Terry Fox Drive Extension Richardson Side Road to Second Line, Storm Water and Floodplain Management Final Report

March 2010 Update

City of Ottawa

09-1518

Submitted by

Dillon Consulting Limited

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1.0 INTRODUCTION

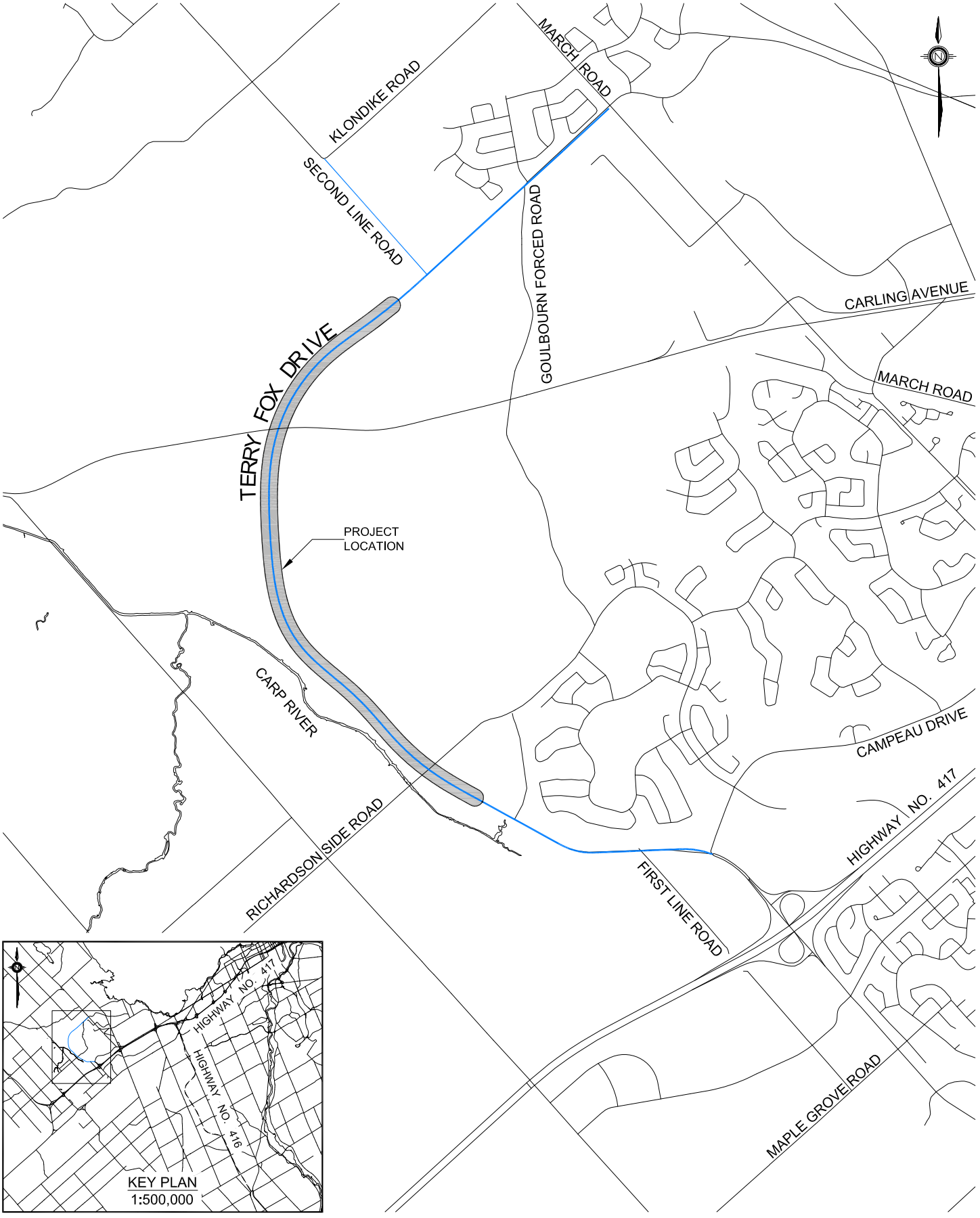
This report documents the recommended Storm Water Management Strategy for the extension of Terry Fox Drive from just south of the existing Richardson Side Road alignment to Second Line Road. Terry Fox Drive is located in the former City of Kanata, a satellite community in the western portion of the City of Ottawa. The project limits for this report are shown in **Figure 1**.

1.1 Background

An Environmental Study Report (ESR) dated October 2000 was completed for the extension of Terry Fox Drive from Eagleson Road / Hope Side Road to March Road. Dillon Consulting Limited was retained in November 2000 to undertake the Preliminary Design and Detailed Design for Terry Fox Drive from realigned Richardson Side Road to March Road. In December 2000, the assignment was divided into phases due to budget constraints and Dillon was authorized to proceed with Phase 1 of the Preliminary Design. In 2007, Dillon completed an EA Addendum for revisions to the original ESR, along with supporting documents, including a Preliminary Design Report and a Draft SWM Report.

In 2009, the City of Ottawa received federal Infrastructure Stimulus funding to complete the Terry Fox Drive project. A stipulation of the funding is that the project must be completed by March 2011. This report reflects the current status of adjacent development, updated environmental data and related reports and studies. Reflecting timing constraints, SWM facilities for Terry Fox Drive have not been integrated with SWM facilities for future development since most development is not yet at the detailed stage. Although SWM for Terry Fox Drive is a "stand-alone" solution, it is flexible enough to accommodate or be integrated with other solutions in the future.

Dillon is currently completing the Detailed Design of Terry Fox Drive. This report provides an update of issues and key design decisions related to SWM since the 2007 Preliminary Design. The report is also intended to support the application to MOE for a Certificate of Approval, as well as provide the City with the documentation required for the project to proceed.



22 December 2009 9:42:35 AM G:\cad\2009\09-1518 Ottawa - Terry Fox Drive Final Design\Report Figures\SWM Report\FIG 1.dwg

DILLON CONSULTING

DATE **DECEMBER 2009**

PROJECT LOCATION

TERRY FOX DRIVE EXTENSION
RICHARDSON SIDE ROAD TO SECOND LINE ROAD
STORMWATER MANAGEMENT REPORT

PROJECT NO. **09-1518**

FIGURE NO. **1**

1.2 Goals, Objectives and Performance Targets

1.2.1 Surface Water Management Goals

This Storm Water Management Report was completed to evaluate the impact of the proposed roadway realignment on surface water systems and to ensure that both water quality and water quantity management and floodplain management goals are achieved.

These goals are:

Goal 1: To convey upstream runoff through the proposed roadway without adverse impacts on the roadway, upstream and downstream properties, or the local natural environment; and

Goal 2: To convey runoff from the proposed roadway without adverse impacts on the roadway, upstream and downstream properties, or the local natural environment;

Goal 3: To improve or maintain existing surface water conditions where practical and cost-effective; and

Goal 4: To develop design and mitigation management alternatives, which are technically effective and cost effective (capital and maintenance) and, which minimize social and environmental impacts (e.g., property requirements and wetlands).

1.2.2 Surface Water Management Objectives

The following objectives for the SWM strategy have been developed to achieve these goals:

Goal 1 Objectives:

1a) Minimize diversion of upstream drainage areas (i.e. provide conveyance through the ROW) to minimize the potential for i) water quantity impacts at diversion outlets, and ii) quantity impacts at existing outlets which may affect the natural environment (e.g., flow reduction);

1b) Provide sufficient conveyance capacity through the ROW (i.e., adequately sized culverts or bridges) to minimize upstream water level impacts; and

1c) Minimize design velocities, to reduce the potential for erosion and need for extensive revetment at cross culvert outlets by means of suitable hydraulic design.

Goal 2 Objectives:

2a) Minimize water quantity impacts by providing a conveyance system and / or outlet area (end of pipe) management measure to match existing condition flow conditions; and

2b) Minimize water quality impacts by providing a conveyance system and / or outlet area management measure with suitable levels of treatment based on environmental sensitivities of receiving waters (i.e., quality of fisheries habitat).

Goal 3 Objectives:

3a) Reduce peak flows to downstream outlets with identified capacity deficiencies by

implementing i) upstream drainage area diversions to adjacent outlets, ii) ROW drainage area diversions to adjacent outlets, or iii) over-control of ROW and upstream drainage area runoff to the existing outlet; and

3b) Provide centralized outlet area management measures (e.g. water quantity or water quality control facilities) to the extent possible.

Goal 4 Objectives:

4a) Consider alternative water quality and quality management measures, which have no property requirements beyond the proposed mainline ROW (e.g. quality treatment in ditches and quality control detention at ditch outlets);

4b) Consider outlet area management measure types, which minimize the extent of property requirements in areas where property beyond the ROW is required;

4c) Consider outlet area management measure design details, which minimize the extent of property requirements in areas where property beyond the ROW is required (e.g., minimize required storage area by i) maximizing side slopes, ii) using low head extended detention outlets (e.g., reverse flow pipes), and iii) setting permanent pools below gravity outlet grades);

4d) Minimize the extent of downstream channelization (outlet improvements) and property requirements by minimizing grade requirements at outlet area management measures (e.g. the use of low head outlets and below grade pools in SWM facilities); and

4e) Consider outlet area management measure functions, which minimize the extent of property area where property beyond the ROW is required (i.e. limit outlet area detention facility function to quantity control only and address quality control in the ROW conveyance system) (note - may be applicable only where outlet environment sensitivities support the use of conveyance treatment, as opposed to outlet area / end of pipe treatment).

1.2.3 Surface Water Management Targets

Specific surface water management targets, or design performance measures were developed to achieve these goals and objectives, and guide the development of the SWM strategy. **Table 1** provides a summary of the surface water management targets and objectives for this study. The targets are based, in part, on design criteria included in subwatershed studies for the Carp River and Shirley's Brook.

The Carp River Subwatershed Study was completed in 2004. According to the study, the instantaneous peak flows in the Carp River do not significantly increase if quantity control is not implemented in future development. The Subwatershed Study does not recommend the implementation of flood control measures, such as quantity control SWMPs (Robinson Consultants, p. 143). This criterion is not reflected in the SWM strategy developed as part of the 2000 ESR or the 2007 Draft Storm Water Report, which reflected the assumption, at that time, that quantity control was required.

Water quality control is recommended in the Carp River Subwatershed Study. Level 2 control suitable for warm-water species is required for facilities discharging to the Carp River or any other

tributaries within the subwatershed. This level of water quality control requires that 70% of total suspended solids in the incoming stormwater be removed by stormwater best management practices. This is consistent with the goals and objectives of the 2007 Dillon Draft Report. As well, the Richardson Ridge Stormwater Servicing Report (IBI 2007) based the SWM plan on the principles of 'first flush' water quality management.

The Shirley's Brook Subwatershed Study (Dillon, 1999) recommends water quality and water quantity treatment of stormwater for development in the subwatershed. Water quality objectives are based on MNR fish habitat classification. The reaches impacted by Terry Fox Drive are classified as Type 2 and, in some places, Type 1 habitat, requiring Level 1 and Level 2 protection or a 70 – 80 % TSS removal rate. For water quantity, "the recommended target level of quantity control would be to control post-development peak flows to their corresponding pre-development levels for the 100-year return period event, such that no new flooding hazards are created and exiting hazards are not aggravated," (Dillon, 1999 p. 6-10).

Table 1: Surface Water Management Targets and Objectives

Objective	Target
1a	Convey all large external areas through the ROW.
1b	Design cross culverts to prevent excessive upstream surcharging under design flow conditions (i.e. satisfy minimum freeboard depth). Design cross culverts to manage upstream flood level impacts (i.e. increase in regulatory flood level of 100mm or less).
1c	Limit culvert outlet velocities to 3 m/s or less. Provide erosion protection at culvert outlets (150mm rip rap for outlet velocities to 3.5 m/s or less). Avoid supercritical culvert flow conditions and need for extensive outlet structures/ basins.
2a	Reduce 100-year peak discharge rates to existing peak discharge rates based on existing drainage area to outlet, for the portion of the project within the Shirley's Brook Subwatershed. There are no quantity control targets for the portion of the project within the Carp River Subwatershed.
2b	Provide Level 1 (Enhanced) quality treatment for discharges to coldwater (Type 1) fishery receiving systems, and Level 2 (Normal) quality treatment for discharges to warm (type 2) water fishery receiving systems.
3a	Divert upstream drainage areas from existing outlets with capacity deficiencies to adjacent outlets with spare capacity.
3b	Provide centralized outlet area management measures where technically feasible.
4a	Develop conveyance system or end-of-pipe quality treatment and quantity detention alternatives for all areas, including the use of oil grit separators.
4b	Use a wet pond or wetland for end-of-pipe management measures.
4c	Maximizing wet pond side slopes. Use reverse flow pipe extended detention outlets (low head). Set permanent pools below gravity outlet.
4d	Use reverse flow pipe extended detention outlets (low head). Set permanent pools below gravity outlet.
4e	Provide quality treatment in the ROW conveyance system for all areas with low outlet environment sensitivities (i.e. no fisheries habitat potential).