “Pentagon Building” is located in the northwest corner of the intersection.

- The Meadowvale GO Train station and parking lot is also located further to the southwest of the intersection. There is an access to one of the parking lots for this station on Argentia Road, south of the study intersection.

There are no direct easterly or westerly accesses to / from Derry Road, and therefore there are no specific businesses until Millcreek Drive or Syntex Drive. Approximately 300m west of the intersection is the GO Train overpass, and approximately 160m east of the intersection is the Highway 401 overpass.

Watershed Descriptions

The study area is located within the Mullet Creek subwatershed of the Credit River watershed. Mullet Creek and its associated regulated areas are managed under the jurisdiction of the Credit Valley Conservation (CVC) and the Ontario Ministry of Natural Resources (MNR) Aurora District.

There are two tributaries of Mullet Creek within the study area.

Tributary 1 of Mullet Creek is located just north of Highway 401 and flows across Derry Road in a general north to south direction towards the main tributary of Mullet Creek. North of the study area this tributary appears to originate as a drainage ditch for Highway 401. Upstream (north) of Derry Road, this tributary appears to be piped as no wetted channel or culvert inlet was observed. Approximately 10 m south (downstream) of Derry Road, a headwall occurs, with a grated opening which is nearly completely plugged with garbage and other debris. This tributary is defined as a wetted cattail corridor of approximately 4 m in width. Wetted width of this channel is approximately 3 m with a depth of 10-15 cm. The channel is choked with cattails and Phragmites. Substrates consist of silt and organic materials. Riparian and instream cover is very high primarily due to the abundance of emergent and overhanging cattails and Phragmites.

The headwall occurring approximately 10 m south of Derry Road functions as a complete barrier to fish movement; Tributary 1 of Mullet Creek can be classified as **indirect warmwater fish habitat.**

Tributary 2 of Mullet Creek flows across Derry Road in a general north to south direction to the west of the study intersection. Upstream of Derry Road, the channel characteristics consist of a largely flat and riffle dominated morphology within a well shaded woodlot. Average channel dimensions are 4 m in width and 20 cm in depth. Substrates include cobble, shale, gravel and silt. This creek appears to receive a large contribution of groundwater due to the presence of iron staining, watercress and other indicative vegetation. Approximately 10 m north (upstream) of the concrete inlet, the channel is braided and flows into the inlet. This concrete structure is set back from Derry Road by approximately 30 m to the north. The watercourse enters this inlet and flow is piped for approximately 700 m to the southeast before discharging into the main tributary of Mullet Creek. The pipe functions as a complete barrier to fish movement and therefore, it is unlikely this watercourse provides fish habitat to the north (upstream) of Derry Road. The watercourse within the vicinity of the study area should be classified as **indirect fish habitat** as it provides flow and likely thermal relief to downstream fish communities.

Based upon a review of the MNR Natural Heritage Information Centre – Biodiversity Explorer on-line database, CVC, MNR and Department of Fisheries Ontario (DFO) Species at Risk mapping and correspondence with CVC, **no aquatic species at risk** occur in Mullet Creek within the vicinity of the study area.

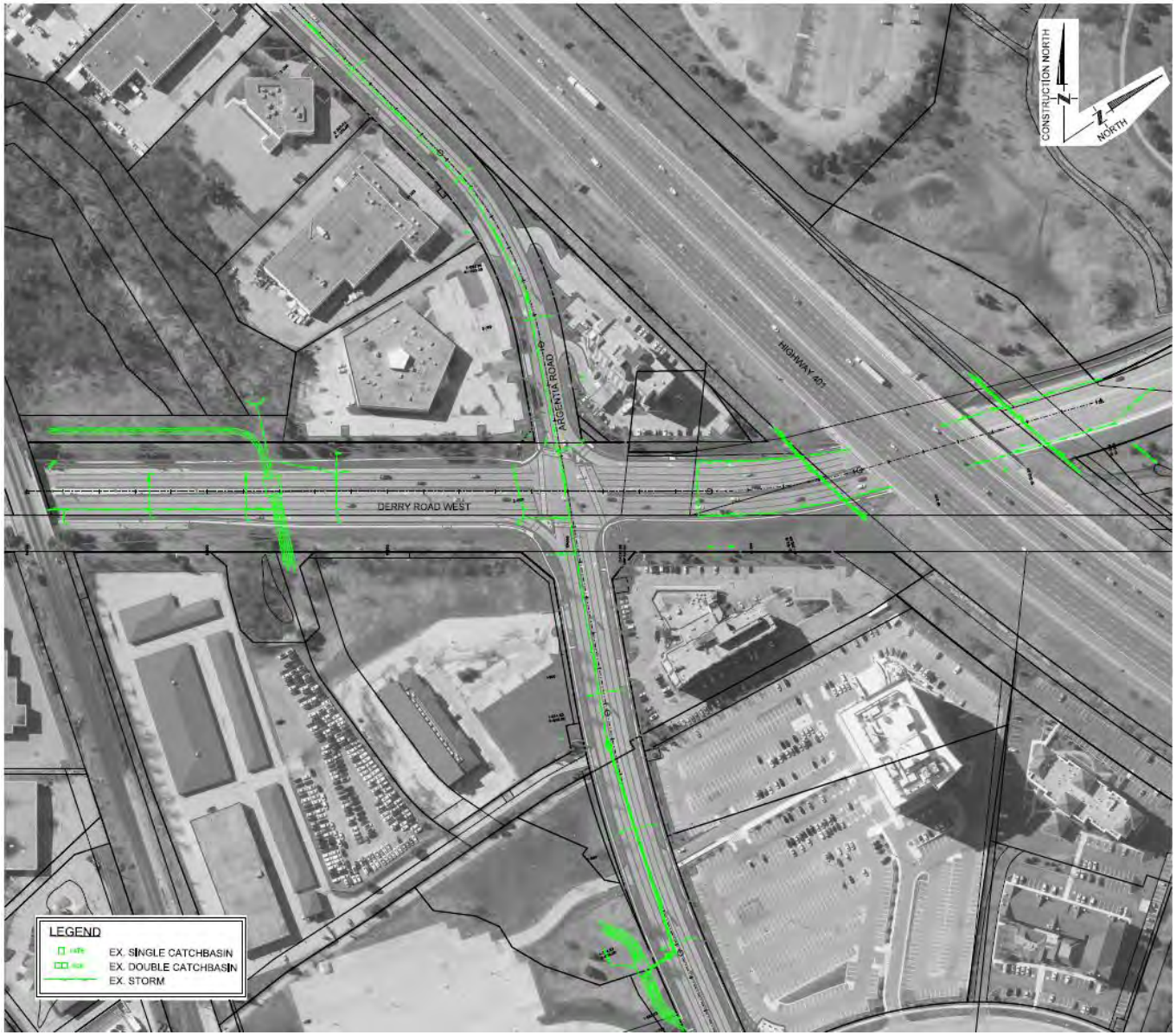
Description of the Existing Subsurface Drainage System

The existing corridor has an urban roadway cross-section with a sub-surface drainage system consisting of a series of catchbasins, storm sewers and subdrains which collect and convey both the granular base material and surface runoff and discharge to the existing municipal storm system and outlets. The storm sewers primarily pick up runoff from the roadway corridors and adjacent properties with the exception of the large trunk line that also carries the piped portion of Tributary 2 of Mullet Creek. Key components include:

- A large trunk line (2700 mm dia.) running along the north side of Derry Road from the western study limit to approximately 160 m west of Derry Road where it turns south and runs parallel to the piped portion of Tributary 2 of Mullet Creek. Both pipes connect into a vault chamber located under the median and westbound lanes of Derry Road. From this vault chamber, the trunk line (now consisting of two 2400 mm dia. pipes) continues underground to the south side of Derry Road and then travels the southeast, crossing Argentia Road approximately 300 m south of Derry Road, before discharging into the main tributary of Mullet Creek near Century Avenue. A second vault chamber for this trunk line is located on the west side of Argentia Road approximately 260 m south of Derry Road.
- A sub-trunk (825 mm dia.) line is also located under the eastbound lanes of Derry Road extending from the western study limit and connecting into the western 2400 mm dia. trunk line pipes crossing Derry Road.
- A second sub-trunk line (750 mm dia. to 1050 mm dia.) is located along the centre of Argentia Road from the northern study limit to approximately 300 m south of Derry Road where it connects into the large trunk line (noted above) via the vault chamber located on the west side of Derry Road.
- A 1050 mm dia. culvert, primarily carrying runoff from the Highway 401 right-of-way, crosses Derry road just to the west of the Highway 401 overpass. Upstream and downstream of this culvert flow is carried via roadside ditches.
- A second 1050 mm dia. culvert (Tributary 1 of Mullet Creek), carries flows across Derry Road just to the east the Highway 401 overpass. Approximately 10 m south (downstream) of Derry Road flow outlets at headwall where it continues to the southeast to connect into the main tributary of Mullet Creek.
- A series of smaller culverts and pipes pick up the remaining surface runoff and granular flow along Derry Road and Argentia Road, and outlet into one of the major systems identified above.

The existing subsurface storm sewer system is also illustrated in **Figure 2**

Figure 2: Existing Subsurface Drainage System



Surface Water Management

The following sections discuss the proposed drainage system, outline the applicable stormwater management guidelines, review and select appropriate stormwater management strategies, and summarize the proposed stormwater management plan.

Description of the Proposed Subsurface Drainage System

The proposed roadway corridor improvements will maintain an urban roadway cross-section. As such the proposed improvements will be incorporated into the existing sub-surface drainage system. In other words, the existing system will be maintained, with catch basins and leads relocated and extended, as necessary, to accommodate the road widening. Overall the existing drainage patterns and locations will be maintained.

Drainage and Stormwater Management Criteria

In accordance with the Region of Peel guidelines, the stormwater management plan should conform to the following documents / guidelines:

- MOEE Stormwater Management Practices Planning and Design Manual, March 2003.
- Credit Valley Conservation Authority Valley Policies for water management.

Pavement Drainage Criteria

MINOR SYSTEM

The storm sewer system draining the pavement for the ultimate roadway configuration is to be designed to the 10 year design storm standard.

MAJOR SYSTEM

The major drainage system for the roadway is to be designed to convey overland flow to the adjacent watercourse in a safe manner.

Water Quality Control Criteria

Credit Valley Conservation requires water quality controls commensurate with the maximum downstream habitat type. In this case, all watercourses within the study limits require “Enhanced” protection (Level 1). Level 1 protection is to be provided, as a minimum for a pavement area equivalent to the new pavement area.

The MOEE Stormwater Management Practices and Planning Manual, March 2003, provides guidance for the selection of appropriate levels of stormwater quality protection for enhanced habitats, based on removal of total suspended solids (TSS).

Pavement Area Analysis

A pavement area analysis was undertaken to determine whether or not the proposed improvements to the intersection will result in an increase in impervious coverage when compared to existing conditions. The existing and proposed pavement areas, based on the preferred design, are summarized in **Table 1**.

Table 1: Existing and Proposed Pavement Areas

Existing Pavement Area (m^2)	Proposed Pavement Area (m^2)	Increase in Paved Area (m^2)	Increase in Paved Area (%)
19,490	22,440	2,950	15%

The pavement analysis determined that the proposed improvements will result in a 15% (0.30 ha) increase in impervious area over existing conditions. Therefore, stormwater management measures will be investigated in order to offset the impacts associated with the increase in pavement.

Stormwater Management Options

Stormwater Management Practices (SWMP's) for the management of roadway runoff generally fall into two categories; those that address water quantity and those that manage water quality of surface runoff. Water quantity management issues relate to properly sizing watercourse crossings of the roadway corridor, as well as the conveyance of roadway runoff along the roadway corridor for minor and major storm events. In addition, water quantity management strategies can include the need for facilities to address downstream flood and erosion potential from the development (expansion) of the roadway right-of-way.

In terms of water quality, the SWMP's relate to the treatment of new pavement and where possible, the treatment of existing pavement; however, current legislation solely relates to the former. Typically, the treatment level is related to the standards defined in the watershed or sub-watershed planning study, which are dependent on the quality and sensitivity of the receiving stream system.

Various Best Management practices or Stormwater Management practices are available to address both the quantity and quality of runoff from roadways. Due to the linear nature of roadway corridors, however, the full spectrum of stormwater management practices is typically not feasible for implementation. This list is further reduced due to the urban environment (i.e. no ditches) and limited physical space constraints. In addition, infiltration techniques such as soak-away pits, infiltration galleries etc. are not applicable due to the low permeability of the existing native soil (clay loam soils). The only potentially applicable SWMP which can be considered are Water Quality Inlets.

Water quality inlets, also known as oil / grit separators, combine storage chambers for sediment trapping and oil separation with drainage inlets or inflow sewers for intercepting or receiving roadway stormwater runoff. Oil / grit separators (OGS) are capable of removing up to 80% of the annual sediment load when properly designed as a source control for small areas.

As the external catchment areas for the Derry Road and Argentia Road intersection are large and carried by large trunk and sub-trunk storm sewer system, OGS units are not considered to be a feasible SWMP. In addition, since the existing SWM system is currently untreated it would be difficult to retrofit the system to in introduce OGS units. One measure that is applicable for

use is a Goss Trap unit. This device allows for floatable objects and oil / grease to be trapped within the catch basin.

Proposed Stormwater Management Plan

No significant impact to water quality or quantity is anticipated since there is only a minor increase in runoff resulting from the proposed widening. In addition there are no treatment measures currently in place for the existing storm sewer systems.

Therefore, the proposed stormwater management plan is to maintain the existing untreated system, with catch basins and leads relocated and extended, as necessary, to accommodate the road widening. Overall the existing drainage patterns and locations will be maintained.

Erosion and Sediment Control during Construction

Erosion and sediment control measures should be implemented and monitored through the construction period. Construction activity 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 detailed 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. These would include the Credit Valley Conservation Authority.

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 fish habitat compensation measures are implemented in accordance with the terms and conditions of the Fisheries Act Authorization.

Summary and Conclusions

The proposed stormwater management plan is to maintain the existing untreated system, with catch basins and leads relocated and extended, as necessary, to accommodate the road widening. Overall the existing drainage patterns and locations will be maintained.

No significant impact to water quality or quantity is anticipated since there is only a minor increase in runoff resulting from the proposed widening. It is recommended to implement Goss Trap systems into catch basins that have been relocated as a result of the intersection improvements.

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

References

HDR Corporation, Preferred Design Drawing (Plan), Draft October 15, 2014;

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Credit Valley Conservation (CVC), *Stormwater Management Guidelines*, August 2012.