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APRIL 2007 REVISION

The December 2004 and March 2006 version of the Terry Fox Drive EA Addendum report was revised to reflect changes that address a Part II Order Request. Where possible, changes made such as, or limited to the text are highlighted using ***bold and italicized text***.

EXECUTIVE SUMMARY

INTRODUCTION

The Terry Fox Drive Environmental Assessment Addendum ("EA Addendum") has been prepared in order to record changes to the October 2000 ESR. The Terry Fox Drive Environmental Study Report, Eagleson Road to March Road was filed in October 2000. Subsequent to the filing of the Environmental Study Report ("ESR"), a preliminary design assignment was undertaken by Dillon Consulting Limited for the segment of Terry Fox Drive between Richardson Side Road and March Road. A Draft Design Brief was completed in June 2001 that indicated significant modifications to the ESR alignment would be necessary. ***These changes relate to the roadway cross-section, alignment and rail grade-separation property requirements and together, required the preparation of an Addendum to the ESR.***

STUDY AREA

Exhibit E-1 shows the primary and secondary study areas considered in this Addendum Report. The primary study area is the immediate vicinity of the alignment for Terry Fox Drive from Richardson Side Road to the Realigned Goulbourn Forced Road (Second Line Road). A secondary study area, that also includes the primary study area, was defined for the purpose of evaluating environmental issues. The secondary study area includes the area bounded on the south side by Richardson Side Road, on the west side by the Carp River, on the north side by Klondike Road and on the east side by the Realigned Goulbourn Forced Road (Second Line Road).

EA ADDENDUM

As work on the preliminary design assignment advanced, it became apparent that modifications to the functional design would be required for the roadway extension/ widening of Terry Fox Drive, as outlined in the October 2000 ESR.

The changes required to arrive at an acceptable roadway design solution were significant and as such, the Municipal Class Environmental Assessment (June 2000) requires that the filed ESR be reviewed by the proponent and that an addendum to the ESR be written.

The study team identified three significant changes to the October 2000 ESR roadway that have driven the need for an Addendum. These changes are:

- modifications to the roadway cross-section;
- modifications to the roadway alignment; and
- identification of property requirements for rail grade-separation

It is important to note that the interpretation of "significant changes" is subject to public scrutiny. Members of the public can object to the above-noted list of significant changes and suggest, with supporting arguments, that other changes to the October 2000 ESR are significant, and should be included within the EA Addendum.

PUBLIC AND AGENCY CONSULTATION

The EA Addendum public consultation process exceeded the minimum requirements of the EA process, continuing the City of Ottawa's commitment to urban planning in an open and inclusive process.

Public and Agency Consultation activities included:

- numerous Technical Advisory Committee meetings;
- discussions with the Mississippi Valley Conservation Authority;
- discussions with local landowners;
- a Public Open House; and
- ***a Special Study Area Workshop.***

PLANNING AND DEVELOPMENT

During Phase 1 of the Preliminary Design of Terry Fox Drive a number of drafts of the Official Plan were released. On April 23, 2003, the City of Ottawa adopted its first Official Plan since the amalgamation of 12 former municipalities in 2001. At the time this report was written, Ontario Municipal Board approval for the new Official Plan was pending. ***However, all appeals dealing with the study area lands (i.e. the "Special Study Area[1]") were resolved through Official Plan Amendment (OPA) 16. The new Official Plan (including OPA 16) was used as the base condition for the planning context of this report and its 2006 update.***

Active development concepts for all parcels of land adjacent to Terry Fox Drive were in various stages of the planning process during the time that the Phase 1 Preliminary Design was undertaken (2001-2003). A number of meetings were held with the landowners and their representatives to share information, address concerns and integrate the extension/widening of Terry Fox Drive with the adjacent developments.

MODIFICATIONS TO THE 2000 ESR

Changes to the ESR Cross-Section

The October 2000 ESR selected a two-lane rural arterial undivided (2 RAU) cross-section with bicycle lanes in both directions and a pedestrian facility on the east/south side as its preferred design for Terry Fox Drive through the study area. This assumption was reviewed in light of revisions to the planned 2021 development levels across the City to accommodate the planned growth in population and employment levels which were presented in the new City of Ottawa Official Plan (April 2003).

The City provided extracts from its long-range transportation model representing Terry Fox Drive and the surrounding development areas. The results of the model were adjusted to represent the planned access patterns to the adjacent lands from Terry Fox Drive. Given the forecasted traffic volumes, it was concluded that four general purpose traffic lanes would be required throughout the study area by 2021.

Having established the need for four general purpose traffic lanes, the preferred roadside treatment/ drainage system for this segment of Terry Fox Drive was reviewed. Although the October 2000 ESR recommended a rural cross-section, the requirement for a four lane facility prompted a detailed review of the preferred roadside treatment/ drainage system.

[1] ***The "Special Study Area" lands were defined to be bounded by Terry Fox Drive, the First Line Road road allowance and Richardson Side Road.***

The recommendation of a four lane cross-section created the need for a centre median to serve delineation and drainage functions while enhancing roadway safety (i.e. divided roadway). From the selection of a centre median came the selection of a preferred cross-section alternative. An evaluation of divided roadway alternatives was completed with consideration of factors including safety, service for pedestrians, consistency with adjacent land uses, drainage considerations, property requirements and cost. Based on this evaluation the preferred alternative is a four lane divided arterial roadway with a fully urban cross-section ***that minimizes right-of-way width and impact on both environmental and development lands.***

Horizontal Alignment

A number of minor shifts have been made to the Terry Fox Drive alignment to improve the roadway geometrics, and to resolve a number of conflicts with local features. The floodplain storage area for the Carp River was adversely affected by the modified alignment, increasing the roadway impact from 27,000 cubic metres in the ESR to 45,000 cubic metres. These results have been discussed with the Mississippi Valley Conservation Authority ("MVCA"). The MVCA has deemed the impact to be negligible and is prepared to accept the additional impact, on the condition that a compensation strategy will be prepared during the detailed design phase.

Protection for Rail Grade-Separation

It is City policy to protect for potential future grade-separations at all at-grade arterial road/rail crossings. In addition to the Do-nothing option, four grade-separation options were considered for the CN Rail crossing at Terry Fox Drive:

- an overpass/short bridge;
- an overpass/long bridge;
- an underpass/open cross-section, and
- an underpass/closed cross-section.

The overpass/short bridge option was selected as the most preferred grade-separation strategy. It ranked first in Staging, and equally preferred in the Transportation and Engineering Environment Criteria Groups. The property envelope for this option was added to the right-of-way requirements for Terry Fox Drive, as this is the ultimate configuration sought. An at-grade crossing may be considered as an interim construction scenario.

NEXT STEPS

To complete the requirements of the 2000 MEA Class EA process, a thirty-day review period for public review followed the issue of the Notice of Filing of Addendum. The public was given the opportunity to review or respond to the changes proposed in the EA Addendum.

1.0 INTRODUCTION

1.1 PURPOSE

The Terry Fox Drive Environmental Assessment Addendum ("the EA Addendum"), Richardson Side Road to Realigned Goulbourn Forced Road (Second Line Road), documents a number of refinements to the design details presented in the October 2000 Terry Fox Drive ESR. The EA Addendum presents changes to the design of Terry Fox Drive that are deemed to be significant. Documentation is presented in sufficient detail to satisfy the requirements of an EA Addendum under the 2000 Municipal Engineers Association ("MEA") Class EA process.

1.2 STUDY AREA

Exhibit 1-1 shows the primary and secondary study areas for the issues considered in this report. The primary study area is the area in the immediate vicinity of the alignment for Terry Fox Drive from Richardson Side Road to Realigned Goulbourn Forced Road (Second Line Road). A secondary study area, that also includes the primary study area, was defined for the purpose of evaluating environmental issues. The secondary study area includes the area bounded on the south side by Richardson Side Road, on the west side by the Carp River, on the north side by Klondike Road and on the east side by the Realigned Goulbourn Forced Road (Second Line Road).

1.3 BACKGROUND

1.3.1 Environmental Study Report (October 2000)

The Region of Ottawa-Carleton and the City of Kanata completed a Schedule "C" Class Environmental Assessment Study in October 2000 for the widening/ extension of Terry Fox Drive between Eagleson Road and March Road. The study established the alignment and cross-section for a continuous arterial road with the following road cross-sections:

- Four lane urban, divided road between Eagleson Road and the realigned Richardson Side Road (north intersection);
- Two lane rural, undivided road between the realigned Richardson Side Road (north intersection) and Goulbourn Forced Road; and
- Four lane urban, divided road between Goulbourn Forced Road and March Road.

Four alignment alternatives were considered for Terry Fox Drive within the Study Area (see **Exhibit 1-2**):

- Alternative 4-1 paralleled the Carp River Flood Plain;
- Alternative 4-2 followed the First Line Road road allowance/ Hydro Cut;
- Alternative 4-3A followed Goulbourn Forced Road to the Second Line Road road allowance and turned north along the west edge of Trillium Woods; and
- Alternative 4-3B followed Goulbourn Forced Road to its intersection with Terry Fox Drive.

A series of critical assumptions were made in the comparison of alignment alternatives[2]:

1. A new two lane collector roadway would be required in the Study Area to serve local access and transportation needs, over and above the arterial road requirements;
2. Four lanes of arterial capacity would eventually be required in the Terry Fox Drive corridor, given that it is one of two north-south arterial roads in Kanata; and
3. The maximum acceptable road width internal to the Lakeside and Marchwood communities would be four lanes; consistent with Regional policy at the time.

Given these assumptions, it would not be possible to simultaneously construct four arterial lanes and two collector lanes in the Goulbourn Forced Road alignment (the result would be a six lane road). Therefore, in order to maintain a common basis for comparison between options, it was assumed that a two lane arterial road would eventually be required in one of the perimeter alignments if one of the internal arterial options was selected (Alignment 4-1 was assumed for measuring impacts of both 4-3A and 4-3B).

A 45 metre right-of-way was used to assess the possible impacts of alignment options for Terry Fox Drive (representing the minimum possible envelope of impact) and a 33 metre right-of-way was assumed for the internal collector road (consistent with City of Kanata standards for collector roads). Given these rights-of-way, the impacts of the four options were measured as follows:

ROAD ALIGNMENT OPTION	BASIS OF IMPACT ASSESSMENT
Perimeter arterial road alignments (4-1 & 4-2)	• 33 metre collector road corridor assumed in the Goulbourn Forced Road alignment • 45 metre arterial road corridor assumed on the perimeter
Internal arterial road alignments (4-3A & 4-3B)	• 33 metre collector road corridor assumed in the Goulbourn Forced Road alignment • Additional 12 metre arterial right-of-way assumed in the Goulbourn Forced Road alignment • 33 metre arterial road corridor assumed on the perimeter (Alignment 4-1)

As the 33 metre collector right-of-way was common to all four alignment alternatives, its effects were not considered in the comparison of impacts between alignment options.

A multi-disciplined evaluation recommended Alternative 4-1 as the preferred alignment alternative.

[2] *The assumptions have not changed; they are presented here because they were not well documented in the October 2000 Terry Fox Drive ESR*

The functional design of Terry Fox Drive in this alignment included the following:

- Bicycle lanes in both directions;
- Sidewalk on the east/south side of the road;
- Conceptual environmental mitigation features (strategy to be developed during detailed design); and
- Separate overland and roadway stormwater collection, conveyance and management systems (strategy to be developed at detailed design).

In October 2000 the ESR was filed and, as no objections were raised, findings were adopted in November 2000. Subsequent to the filing of the ESR, segments of Terry Fox Drive, south of Richardson Side Road, proceeded through design and construction phases.

1.3.2 Functional Design Brief (July 2001)

Dillon Consulting Limited began the Preliminary Design for the segment of Terry Fox Drive between Richardson Side Road and March Road in November 2000. Phase 1 of the Preliminary Design consisted of a functional design review of several key road design parameters from the ESR for this section of the road. Findings and recommendations from the functional design review were documented in a Functional Design Brief, dated July 2001.

Phase 1 of the Preliminary Design recommended several significant modifications to the ESR design. These modifications are the subject of this Environmental Assessment Addendum.
Phase 1 of the Preliminary Design also developed frameworks for two key strategies committed to in the 2000 ESR, both of which are to be reviewed and confirmed during detailed design:

- A stormwater management strategy was developed for the roadway, consisting of separate collection, conveyance, and treatment systems for roadway flow and overland flow. The need for separate systems was determined by the Shirley's Brook/ Watts Creek Subwatershed Study and confirmed by the 2000 ESR; and
- A natural environment impact mitigation plan was developed for the Recommended Alignment, consisting of treatments that reduce:
    - the barrier impact of the road on movement of terrestrial wildlife in the South March Highlands ecosystem;
    - the impact of the road on the wetlands complex in area of the of the CNR crossing;
    - the impact of the road on the woodlands habitat through which the road passes from west of Goulbourn Forced Road to north of Richardson Side Road; and
    - the impact of the road on the aquatic habitat of Shirley's Brook and its tributaries.

The mitigation strategy included several small ecological passageways underneath the road to permit the free movement of wildlife and to accommodate drainage. The strategy also proposed a large ecological passageway underneath the road in an uplands area southwest of the CNR crossing (known as the "saddle"). Passageways such as the one proposed have been used in other jurisdictions (Banff National Park, Glacier National Park, Vermont, Florida and Europe). An initial location for the large passageway was established following a three-month study of patterns of movement of uplands wildlife in the winter of 2001.

A copy of the Natural Environment Mitigation Strategy Working Paper is presented in **Appendix A**.

1.3.3 Preliminary Design Report

A Preliminary Design Report has been prepared to document key assumptions, findings and recommendations from the Preliminary Design process. The Preliminary Design relied on the adoption of the alignment and general design parameters recommended by the EA Addendum. The Preliminary Design Report was updated in October 2005 and will be finalized following the completion of the EA Addendum.

The most recent modifications relate to the vertical profile. In order to accommodate development plans for the Kanata Highlands Property, located in the eastern-most parts of parcels of land within Lots 6 to 10, Concession 1, geographic township of March , design parameters were revisited (e.g. overland drainage conveyance requirements, ecological culvert requirements, roadway grade, etc.). In general, the revised parameters allowed the vertical profile to be reduced through Stations 13+500 to 14+000.

A copy of the Table of Contents for the Preliminary Design Report ***(October 2005)*** is presented in **Appendix B**.

1.4 EA ADDENDUM

The Municipal Engineers Association ("MEA") Class Environmental Assessment (June 2000) requires that a filed ESR be reviewed by the proponent and that an addendum to the ESR be prepared where any significant modification to the project or change in the environmental setting for the project occurs.

An Addendum to the 2000 Terry Fox Drive ESR is required at this time, for the section of Terry Fox Drive between Richardson Side Road and Realigned Goulbourn Forced Road, to address three significant changes proposed by the Preliminary Design:

- The recommended roadway cross-section has been changed;
- The recommended roadway alignment has been changed; and
- Property requirements for a potential future rail grade-separation have been identified.

According to the MEA Class EA Planning Process, EA Addenda must document the following:

- circumstances necessitating the change to the ESR;
- implications the change will have on the environment; and
- requirements of additional mitigation of negative environmental impacts.

Once the Addendum has been completed, it must be filed with the ESR and Notice of Filing of Addendum must be given to all potentially affected members of the public, review agencies and all parties listed in the original ESR.

It is important to note that the interpretation of "significant changes" is subject to public scrutiny. Members of the public can object to the above-noted list of significant changes and suggest, with supporting arguments, that other proposed changes to the October 2000 ESR are significant, and should be included within the EA Addendum.

2.0 PLANNING CONTEXT FOR REPORT

2.1 OFFICIAL PLAN

On April 23, 2003, City of Ottawa Council adopted its first Official Plan (OP) following the amalgamation of the 12 former municipalities in 2001. At the time this report was written, Ontario Municipal Board approval for the new Official Plan was pending. ***All appeals dealing with the study area lands (i.e. the "Special Study Area[3]") were resolved through Official Plan Amendment (OPA) 16. Appeals to the Ontario Municipal Board related to OPA 16 were resolved in December 2005. The new Official Plan (including OPA 16) was used as the base condition for the planning context of this report and its 2006 update. These decisions are included in Appendix C.***

***OPA 16 changed and redefined the land use designations of lands located in the eastern-most parts of parcels of land within Lots 6 to 10 in the geographic township of March Concession 1. The land use designations for the EA Addendum Study Area in City of Ottawa OP (including OPA 16) are shown in* Exhibit 2-1.**

The governing municipal OP has two impacts on the recommendations of the EA Addendum:

1. It dictates the land use designations around the Terry Fox Drive corridor, which impacts the assessment of alignment and cross-section alternatives; and
2. It dictates infrastructure planning and design policies, which influences the development of the stormwater and natural environment impact mitigation strategies.

2.1.1 Infrastructure Planning and Design Policies

The City OP is committed to environmentally-sensitive development of land and infrastructure. This philosophy, reflected in a number of OP policies, was used as a guiding principle in the development of the environmental impact mitigation strategy.

The new Official Plan enumerates several policies that reinforce the City of Ottawa's commitment to environmentally-sensitive infrastructure planning and design:

- The Natural Areas policy is aimed at protecting environmental areas within urban and rural areas. This policy ensures the environmentally-sensitive development of land through development review process requirements.
- The City of Ottawa's Land Form Features policy ensures that the educational, scientific and the landscape value of the Geomorphic, Geological and Landform Features will not be impaired. The City will encourage the protection of other significant landform features, such as rock outcrops, escarpments, knolls, valley or other identified features.

[3] *The "Special Study Area" lands were defined to be bounded by Terry Fox Drive, the First Line Road road allowance and Richardson Side Road.*

2.2 DEVELOPMENT CONCEPTS FOR ADJACENT LAND

Active development concepts for all parcels of land adjacent to Terry Fox Drive were in various stages of the planning process during the time that the Preliminary Design was being developed. A number of meetings were held with the landowners and their representatives to share information, address concerns and integrate the extension/widening of Terry Fox Drive with the adjacent developments. Many of the developments were in the conceptual stage ***without engineered site or subdivision plans.*** Given the ***initial stage*** in the concepts and their construction timing, the EA Addendum adopted the following positions on issues of interest to the adjacent landowners. A record of events, included in **Appendix D**, shows the various meeting dates and topics discussed.

2.2.1 *Vertical Alignment*

The current ***vertical*** alignment for Terry Fox Drive was established through negotiations with local landowners. Minor adjustments to the roadway design that do not affect other parties could be considered without requiring further Addenda to the EA. The rationale for such adjustments would have to be provided to the City of Ottawa for their review. Ultimate approval authority for such adjustments will be at the discretion of the City of Ottawa.

2.2.2 *Land Use Designation Changes*

The former Region of Ottawa-Carleton and City of Kanata recognized that a large segment of the lands between the former Urban Boundary (First Line Road road allowance) and Terry Fox Drive (the "interstitial lands") have significant environmental value. The existing land use designations (prior to resolution of OPA 16) were a combination of Natural Environment Area ("NEA") 'B' (described as Marginal Resource Restricted (Special Policy Area 1) in the former Regional and Kanata OPs) and Agricultural Resource Area (ARA).

The 2003 Official Plan (OP) placed the interstitial lands into a "Special Study Area" and staff was directed to conduct a study to determine, amongst other things, the appropriate land use designations.

City of Ottawa Planning staff completed the "Special Study" in March 2004. The year-long planning process included substantial participation from area stakeholders. The recommended land use designations were submitted to the Planning and Environment Committee for their consideration in September 2004. The recommended land uses (as amended by Committee and carried by Council) were that the interstitial lands would be designated as General Urban Area with the preservation of a significant north-south linkage adjacent to the First Line Road road allowance/ Hydro corridor as Major Open Space. The lands known as the KNL Exchange Lands were designated as Natural Environment Area.

Appeals to the Ontario Municipal Board related to OPA 16 were resolved in December 2005. Any further changes to the land use designations on adjacent lands would require the proponent to complete an Official Plan Amendment.

2.2.3 Natural Environment Impact Mitigation Strategy

The October 2000 ESR deferred the preparation of detailed mitigation plans for terrestrial environment, aquatic environment, and surface water to the detailed design stage. The conceptual strategy for Natural Environment Impact Mitigation was developed considering both the existing and proposed Official Plan land use designations. Details on the conceptual Impact Mitigation Strategy are outlined in **Appendix A** of this report.

The land use designations finalized through OPA 16 eliminate the need for many of the mitigation measures proposed particularly those intended to preserve connectivity between natural areas across the Terry Fox Drive corridor. Mitigation features are no longer needed where land use designations adjacent to Terry Fox Drive have changed to General Urban Area (e.g. south of the Major Open Space designation).

The conceptual mitigation strategy should be reviewed prior to construction to confirm the need for proposed mitigation measures. This applies more specifically to environmental passageways, and is discussed in more detail in **Appendix A**.

Changes to the strategy would not require any further process approvals and could be made at the discretion of the City of Ottawa. ***However, it is anticipated that public consultation will resume during detailed design. Issues such as mitigation would then be presented to appropriate stakeholders (e.g. public and agency groups).***

2.2.4 Road Right-of-Way

The Preliminary Design identified the property required for the following roadway elements:

1. Basic cross-section elements within the 45-metre right-of-way set by the ESR;
2. ***Safe recoverable or traversable*** side slopes to match road structure with existing ground;
3. Stormwater management facilities required to accommodate drainage from the roadway structure; and
4. Roadway crossing culverts required to accommodate overland drainage channels from adjacent lands.

Given the ***variability*** of the timing of construction for the adjacent developments, the City of Ottawa will ***identify*** the property required to construct the road given the existing conditions, as this is the worst-case scenario. ***Grading beyond the right-of-way will be addressed through acquisition and/or easement agreements.***

2.2.5 Stormwater Management Facilities Strategy

A stand-alone stormwater management facilities strategy was developed for the road to ensure that construction of Terry Fox Drive was not dependent on other infrastructure being in place. This strategy represents the maximum property requirement for the City of Ottawa for the management of stormwater runoff from Terry Fox Drive to meet the required levels of quality and quantity control. All parties in the area (i.e. the City of Ottawa and the adjacent landowners) recognize the mutual benefit of integrating stormwater management facilities to create an overall combined strategy for North Kanata.

A number of meetings were held with the landowners and their representatives to identify opportunities to integrate the stormwater management facilities. Specific opportunities to integrate the roadway and development systems are described in the Preliminary Design Report. Changes to stormwater management facilities can be approved by the City of Ottawa through the approvals/review process for applications made under the Planning Act ***and during detailed design.***

2.2.6 Roadway Vertical Profile

The Preliminary Design profile ***was*** established for the roadway based on the topography of the area, existing adjacent land uses and a number of design constraints. ***The vertical profile was adjusted during the EA Addendum process to accommodate adjacent landowners' development plans as described later in this report.***

One of the key drivers for the vertical profile has been the drainage strategy, which requires culverts under the roadway to convey upstream overland drainage across Terry Fox Drive, meeting minimum requirements for freeboard clearance depth from the water levels to the roadway surface.

Minor changes to the road profile that do not adversely affect other parties ***can*** be considered without requiring further Addenda to the EA, provided they meet TAC and/or City of Ottawa design requirements for a major arterial roadway and do not increase the amount of fill within the Carp River Floodplain.

The profile, as presented in the EA Addendum, does not reflect the City of Ottawa's 2004 Sewer Design Guidelines. The EA Addendum profile reflects a depth of cover of 1.5 metres while the Design Guidelines recommend a minimum depth of cover of 2.0 metres. As this guideline was adopted after the development of the EA Addendum profile, it was not incorporated into the recommended design. The City may choose to modify the road profile during detailed design to increase the depth of cover, so long as this does not increase the amount of fill within the Carp River Floodplain or adversely affect adjacent development lands.

2.2.7 *Intersection Locations*

The location of intersections on Terry Fox Drive have been addressed by this EA and will be confirmed through the planning approval process. Specific issues, which may arise concerning access to Terry Fox Drive, will be investigated as part of the roadway ***Detailed*** Design assignment ***and/or development applications***.

The EA Addendum ***identified*** the following intersections/ accesses within the study area (listed from south to north):

- a ***three***-legged intersection with Richardson Side Road existing (west leg) and an access to the private driveway access to the Richardson Farm (east leg) located at approximately Station 12+420;
- a three-legged intersection/ access to the Regional Realty lands ***located at approximately Station 13+000;***
- ***a three-legged intersection to the General Urban Lands (east of Terry Fox Drive) and an access to the lands within Lots 6 to 10, Concession 1, geographic township of March, located at approximately Station 13+700;***
- a three-legged intersection at the KNL lands ***(future Street No. 1)*** located at approximately Station 15+625; and
- a four-legged intersection with Second Line Road (north leg) and realigned Goulbourn Forced Road (south leg) ***located at approximately Station 16+080.***

3.0 PUBLIC AND AGENCY CONSULTATION

According to the 2000 Municipal Engineers Association ("MEA") Class EA process the only public consultation required for an addendum to an EA is the issuing of a Notice of Filing of Addendum; however, the City continues its commitment to urban planning in an open and inclusive process. The consultation program followed for the Terry Fox Drive EA Addendum is described below. A record of events for this project is included in **Appendix D**.

3.1 TECHNICAL ADVISORY COMMITTEE MEETING

Numerous Technical Advisory Committee ("TAC") meetings were held to solicit input from the key City of Ottawa departments concerned with the project. Staff representing the following groups participated in the TAC:

Planning and Growth Management Department	Planning, Environment and Infrastructure Policy Branch	Community Design and Environment Division
		Transportation and Infrastructure Policy Division
	Planning and Infrastructure Approvals Branch	Infrastructure Approvals Division
Public Works and Services Department	Infrastructure Services Branch	Construction Services - West

3.2 AGENCY CONTACT

A number of discussions were held with the Mississippi Valley Conservation Authority ("MVCA") regarding impacts on the Carp River Floodplain. The MVCA has conceptually approved the additional impacts on the Carp River Floodplain, pending negotiation of an appropriate compensation strategy. Correspondence with the MVCA regarding floodplain compensation is found in **Appendix E.**

3.3 CONTACT WITH LOCAL LANDOWNERS/ COMMUNITY REPRESENTATIVES

All local landowners were contacted on a number of occasions through the course of completing Phase 1 of the Preliminary Design and the EA Addendum.

The purpose of these contacts was to:

- Secure permission to enter private property to complete surveying, geotechnical and natural environment surveys; and
- Exchange information regarding the progress of the development plans and the road design.

3.4 PUBLIC OPEN HOUSE

A Public Open House was held on December 3, 2002 at the Kanata United Church. The Public Open House was hosted by the City of Ottawa and included two different topics; a presentation of the Terry Fox Drive EA Addendum Study and a presentation of the Kanata Lakes Development Plan and Clear Cut

Compensation and Remediation. The Terry Fox Drive presentation was an overview of the proposed modifications to the EA document. Copies of the display boards presented at the Open House are contained in **Appendix F**.

Public Notification of the Public Open House was published on November 22, 2002 in both the Ottawa Citizen and Le Droit newspapers. In addition, public notification leaflets were mailed to all landowners and stakeholders identified during either the EA process, or the EA Addendum process. Public Notification leaflets were also distributed by mail to all residents in the area bounded by Campeau Drive, March Road, Goulbourn Forced Road and Old Carp Road. A copy of the Public Notification is provided in **Appendix G**.

Approximately 150 people attended the Public Open House. All attendees were encouraged to fill in and submit comment sheets regarding the project modifications and the information presented. Comments received from the Open House were addressed by the City of Ottawa. These comments have been summarised and are provided in **Appendix H**.

A Notice of Filing of Addendum was published on January 7 and January 14, 2005 in both the Ottawa Citizen and Le Droit newspapers. In addition, public notification leaflets were mailed to all landowners and stakeholders identified during either the EA process, or the EA Addendum process. A copy of the Notice of Filing of Addendum is provided in **Appendix G**.

3.5 SPECIAL STUDY AREA WORKSHOPS

A series of facilitated workshops were held by City staff as part of the Special Study Area requirement to consult with landowners, community groups, individuals and other stakeholders with an interest in the subject lands.

Three separate workshops were held between July 29, 2003 and September 10, 2003. Stakeholders were given an opportunity to identify themselves and/or the group they represented and their area of concern within the Special Study Area. A summary of the Terry Fox Drive EA Addendum was presented to the group during the first workshop and relevant mapping was made available.

4.0 MODIFICATIONS TO CROSS-SECTION

The October 2000 ESR selected a two-lane rural arterial undivided (2 RAU) cross-section with bicycle lanes in both directions and a sidewalk on the east/south side as the preferred design for Terry Fox Drive through the study area. Transition sections were proposed between the two Richardson Side Road intersections (new/south and existing/north) and west of the Goulbourn Forced Road intersection, both of which provided the transition from a four-lane urban arterial divided (4UAD) cross-section to the primary two-lane rural arterial undivided (2RAU) cross-section.

Planning for the West Urban Area has continued since the ESR was filed. Significant changes are now recommended to the proposed cross-section of Terry Fox Drive, including the number of basic traffic lanes required, the preferred roadside treatment (i.e., whether the road should have a shoulder-and-ditch treatment or a curb and stormsewer treatment) and construction staging. These issues are discussed individually below.

4.1 REVIEW OF NUMBER OF TRAFFIC LANES

The new City of Ottawa Official Plan (April 2003) proposes significant intensification to the development levels in all urban areas in Ottawa, including Kanata. The 2021 population and employment forecasts for Kanata-Stittsville from the former Regional OP and the City of Ottawa OP are provided below:

Forecasted 2021 Development Levels for Kanata - Stittsville		
Data Source	**Population**	**Employment**
Former Regional OP	108,500	46,500
City of Ottawa OP	185,800	91,078

The development forecasts for Kanata in the Regional OP only supported a two lane cross-section for Terry Fox Drive between Goulbourn Forced Road and Richardson Side Road by 2021 in the 2000 ESR.

The City provided extracts from its long-range transportation model for Terry Fox Drive based on the development levels recommended in the 2003 OP. The results of the model were adjusted to represent the access patterns indicated by the concept plans for the adjacent lands from Terry Fox Drive. **Appendix I** contains a Traffic Volumes Review describing the development of link volumes on Terry Fox Drive. **Exhibit 4-1** shows the forecasted 2021 traffic volumes for the PM peak hour. An aggressive non-auto mode share (30%) was assumed for 2021, consistent with the policies in the 2003 Transportation Master Plan.

The forecasted peak hour peak direction traffic volumes (1,600 and 1,475 vehicles per hour (vph), north of Richardson Side Road and west of Goulbourn Forced Road, respectively) suggest four general purpose traffic lanes will be required throughout the study area by 2021. Typical lane capacities for arterial roads range from 1100 to 1300 vehicles per hour (vph) per direction, depending on the adjacent land uses, the anticipated number of accesses and the anticipated level of traffic control. Given these capacities for two lane roadways and the forecasted traffic volumes, it was concluded that four general purpose traffic lanes will be required throughout the study area by 2021.

4.2 PREFERRED ROADSIDE TREATMENT/ DRAINAGE SYSTEM

In the October 2000 ESR, a rural cross-section was recommended for the segment of Terry Fox Drive between relocated Richardson Side Road and Goulbourn Forced Road, based on the following rationale:

- Based on projected traffic volumes, the initial stage for Terry Fox Drive required only two lanes (to be built without a median);
- The cross-section elements and the ditches could easily fit within the 45-metre road ROW;
- The simple cross-section would allow water to easily flow across the road to either ditch, which is important as there are a number of horizontal curves in the alignment and much of the road will be super-elevated;
- With only two lanes of asphalt, there is an opportunity to provide runoff quality control in the roadside grassed ditches; and
- The adjacent lands were to be maintained as rural or Natural Environment area.

The recommendation of a four lane cross-section affects many of the above-noted factors. Changes in the planned land use adjacent to the corridor at the south end of the study area were also a factor in the decision regarding the type of cross-section.

Therefore, a detailed review of the preferred roadside treatment/ drainage system was completed and is documented below.

4.2.1 Required Elements of the Terry Fox Drive Cross-Section

A 45-metre nominal right-of-way width was identified for Terry Fox Drive, in keeping with the City of Ottawa practices for new arterial road corridors. The following elements must be accommodated within the roadway cross-section:

- 4 general purpose traffic lanes;
- bike lanes in both directions;
- a pedestrian facility on the east/south side of the road (i.e. the "inside" of the road) – this needs to be a sidewalk adjacent to the road when the road is beside developed lands, but could be a multi-use pathway through the ***Major Open Space and/or*** NEA lands;
- a drainage system for the roadway drainage (i.e. the minor system);
- a utility corridor (for streetlights); and
- a clear zone (10 metres for a 90 kilometre per hour design speed), free of obstacles (or with guide rail where required).

Additional property is also required to provide for external overland drainage (the ESR committed to separate drainage systems for the roadway and overland drainage and the Shirley's Brook/ Watts Creek Subwatershed Study confirmed the need for the separate systems).

In addition to these basic elements there are long segments where the roadway cross-section width must be supplemented by additional property in order to match embankments to original ground elevations. The topography of the identified corridor varies significantly, requiring either significant cuts or fills to construct the road. The October 2000 ESR did not identify these embankment requirements as the functional design had not advanced far enough to detail the embankment needs. However, all alternatives would have had comparable embankment requirements since the topography of the entire South March Highlands varies. The embankments resulting from the roadway construction may be reduced or eliminated on the east/south side as the lands adjacent to the corridor develop and the elevation of original ground is integrated with the roadway elevations.

4.2.2 Planning Level Assumption for Property Envelope

The Preliminary Design of Terry Fox Drive proceeded concurrently with the EA Addendum (it was, in fact, the force driving the need for the EA Addendum). The property envelope required for Terry Fox Drive was established through the Preliminary Design assignment. For planning purposes (comparison of cross-section alternatives and comparison of alignment alternatives) a uniform width of 95m was assumed for the corridor. This width represents the typical width of the widest points of the property envelope for the road in the Preliminary Design and is realistic, but slightly conservative.

4.2.3 Fixed Elements of the Roadside Treatment/ Drainage System

Basic Median Treatment

The 90 km/hr design speed for Terry Fox Drive creates the need for a median between opposing lanes of traffic throughout the study area to provide adequate safety for road users/ drivers. Median options include:

1. A rural median (e.g., a wide grassed area); and
2. An urban median with a barrier (e.g., a curb, a jersey barrier, etc.).

Given the design speed of Terry Fox Drive, a rural median would have to be at least 10 metres wide, with slopes of 4:1 or flatter, in order to provide an adequate level of safety. Although a rural median would eliminate approximately $2M of roadway drainage infrastructure[4] (catchbasins and stormsewer), the large separation between travel lanes would make intersection design problematic and would lead to significantly higher rock excavation costs and environmental impacts. The increased rock excavation cost would range from $1.5M to $2.5M, depending on the depth of excavation required, essentially offsetting the cost of the drainage infrastructure. Given the equal costs between the median options, the increased environmental impacts of the rural median make an urban median the preferred treatment.

Barrier System

The introduction of a significant barrier system in the median (e.g., a jersey barrier) was considered for Terry Fox Drive, but the City's successful use of curbed medians on similar roads (Hunt Club Road, Innes Road, Montreal Road, to name a few) supported the conclusion that a curbed median was a sufficient treatment.

Median Drainage Options

The selection of a raised median drives the need for a closed drainage system for the roadway. Although drainage from the roadway can be made to flow to the outside shoulders on tangent sections, a significant length of the roadway extension is super-elevated (over 90%) which results in draining half of the roadway runoff toward the median.

Options for median drainage that were considered include:

1. A slotted median that would allow water to drain through the median;
2. Catchbasins and catchbasin leads connected to a roadside ditch; and
3. Catchbasins and catchbasin leads connected to a stormsewer.

[4] *Details on construction cost estimates are presented in* ***Section 5.2*** *of this report.*

A slotted median (Option 1) was dismissed as an alternative for safety and maintenance reasons. Slotted medians create safety concerns related to concentrated runoff freezing, creating ice on the road, and maintenance concerns in terms of blockages.

Catchbasins connecting to a ditch (Option 2) was dismissed as an alternative due to two design constraints. The minimum depth required for the catchbasin leads conveying water from the catchbasins to the roadside ditch would force the centreline of the ditch to be relatively low, widening the ditch and increasing the environmental impact of the footprint. As well, the ESR committed to separate roadway and overland stormwater collection and conveyance systems, which would mean that separate, parallel ditches would be required along the east/south side of Terry Fox Drive for much of its length. This would be visually unattractive and would create an unacceptable barrier for pedestrians and cyclists attempting to access the road.

Therefore, based on the review of the alternatives, catchbasins and a stormsewer (Option 3) was determined to be the preferred option for the median drainage system.

4.2.4 Cross-Section Alternatives

Given the selection of a curb treatment for the median, the cross-section alternatives were limited to alternative treatments of the outside edges of the road. The available options were either uniform on both sides of the road, or "hybrid" options that included rural and urban treatments.
The options included:

1. Rural on both the east/south and west/north sides;
2. Rural on the east/south side and urban on the west/north side;
3. Urban on the east/south side and rural on the west/north side; and
4. Urban on both the east/south and west/north sides.

These options are shown in **Exhibits 4-2** and **4-3**. For ease of reference, cross-sections are shown with crowned sections as opposed to plain sections. Superelevation rates and specific drainage requirements will be finalized during Preliminary Design.

4.2.5 Evaluation Factors

The list of criteria and indicators used in the October 2000 ESR was reviewed to determine criteria relevant to the evaluation of cross-section alternatives. Criteria that would not assist in the evaluation were dismissed. Some criteria were combined for ease of analysis.

The decision criteria to be considered when setting the cross-section for Terry Fox Drive were determined to be:

- Cross-section width (which represents area of land removed, including agricultural land, archaeological potential, heritage features, natural areas, terrestrial habitat, and/or aquatic habitat);
- Impact on surface water quantity and quality (e.g. stormwater management goals are met more effectively and economically if the roadway runoff is "managed" separately from the external "clean" storm flows);
- Consistency with adjacent land uses;
- Safety for road users (drivers and cyclists);
- Safety for pedestrians walking adjacent to the road;

- Ability to support future widening;
- Service for pedestrians;
- Capital cost.

4.2.6 Recommended Roadside Treatment/ Drainage System

The evaluation of cross-section alternatives were evaluated using the decision criteria outlined in **Section 4.2.5**. The results are described below, and summarised in **Table 4-1**.

TABLE 4-1 - Comparison of Four Lane Cross-Section Alternatives

Criteria Group	Criteria	Cross-Section Alternatives			
		Alternative 1 Both Rural	**Alternative 2 Rural east/south Urban west/north**	**Alternative 3 Urban east/south Rural west/north**	**Alternative 4 Both urban**
Natural Environment	Property/ Area of Roadway Footprint	**Rank: 4** Alternative 1 requires the largest property envelope. Assuming a typical width of 5m per ditch and a corridor length of 4.5 km, the two drainage ditches will remove an additional 4.5 ha of natural area (an increase of approximately 10% on the 43 ha of footprint impact).	**Rank: 2** Alternatives 2 and 3 require more property than Alternative 4, but less than Alternative 1. Assuming a typical width of 5m per ditch and a corridor length of 4.5 km, the one drainage ditch will remove an additional 2.3 ha of natural area (an increase of approximately 5% on the 43 ha of footprint impact).	**Rank: 2** Alternatives 2 and 3 require more property than Alternative 4, but less than Alternative 1. Assuming a typical width of 5m per ditch and a corridor length of 4.5 km, the one drainage ditch will remove an additional 2.3 ha of natural area (an increase of approximately 5% on the 43 ha of footprint impact).	**Rank: 1** Alternative 4 has the smallest property envelope of the four cross-section options. For planning purposes, the footprint of the road has been estimated to be 95m wide by 4.5 km long, or approximately 43 ha.
	Impact on surface water quantity/ quality	**Rank: Equal** All alternatives separate overland flow from roadway runoff and have approximately equal impacts.			
Planned Land Use and Future Communities	Consistency with adjacent land uses	**Rank: 2** The existing land use designations adjacent to the road are split between NEA, Major Open Space, General Urban and General Rural. A rural cross-section is consistent with approximately half of the adjacent land uses.	**Rank: 4** The existing land use designations adjacent to the road are split between NEA, Major Open Space, General Urban and General Rural. The rural/ urban cross-section described would be least consistent with the adjacent land uses.	**Rank: 1** The existing land use designations adjacent to the road are split between NEA, Major Open Space, General Urban and General Rural.. The urban/ rural cross-section described would be most consistent with the adjacent land uses.	**Rank: 2** The existing land use designations adjacent to the road are split between NEA, Major Open Space, General Urban and General Rural. A fully urban cross-section is consistent with approximately half of the adjacent land uses.

TABLE 4-1 - Comparison of Four Lane Cross-Section Alternatives

Criteria Group	Criteria	Cross-Section Alternatives			
		Alternative 1 Both Rural	**Alternative 2 Rural east/south Urban west/north**	**Alternative 3 Urban east/south Rural west/north**	**Alternative 4 Both urban**
Transportation Service	Safety for road users	**Rank: Equal** Selection of rural or urban cross-section is equal since road safety guidelines would be maintained in both cases.			
	Safety for pedestrians	**Rank: Equal** Selection of rural or urban cross-section is equal since pedestrian safety guidelines would be maintained in both cases.			
	Ability to support future widenings	**Rank 1:** Widening could be accomplished without having to relocate catchbasins and extend catchbasin leads.	**Rank: 2** Widening would necessitate the relocation of catchbasins and extension of catchbasin leads on one side of the road	**Rank: 2** Widening would necessitate the relocation of catchbasins and extension of catchbasin leads on one side of the road	**Rank 4:** Widening would necessitate the relocation of catchbasins and extension of catchbasin leads on both sides of the road
	Service for pedestrians	**Rank: 3** Pedestrian facility on east/ south side would be located between the road and overland drainage ditches or outside both ditches, making it difficult for pedestrians to access the road.	**Rank: 3** Pedestrian facility on east/ south side would be located between the road and overland drainage ditches or outside both ditches, making it difficult for pedestrians to access the road.	**Rank: 1** Pedestrian facility on east/ south side would have easy access to Terry Fox Drive.	**Rank: 1** Pedestrian facility on east/ south side would have easy access to Terry Fox Drive.
Costs	Construction cost	**Rank: Equal** Construction costs estimates vary by $500K between alternatives, representing less than 2% of the more than $30M construction cost estimate for Terry Fox Drive (details on construction cost estimates are in **Section 5.2** of this report).			

Discussion

All Alternatives were ranked equally under four of the criteria:

- The impact on surface water quantity/quality is equal for all cross-section options, as it is assumed that adequate treatment facilities for road drainage will be provided under all Alternatives. Overland flow will be intercepted and conveyed across the road alignment in a separate system, as dictated by the ESR and Shirley's Brook Subwatershed Plan;
- Safety for road users and safety for pedestrians were not distinguishing criteria between alternatives, as the cross-section options were generated to meet minimum design guidelines, such as minimum clear zones; and
- Construction cost estimates are approximately equal for all cross-section options, varying by less than $500,000 or 2% of the more than $30 Million construction cost for this section of Terry Fox Drive[5].

Property impacts, and thus environmental impacts, of an urban cross-section are less than those of hybrid or rural options. The road ROW ranges from 48.0 hectares for the fully rural cross-section, to 45.5 hectares for the hybrid cross-sections (Rural/ Urban and Urban/Rural), to 43.0 hectares for the urban cross-section. The footprint for the road should be minimized to reduce environmental impacts, expensive rock excavations, and potential impacts on development lands.

Alternative 3 (hybrid) has a rural treatment on the west side of the alignment and is considered to be more consistent with the land use designations adjacent to Terry Fox Drive (NEA, Major Open Space, General Urban and General Rural). Alternative 3 ranks first because it is most consistent with the predominantly urban areas east/south of the alignment but (as per OMB decision) also has a rural treatment along the undeveloped areas west/north of the alignment. Alternatives 1 and 4 rank second, followed by the hybrid Alternative 2, which is least consistent and ranks fourth.

Level of service for pedestrians is much better for alternatives that feature an urban treatment on the east/ south side of Terry Fox Drive. Access to the road and, therefore, opportunities to cross Terry Fox Drive are better addressed with urban cross-section options. The alternatives that feature a rural treatment on the east/ south side of Terry Fox Drive create a barrier between the planned linear pedestrian facility and the roadway itself, significantly impeding crossing opportunities. **Table 4-2** presents a summary of the findings of the multi-disciplined evaluation.

[5] *The assumptions have not changed; they are presented here because they were not well documented in the October 2000 Terry Fox Drive ESR*

TABLE 4-2 - Comparison of Four Lane Cross-Section Alternatives					
Criteria Group	**Criteria**	**Cross-Section Alternatives**			
		Alt 1 Both Rural	**Alt 2 Urban-Rural**	**Alt 3 Rural-Urban**	**Alt 4 Both Urban**
Natural Environment	Property/ Area of roadway footprint	4	2	2	1
	Impact on surface water quantity/ quality	Equal			
Planned Land Use	Consistency with adjacent land uses	2	4	1	2
Transportation Service	Safety for road users	Equal			
	Safety for pedestrians	Equal			
	Ability to support future widenings	1	2	2	4
	Service for pedestrians	3	3	1	1
Costs	Construction cost	Equal			

Alternative 4 (fully urban) ranked well for most indicators (second for "area of roadway footprint" and "ability to support future widenings"). Alternative 4 was adopted as the preferred cross-section, given the importance of reducing the area of impacted land as a component of the Natural Environment Impact Mitigation Strategy, now particularly on the west/ north of the alignment.

5.0 HORIZONTAL ALIGNMENT CONSIDERATIONS

The EA Addendum study addressed two issues related to the horizontal alignment of the roadway:

- A number of minor modifications were required to the ESR alignment to improve the roadway geometrics and/ or resolve conflicts between the roadway and adjacent lands; and
- Two alternative alignments for Terry Fox Drive were raised by area stakeholders through the consultation process. Given that the definition of the project has a changed significantly (i.e., from a two lane road with a primarily rural cross-section a four lane roadway with an urban cross-section), the study team felt that it was appropriate to consider the merits of the alignment options, if only to confirm the alignment that was recommended by the 2000 ESR.

These issues were addressed in the order that they are presented above. That is, the ESR alignment was first revised to resolve all outstanding issues and conflicts, then a comparative evaluation was undertaken of the EA Addendum (i.e., the revised ESR alignment) floodplain alignment and the two other alignment options that were identified. The two steps are discussed in detail below.

5.1 MODIFICATIONS TO THE ESR FLOODPLAIN ALIGNMENT

There were a number of issues that drove a review of the horizontal alignment. As an alignment revision in one location affects the alignment over large sections of the study area, it was not possible to develop alignment alternatives to resolve each issue in isolation. The alignment was developed iteratively, with explicit consideration of the impacts on various constraints. The product was an alignment that addressed each of the issues raised through the initial stage (Phase 1) of the preliminary design exercise, as well as issues that arose later in the design process. The issues driving the revisions to the horizontal alignment are presented individually below in the chronological order in which they arose.

5.1.1 Richardson Barn

A new barn was constructed on the Richardson Farm within the roadway alignment (at approximately Station 12+560) subsequent to the completion of the Terry Fox Drive ESR. The roadway could not be built, as planned, with the barn remaining in place, as shown in **Exhibit 5-1**. Costs to relocate the barn were estimated to be roughly $60,000 (in 2002 dollars), which were equivalent to the estimated floodplain compensation costs that would be incurred by shifting the roadway to the west. The Mississippi Valley Conservation Authority (MVCA) was contacted and identified no significant concerns, other than the need to identify appropriate compensation; therefore, the roadway was shifted to avoid the barn.

5.1.2 Elimination of Broken-Back Curve

The ESR alignment for Terry Fox Drive included a "broken-back curve" between Stations 13+800 and 14+800 (see **Exhibit 5-2**). A broken-back curve consists of a short tangent between two same-direction curves. Such an alignment goes against driver expectancy, creating a safety concern, and was an undesirable element of the design aesthetics of Terry Fox Drive.

The broken-back curve was originally adopted for this segment of Terry Fox Drive to manoeuvre the alignment between three significant rock knolls southwest of the Terry Fox Drive crossing of the CNR[6] and environmental purposes: the blasting of rock to create an acceptable road profile is expensive and the knolls are locally significant features.

Although the broken-back curve was considered to be an undesirable feature of the ESR design, it was included in the ESR alignment because it allowed an alignment that minimised the impact of the roadway on the Carp River floodplain south of the rock knolls. The MVCA indicated during the review period of the ESR that it would be prepared to discuss compensation strategies to offset floodplain impacts, allowing for the removal of this design feature.

5.1.3 Regional Group Lands

The Regional Group, landowners adjacent to Terry Fox Drive, proposed a minor westerly shift in the Terry Fox Drive alignment to accommodate development plans for its lands (approximately Station 12+500 to 13+500) (see **Exhibit 5-3**).

Again, the only potential negative impact of the westerly shift was removal of additional floodplain. The MVCA identified no significant concerns, other than the need to identify appropriate compensation, and the shift was incorporated into the alignment.

5.1.4 Change in Design Philosophy

The preliminary design team suggested a change in the design philosophy for Terry Fox Drive that would see the construction of a much more curvilinear, parkway style road. Use of a parkway-style design would fit the roadway more to the roadway environment and provide better visual clues about the driving environment to drivers, increasing user safety. The change in philosophy affected the alignment along its entire length, in that many of the horizontal design parameters were changed slightly. No significant impacts were identified, and the parkway-style design philosophy was adopted.

5.1.5 EA Addendum Horizontal Alignment

Exhibit 5-4 shows the centreline of the resulting revised alignment for Terry Fox Drive (noted as the Revised Floodplain Alignment) alongside the original centreline from the October 2000 ESR.

[6] *This is a City of Ottawa rail corridor that is known locally as the Canadian National Rail line (CNR Line). For simplicity, it is referred to in this report as CNR line.*

5.2 EVALUATION OF HORIZONTAL ALIGNMENT ALTERNATIVES

Local land owners and area stakeholders raised two alternative alignments for Terry Fox Drive through the public consultation events undertaken in the EA Addendum study process. The alternative alignments were functionally different from the Revised Floodplain Alignment and had the possibility of creating fewer/ lower environmental impacts. **Exhibit 5-5** shows the centreline of the two additional alignment options, along with the Revised Floodplain and ESR alignments. The two additional options are described briefly below.

ALIGNMENT	RATIONALE
Hydro Cut / Alignment 4-2 from the ESR	This is essentially the same centreline alignment that was tested in the original EA study. The eastern edge of the property line was set at the eastern edge of the existing First Line Road road allowance. A 100 km/hr design speed was used to develop the horizontal curve north of the CNR rail line crossing. Area stakeholders requested that this alignment be reconsidered in light of the increase in the construction cost estimate for the EA Addendum alignment and the adoption of the four lane urban cross-section. The 2000 ESR concluded that the floodplain alignment was preferred over the Hydro Cut alignment, despite higher environmental impacts, due to a $4M lower construction cost. Given the change in the definition of the project, both the project team and the area stakeholders felt that it would be reasonable to revisit the Alignment 4-2 to see if the floodplain alignment would still be preferred.
Rogers Pass Alignment	One of the adjacent land owners requested that the study team consider shifting the road alignment approximately 200 metres to the west through the "saddle" area (the rock knolls located just southwest of the CNR crossing of the First Line Road road allowance identified in **Exhibit 5-5**). It was argued that such a shift would take advantage of a natural gap in the rock knolls and that the rock excavation and environmental impacts would be much lower. The alignment shift would also better suit the land owner's development plans.

Alignment options were compared using the Criteria and Indicators that were used to compare options in the October 2000 ESR. A nominal 95 metre right-of-way was established through the preliminary design assignment to accommodate all of the roadway design elements and grading functions.

Table 5-1 presents the detailed comparison of the three alignment alternatives and **Table 5-2** presents a summary of the comparative evaluation.

TABLE 5-1– COMPARISON OF ALIGNMENT ALTERNATIVES				
Criteria Group	**Indicator**	**EA Addendum Alignment (EAA Alignment)**	**October 2000 ESR* Alternative 4-2 (Hydro Cut)**	**Roger's Pass Alignment (Rogers Pass)**
Natural Environment				
Impact on Significant Natural Areas and Terrestrial Habitat	Area (ha) of wetlands removed that is designated for long-term environmental protection	**Ranked: First** The EA Addendum (EAA) alignment will remove 1.5 ha of wetlands designated as natural environment area. The difference in area of impact between alignment options is not considered to be significant. The loss of this area of wetlands would not change the value of wetlands on the Ministry of Natural Resources (MNR) scale, and there is some margin for error in the assessment of wetlands area due to the need to interpret the MNR wetlands boundaries. The EAA Alignment and Alignment 4-2 cross the edge of the wetland; whereas the Roger's Pass alignment fragments the wetland by isolating up to 10% of the area on the east side of the road.	**Ranked: First** Alignment 4-2 will remove 0.5 ha of wetlands designated as natural environment area. The difference in area of impact between alignment options is not considered to be significant. The loss of this area of wetlands would not change the value of wetlands on the Ministry of Natural Resources (MNR) scale, and there is some margin for error in the assessment of wetlands area due to the need to interpret the MNR wetlands boundaries. The EAA Alignment and Alignment 4-2 cross the edge of the wetland; whereas the Roger's Pass alignment fragments the wetland by isolating up to 10% of the area on the east side of the road.	**Ranked: Third** The Roger's Pass alignment will remove 4.5 ha of wetlands designated as natural environment area. The difference in area of impact between alignment options is not considered to be significant. The loss of this area of wetlands would not change the value of wetlands on the Ministry of Natural Resources (MNR) scale, and there is some margin for error in the assessment of wetlands area due to the need to interpret the MNR wetlands boundaries. The EAA Alignment and Alignment 4-2 cross the edge of the wetland; whereas the Roger's Pass alignment fragments the wetland by isolating up to 10% of the area on the east side of the road.
	Area (ha) of woodlands removed that is designated for long-term environmental protection	**Ranked: First** The EAA alignment footprint removes 13.0 ha of woodlands within areas designated for long term environmental protection The EAA alignment isolates an additional 0.5 ha of woodlands within areas designated for long term protection between the road and the urban boundary (west of Second Line Road; south of the road; north of the development area). Woodlands of less than 4.0 ha in area can not typically survive as viable habitat. Therefore, the isolated woodland area would lose its environmental value. The total area of woodlands removed by the EAA alignment is 13.5 ha. This is considered to be equivalent to the impact of the Roger's Pass alignment, and less than the impact of Alignment 4-2.	**Ranked: Third** The Alignment 4-2 footprint removes 23.5 ha of woodlands within areas designated for long term environmental protection. Alignment 4-2 does not fragment any woodlands within areas designated for long term protection. Alignment 4.2 will isolate 1.5 ha of woodlands designated for future development north/ west of the roadway. This area is contiguous with woodland areas designated for long term environmental protection and would likely be added to the environmental lands, reducing the impact on woodland areas by this alignment. The total area of woodlands removed by Alignment 4-2 is 23.5 ha. This is considered to be significantly more than the impact of the EAA and Roger's Pass alignments.	**Ranked: Second** The Roger's Pass alignment footprint removes 19.0 ha of woodlands within areas designated for long term environmental protection. The Roger's Pass alignment isolates an additional 9.0 ha of woodlands within areas designated for long term protection between the road and the urban boundary (west of Second Line Road; south of the road; north of the development area). Woodlands of more than 4.0 ha in area can typically survive as viable habitat. Therefore, the isolated woodland area will maintain some environmental value. The total area of woodlands removed by the Roger's Pass alignment is 19.0 ha, with a further 9.0 ha isolated from the main environmental area. This is considered to be equivalent to the impact of the EAA alignment, and less than the impact of Alignment 4-2.
	Area (ha) of woodlands and wetlands removed that are designated for future development	**Ranked: Second** The EAA Alignment will remove 6.5 ha of woodlands and 1.5 ha of wetlands that are designated for future development.	**Ranked: Third** Alignment 4-2 will remove 5.0 ha of woodlands and 1.5 ha of wetlands that are designated for future development.	**Ranked: First** The Roger's Pass alignment will remove 1.5 ha of woodlands that are designated for future development.
Impact on Aquatic Habitat	Amount and quality of aquatic habitat displaced or disrupted	**Ranked: Equal** All alignment options cross 5 fish-bearing streams/watercourses. Mitigation through facility design will minimize effects.	**Ranked: Equal** All alignment options cross 5 fish-bearing streams/watercourses. Mitigation through facility design will minimize effects.	**Ranked: Equal** All alignment options cross 5 fish-bearing streams/watercourses. Mitigation through facility design will minimize effects.

TABLE 5-1– COMPARISON OF ALIGNMENT ALTERNATIVES

Criteria Group	Indicator	EA Addendum Alignment (EAA Alignment)	October 2000 ESR* Alternative 4-2 (Hydro Cut)	Roger's Pass Alignment (Rogers Pass)
Impact on Surface Water Quality/ Quantity	Potential for alteration of watercourse flows	**Ranked: Second** The EAA and Roger's Pass alignments create a new roadway in the Carp River drainage basin. This new roadway will result in changes to the current drainage pattern, as water that currently flows along the surface to the Carp River will now be required to change course by the road alignment. Mitigation through facility design will minimize effects. This alternative will remove 45,000 m^3 from the Carp River floodplain. The MVCA has indicated that impacts of this magnitude are not significant and can be easily mitigated.	**Ranked: First** Alignment 4-2 has the least impact of all alternatives because it is situated at the top of the drainage divide between the Carp River and Shirley's Brook drainage basins. The alignment will not impede flows or change the drainage pattern in either basin. It should be noted that current overland watercourses in the Shirley's Brook drainage basic will be significantly impacted by future development. This alignment will not impact the Carp River floodplain.	**Ranked: Second** The EAA and Roger's Pass alignments create a new roadway in the Carp River drainage basin. This new roadway will result in changes to the current drainage pattern, as water that currently flows along the surface to the Carp River will now be required to change course by the road alignment. Mitigation through facility design will minimize effects. This alternative will remove 45,000 m^3 from the Carp River floodplain. The MVCA has indicated that impacts of this magnitude are not significant and can be easily mitigated.
	Potential for change in surface water quality	**Ranked: Equal** All alignments will have minimal impact on surface water quality. Terry Fox Drive will have separate drainage systems for roadway and overland drainage, and roadway drainage will be treated in storm water management ponds before being released into the watershed.	**Ranked: Equal** All alignments will have minimal impact on surface water quality. Terry Fox Drive will have separate drainage systems for roadway and overland drainage, and roadway drainage will be treated in storm water management ponds before being released into the watershed.	**Ranked: Equal** All alignments will have minimal impact on surface water quality. Terry Fox Drive will have separate drainage systems for roadway and overland drainage, and roadway drainage will be treated in storm water management ponds before being released into the watershed.
Overall Natural Environment Criteria Group Ranking:		***1***	***2***	***2***
Planned land Use and Future Communities				
Impact on Planned Land Uses	Consistency with land use designations and approved development plans	**Ranked: Second** The EAA alignment removes 7.5 ha of land that is part of the KNL (Marchwood) subdivision application.	**Ranked: Third** Alignment 4-2 removes 8.0 ha of land that is part of the KNL (Marchwood) subdivision application.	**Ranked: First** The Roger's Pass alignment does not impact on planned developments.
	Consistency with Official Plan policies	**Ranked: Equal** All alignments are equally consistent with the policies of the Official Plan (OP). The City of Ottawa OP permits Public Utility Facilities that are subject to the Environmental Assessment Act under all land use designations.	**Ranked: Equal** All alignments are equally consistent with the policies of the Official Plan (OP). The City of Ottawa OP permits Public Utility Facilities that are subject to the Environmental Assessment Act under all land use designations.	**Ranked: Equal** All alignments are equally consistent with the policies of the Official Plan (OP). The City of Ottawa OP permits Public Utility Facilities that are subject to the Environmental Assessment Act under all land use designations.
Impacts on Future Communities	Future residential areas disrupted as a result of potential noise impacts associated with traffic operations	**Ranked: First** The EAA and Roger's Pass alignments have fewer residences along their lengths because they are bordered on the north/west side (and on the east side to a degree) by rural lands and natural environment lands. The Roger's Pass alignment may offer the opportunity for some natural noise mitigation using rock knolls, but the effectiveness of these knolls in mitigating noise have not been demonstrated. It is noted that it will be the responsibility of the land developers to construct any noise attenuation measures required, not the City of Ottawa.	**Ranked: Third** Alignment 4-2 has the highest number of residences abutting it. It is noted that it will be the responsibility of the land developers to construct any noise attenuation measures required, not the City of Ottawa	**Ranked: First** The EAA and Roger's Pass alignments have fewer residences along their lengths because they are bordered on the north/west side (and on the east side to a degree) by rural lands and natural environment lands. The Roger's Pass alignment may offer the opportunity for some natural noise mitigation using rock knolls, but the effectiveness of these knolls in mitigating noise have not been demonstrated. It is noted that it will be the responsibility of the land developers to construct any noise attenuation measures required, not the City of Ottawa.
Overall Planned land Use and Future Communities Criteria Group Ranking:		***1***	***3***	***1***

TABLE 5-1– COMPARISON OF ALIGNMENT ALTERNATIVES				
Criteria Group	**Indicator**	**EA Addendum Alignment (EAA Alignment)**	**October 2000 ESR* Alternative 4-2 (Hydro Cut)**	**Roger's Pass Alignment (Rogers Pass)**
Cost				
Cost	Construction Costs	**Ranked: First** Construction of a 4 lane urban road with a centre median in the EAA alignment is estimated to cost approximately $34 million dollars.	**Ranked: Second** Construction of a 4 lane urban road with a centre median in Alignment 4-2 is estimated to cost approximately $38 million dollars, which is similar to the Roger's Pass cost.	**Ranked: Second** Construction of a 4 lane urban road with a centre median in the Roger's Pass alignment is estimated to cost approximately $37 million dollars, which is similar to the Alternatigve 4-2 cost.
Transportation Service				
Support for Utilitarian Walking and Cycling:	Exposure of pedestrians/bicycles from land uses adjacent to the alignment due to location of alignment	**Ranked: First** The EAA and Roger's Pass alignments border urban development to a more limited extent – on the south side west of Goulbourn Forced Road. Pedestrians and cyclists will have minimal exposure to auto and truck traffic.	**Ranked: Third** Alignment 4-2 borders urban development to the greatest extent – on the east side north of Richardson Side Road and the south side west of Goulbourn Forced Road. Pedestrians and cyclists will have minimal exposure to auto and truck traffic.	**Ranked: First** The EAA and Roger's Pass alignments border urban development to a more limited extent – on the south side west of Goulbourn Forced Road. Pedestrians and cyclists will have minimal exposure to auto and truck traffic.
	Length of alignment alternative	**Ranked: Equal** The EAA alignment is approximately 4.5 km long. All alignments are considered to have similar lengths, which is important to the service of walking and cycling trips.	**Ranked: Equal** Alignment 4-2 is approximately 4.2 km long. All alignments are considered to have similar lengths, which is important to the service of walking and cycling trips.	**Ranked: Equal** The Roger's Pass alignment is approximately 4.8 km long. All alignments are considered to have similar lengths, which is important to the service of walking and cycling trips.
	Access to pedestrian and bicycle trip origins and destinations	**Ranked : Second** The EAA and Roger's Pass alignments border urban development to a more limited extent – on the south side west of Goulbourn Forced Road. This provides more limited access to pedestrian and bicycle origins and destination.	**Ranked : First** Alignment 4-2 will border urban development to greater extent – on the east side north of Richardson Side Road and the south side west of Goulbourn Forced Road. This provides greater access to pedestrian and bicycle origins and destination.	**Ranked : Second** The EAA and Roger's Pass alignments border urban development to a more limited extent – on the south side west of Goulbourn Forced Road. This provides more limited access to pedestrian and bicycle origins and destination
Support for Public Transit	Proximity of the alignment to transit market	**Ranked : Second** The EAA and Roger's Pass alignments border urban development to a more limited extent – on the south/east side for the entire length. This provides more limited access to transit origins and destination.	**Ranked : First** Alignment 4-2 borders urban development to greater extent – on both sides from Kanata Road to CNR and south side from CNR to Goulbourn Forced Road. This provides greater access to transit origins and destination.	**Ranked : Second** The EAA and Roger's Pass alignments border urban development to a more limited extent – on the south/east side for the entire length. This provides more limited access to transit origins and destinations.
Level of Service	Level of mobility for regional trips provided by alignment	**Ranked: First** The EAA and Roger's Pass alignments would have less interference from adjacent land uses and, therefore, would provide the highest level of regional mobility.	**Ranked: Third** Alignment 4-2 would have more interference from adjacent land uses than the floodplain alignments. It would provide the lowest level of regional mobility.	**Ranked: First** The EAA and Roger's Pass alignments would have less interference from adjacent land uses and, therefore, would provide the highest level of regional mobility.
	Mobility for commercial vehicles/goods	**Ranked: First** The EAA and Roger's Pass alignments would have less interference from adjacent land uses and, therefore, would provide the highest level of mobility for commercial vehicles/goods movement.	**Ranked: Third** Alignment 4-2 would have more interference from adjacent land uses and, therefore, would provide the highest level of mobility for commercial vehicles/goods movement.	**Ranked: First** The floodplain alternatives would have the least amount of interference from adjacent land uses and, therefore, would provide the highest level of mobility for commercial vehicles/goods movement.

TABLE 5-1– COMPARISON OF ALIGNMENT ALTERNATIVES

Criteria Group	Indicator	EA Addendum Alignment (EAA Alignment)	October 2000 ESR* Alternative 4-2 (Hydro Cut)	Roger's Pass Alignment (Rogers Pass)
Potential to develop a Scenic Roadway	Anticipated view from the Roadway	**Ranked: First** The EAA and Roger's Pass alignments are bordered on the north/west side by NEA and General Rural and on the south/east side by Major Open Space and General Urban lands affording roadway users a clear view of the Carp River. All alternatives provide adequate buffer to provide landscaping etc. to screen the roadway where desired.	**Ranked: Third** This alternative is less preferred than the floodplain alignments. Future development on the south/east side of the roadway for the entire of the length will reduce the ability to provide a scenic roadway. All alternatives provide adequate buffer to provide landscaping etc. to screen the roadway where desired.	**Ranked: First** The EAA and Roger's Pass alignments are bordered on the north/west side by NEA and General Rural and on the south/east side by Major Open Space and General Urban lands affording roadway users a clear view of the Carp River. All alternatives provide adequate buffer to provide landscaping etc. to screen the roadway where desired.
Local Access	Ability to serve local private vehicle access needs	**Ranked: Equal** There is no appreciable difference between alternatives for serving private vehicle access needs.	**Ranked: Equal** There is no appreciable difference between Alternatives for serving private vehicle access needs.	**Ranked: Equal** There is no appreciable difference between Alternatives for serving private vehicle access needs.
Ability to support future widening	Ability to support future widening	**Ranked: Equal** All alignments will provide opportunity for future widening, if required.	**Ranked: Equal** All alignments will provide opportunity for future widening, if required.	**Ranked: Equal** All alignments will provide opportunity for future widening, if required.
Overall Transportation Service Criteria Group Ranking:		***1***	***3***	***1***
Social Environment				
Impact on Residents	Number of residences displaced	**Ranked: Equal** No existing residences will be displaced by any of the alternatives	**Ranked: Equal** No existing residences will be displaced by any of the alternatives	**Ranked: Equal** No existing residences will be displaced by any of the alternatives
	Number of residences disrupted as a result of noise impacts associated with construction and/or operation	**Ranked: Equal** One farmhouse is located at the northwest corner of the Hydro Cut and Richardson Side Road (in proximity to the road) which could be subject to disruption effects such as noise. All alignments pass within similar proximity to the farmhouse. All alternatives are likely to result in noise disruption to the southern portion of the Morgan's Grant Subdivision at the northeast corner of Goulbourn Forced Road and Terry Fox Drive.	**Ranked: Equal** One farmhouse is located at the northwest corner of the Hydro Cut and Richardson Side Road (in proximity to the road) which could be subject to disruption effects such as noise. All alignments pass within similar proximity to the farmhouse. All alternatives are likely to result in noise disruption to the southern portion of the Morgan's Grant Subdivision at the northeast corner of Goulbourn Forced Road and Terry Fox Drive.	**Ranked: Equal** One farmhouse is located at the northwest corner of the Hydro Cut and Richardson Side Road (in proximity to the road) which could be subject to disruption effects such as noise. All alignments pass within similar proximity to the farmhouse. All alternatives are likely to result in noise disruption to the southern portion of the Morgan's Grant Subdivision at the northeast corner of Goulbourn Forced Road and Terry Fox Drive.
	Potential for negative impact on community / recreational features	**Ranked: Second** The EAA and Roger's Pass alignments cross the proposed recreational pathway along the CNR corridor envisioned in the City's Official Plan. It will also likely run alongside the future recreational pathway along the Carp River designated in Schedule "I" of the City's Official Plan. As a roadway in this location has the potential to significantly reduce the aesthetic value of a trail along the river, these alternatives are ranked second.	**Ranked: First** Alignment 4-2 will not impact the planned Carp River recreational pathway.	**Ranked: Second** The EAA and Roger's Pass alignments cross the proposed recreational pathway along the CNR corridor envisioned in the City's Official Plan. It will also likely run alongside the future recreational pathway along the Carp River designated in Schedule "I" of the City's Official Plan. As a roadway in this location has the potential to significantly reduce the aesthetic value of a trail along the river, these alternatives are ranked second.
	Change in community character	**Ranked: Equal** Most of the land in the vicinity of the alternative alignments is currently vacant with only a few sporadic residences. All alternative alignments are considered to have equal low potential for change in existing community character.	**Ranked: Equal** Most of the land in the vicinity of the alternative alignments is currently vacant with only a few sporadic residences. All alternative alignments are considered to have equal low potential for change in existing community character.	**Ranked: Equal** Most of the land in the vicinity of the alternative alignments is currently vacant with only a few sporadic residences. All alternative alignments are considered to have equal low potential for change in existing community character.

TABLE 5-1– COMPARISON OF ALIGNMENT ALTERNATIVES				
Criteria Group	**Indicator**	**EA Addendum Alignment (EAA Alignment)**	**October 2000 ESR* Alternative 4-2 (Hydro Cut)**	**Roger's Pass Alignment (Rogers Pass)**
Overall Social Environment Criteria Group Ranking:		*2*	*1*	*2*
Economics				
Economics	Impact on business activity	**Ranked: Equal** There are no businesses in proximity to any of the alternatives. No alternative results in a loss of existing businesses.	**Ranked: Equal** There are no businesses in proximity to any of the alternatives. No alternative results in a loss of existing businesses.	**Ranked: Equal** There are no businesses in proximity to any of the alternatives. No alternative results in a loss of existing businesses.
Agriculture				
Agriculture	Area (ha) of prime agricultural land designated for long term agricultural use removed.	**Ranked: Equal** None of the alternatives remove lands designated as Agricultural Resource Area.	**Ranked: Equal** None of the alternatives remove lands designated as Agricultural Resource Area.	**Ranked: Equal** None of the alternatives remove lands designated as Agricultural Resource Area.
	Area (ha) of designated agricultural land within 30 m of the new roadway that may be impacted by nuisance effects.	**Ranked: Second** The EAA and Roger's Pass alignments have the potential to disturb agricultural operations on the west side of the road mostly from salt spray and dust. Approximately 5.0 ha of agricultural land could be impacted. It should be noted that while this area is within the ARA designation, most of the land in question is not conductive to agriculture due to the presence of bedrock at or near the surface.	**Ranked: First** This alternative will not result in impacts to agricultural land from salt spray and dust.	**Ranked: Second** The EAA and Roger's Pass alignments have the potential to disturb agricultural operations on the west side of the road mostly from salt spray and dust. Approximately 5.0 ha of agricultural land could be impacted. It should be noted that while this area is within the ARA designation, most of the land in question is not conductive to agriculture due to the presence of bedrock at or near the surface.
	Potential for farmland fragmentation	**Ranked: Equal** None of the alternatives results in the fragmentation of farmland.	**Ranked: Equal** None of the alternatives results in the fragmentation of farmland.	**Ranked: Equal** None of the alternatives results in the fragmentation of farmland.
Overall Agriculture Criteria Group Ranking:		*2*	*1*	*2*
Cultural Resources				
Impact on Archeological Resources	Area of medium and high archaeological potential affected	**Ranked: Equal** A Stage 2 Archeological Study was conducted on the EAA alignment. Three archeological features were identified that would be impacted. Mitigation is available and net impacts will be minimal.	**Ranked: Equal** At Stage 1 Archeological Study was conducted on Alignment 4-2 and approximately 1600 m of archeological potential was identified north of Richardson Side Road. Any features that would be impacted could be easily mitigated.	**Ranked: Equal** A Stage 2 Archeological Study was conducted on the EAA alignment. Three archeological features were identified that would be impacted. Mitigation is available and net impacts will be minimal.
	Proximity to known archaeological resources	**Ranked: Equal** A Stage 2 Archeological Study was conducted on the EAA alignment. Three archeological features were identified that would be impacted. Mitigation is available and net impacts will be minimal.	**Ranked: Equal** At Stage 1 Archeological Study was conducted on Alignment 4-2 and approximately 1600 m of archeological potential was identified north of Richardson Side Road. Any features that would be impacted could be easily mitigated.	**Ranked: Equal** A Stage 2 Archeological Study was conducted on the EAA alignment. Three archeological features were identified that would be impacted. Mitigation is available and net impacts will be minimal.

TABLE 5-1– COMPARISON OF ALIGNMENT ALTERNATIVES				
Criteria Group	**Indicator**	**EA Addendum Alignment (EAA Alignment)**	**October 2000 ESR* Alternative 4-2 (Hydro Cut)**	**Roger's Pass Alignment (Rogers Pass)**
Impact on Built Heritage	Loss or disruption to heritage features	**Ranked: Equal** None of the alignments will result in loss of heritage features.	**Ranked: Equal** None of the alignments will result in loss of heritage features.	**Ranked: Equal** None of the alignments will result in loss of heritage features.
	Impact on cultural landscapes	**Ranked: Second** The EAA and Roger's Pass alignments have similar impacts on the cultural landscape, as they set Terry Fox Drive in a location where no roadway was ever anticipated. The Hydro Cut alignment follows former roadways thus mimicking the landscape of the past.	**Ranked: First** Alignment 4-2 follows former roadways thus mimicking the landscape of the past.	**Ranked: Second** The EAA and Roger's Pass alignments have similar impacts on the cultural landscape, as they set Terry Fox Drive in a location where no roadway was ever anticipated. The Hydro Cut alignment follows former roadways thus mimicking the landscape of the past.
Overall Cultural Resources Criteria Group Ranking:		*2*	*1*	*2*

* A 95m ROW was used to calculate impacted areas.

TABLE 5-2 COMPARISON OF ALIGNMENT ALTERNATIVES - SUMMARY			
Criteria Group	**EA Addendum Alignment (EAA Alignment)**	**October 2000 ESR* Alternative 4-2 (Hydro Cut)**	**Rogers' Pass Alignment**
High Importance Criteria Groups			
Natural Environment	**Ranked First** The EAA alignment has the lowest possible impact on wetlands and woodlands. Existing watercourses will be altered, but watercourses will be changed by development of Marchwood and Lakeside.	**Ranked Second** Alignment 4-2 has the greatest impact on woodlands. Existing watercourses are preserved, but watercourses will be changed by development of Marchwood and Lakeside.	**Ranked Second** The Roger's Pass alignment has the greatest impact on wetlands. Existing watercourses will be altered, but watercourses will be changed by development of Marchwood and Lakeside.
Planned Land Use	**Ranked First** The EAA alignment removes approximately 7.5 ha of land that is currently part of the KNL development concept for Marchwood.	**Ranked Third** Alignment 4-2 removes approximately 8.0 ha of land that is currently part of the KNL development concept for Marchwood.	**Ranked First** The Roger's Pass alignment has no negative impact on planned land uses or development concepts.
Construction Costs	**Ranked First** The EAA alignment results in the lowest construction cost of the three options- $34 Million, including environmental impact mitigation features and contingencies.	**Ranked Second** Alignments 4-2 and Roger's Pass result in higher construction costs than the EAA Alignment ($37M - $38M vs. $34M), accounting for environmental impact mitigation features and contingencies.	**Ranked Second** Alignments 4-2 and Roger's Pass result in higher construction costs than the EAA Alignment ($37M - $38M vs. $34M), accounting for environmental impact mitigation features and contingencies.
Transportation Service	**Ranked First** The EAA and Roger's Pass alignments permit a higher level of service since they border urban development to a more limited extent.	**Ranked Third** Alignment 4-2 has the lowest level of service since it borders urban development to the greatest extent.	**Ranked First** The EAA and Roger's Pass alignments permit a higher level of service since they border urban development to a more limited extent.

TABLE 5-2 COMPARISON OF ALIGNMENT ALTERNATIVES - SUMMARY			
Criteria Group	**EA Addendum Alignment (EAA Alignment)**	**October 2000 ESR* Alternative 4-2 (Hydro Cut)**	**Rogers' Pass Alignment**
Low Importance Criteria Groups			
Social Environment	**Ranked Second** The EAA and Roger's Pass alignments will parallel the planned multi-use recreational Carp River pathway, which will disrupt pathway users. All alignment options will cross the planned pathway along the CNR tracks, also disrupting users and causing conflicts at the crossing.	**Ranked First** Alignment 4-2 avoids the planned multi-use recreational Carp River pathway, avoiding impacts on pathway users. All alignment options will cross the planned pathway along the CNR tracks, also disrupting users and causing conflicts at the crossing.	**Ranked Second** The EAA and Roger's Pass alignments will parallel the planned multi-use recreational Carp River pathway, which will disrupt pathway users. All alignment options will cross the planned pathway along the CNR tracks, also disrupting users and causing conflicts at the crossing.
Economics	**Ranked Equal** There are no existing businesses along Terry Fox Drive; therefore, there is no potential for impact on businesses.	**Ranked Equal** There are no existing businesses along Terry Fox Drive; therefore, there is no potential for impact on businesses.	**Ranked Equal** There are no existing businesses along Terry Fox Drive; therefore, there is no potential for impact on businesses.
Agriculture	**Ranked Second** The EAA and Roger's Pass alignments disrupt farming activities on the agricultural land adjacent to the roadway north of Richardson Side Road. The long term use of this land for farming is in doubt, given the sale of the majority of the Richardson Farm to the Regional Group.	**Ranked First** Alignment 4-2 has no impact on farming activities on the agricultural land adjacent to the roadway north of Richardson Side Road. The long term use of this land for farming is in doubt, given the sale of the majority of the Richardson Farm to the Regional Group.	**Ranked Second** The EAA and Roger's Pass alignments disrupt farming activities on the agricultural land adjacent to the roadway north of Richardson Side Road. The long term use of this land for farming is in doubt, given the sale of the majority of the Richardson Farm to the Regional Group.
Cultural Resources	**Ranked Second** The EAA and Roger's Pass alignments disrupt the historic cultural landscape, whereas Alignment 4-2 follows an historic road allowance. This issue is not significant, given the changes to the historic character of the area due to land development activities.	**Ranked First** The EAA and Roger's Pass alignments disrupt the historic cultural landscape, whereas Alignment 4-2 follows an historic road allowance. This issue is not significant, given the changes to the historic character of the area due to land development activities.	**Ranked Second** The EAA and Roger's Pass alignments disrupt the historic cultural landscape, whereas Alignment 4-2 follows an historic road allowance. This issue is not significant, given the changes to the historic character of the area due to land development activities.

As **Table 5-2** demonstrates, the EA Addendum alignment (or the revised ESR alignment) remains the preferred alignment option for Terry Fox Drive between Richardson Side Road and Goulbourn Forced Road (realigned) / Second Line Road. It ranks:

- First in all of the Criteria Groups that were identified as "High Importance" in the 2000 ESR (Natural Environment, Planned Land Use, Cost, and Transportation Service);
- Equal to the other two alignment options in two of the "Low Importance" Criteria Groups (Business and Cultural Resources); and
- Second, behind the Hydro Cut alignment in the remaining two "Low Importance" Criteria Groups (Agriculture and Social Impact).

The Construction Cost Estimate has increased from $13.5M in the 2000 ESR to $34.0M in the EA Addendum. Obviously, this increase is significant. The rationale for the increase in construction cost estimate for this section of Terry Fox Drive is outlined in **Table 5-3**.

The MVCA has not expressed concern over the increased impact on the Carp River Floodplain, with the caveat that an adequate compensation strategy be developed during the detailed design phase. The peak flood levels and rates of flow for the Carp River are not a concern; however, adequate storage capacity needs to be provided. The compensation strategy will include either compensation land for flood storage, a monetary contribution to the MVCA, or a combination of both options. Correspondence with the MVCA is included in **Appendix E**.

TABLE 5-3
Rationale for Construction Cost Estimate Increase
for the Floodplain Alignment 2000 ESR vs. the EA Addendum

Cost Item	Cost Increase
ESR Construction Cost Estimate	$13.5 M
Corridor Preparation (increases due to 4 lane cross-section and additional rock excavation)	+ $3.5 M
Road Structure (increases due to 4 lane cross-section and shallower side slope)	+ $2.9 M
Storm Water Management Ponds (not included in ESR cost estimate)	$3.2 M
Roadway Drainage (increases due to storm sewers and increased data precision)	+ $1.4 M
Overland Drainage System (not included in ESR cost estimate)	$3.3 M
Environmental Impact Mitigation Strategy (not included in ESR cost estimate)	$3.9 M
Contingency (increases due to increases in base estimate)	+ $2.3 M
Total	***$34.0 M**

***Note**: Costs are in 2004 dollars

6.0 PROTECTION FOR RAIL GRADE-SEPARATION

6.1 RATIONALE FOR PROPOSED CHANGES

It is City policy to protect for potential future grade-separations at all at-grade arterial road/rail crossings. Dillon was directed to review grade-separation options on Terry Fox Drive and identify the property envelope that should be protected.

6.2 ALTERNATIVES CONSIDERED

A number of grade-separation options were identified. Because of obvious disadvantages several of these options were screened out from further review.

6.2.1 Dismissed Options

Each of the options that was screened out is identified below, with the rationale for dropping them from consideration.

6.2.1.1 Option 1 - Do-Nothing

As with all Class EA studies, one Option that must be considered is the "Do-nothing" Option. In this case, the "Do-nothing" Option would leave the rail crossing as an at-grade crossing, with the maximum possible control being some combination of flashing lights, bells, and moveable gates. Such a rail crossing scenario may be implemented and remain in place indefinitely, however, the Do-Nothing is not an acceptable option for the grade-separation.

On February 26, 2003 recommendations from the Rapid Transit Expansion Strategy (RTES) were presented to City of Ottawa Council and approved. The final RTES study report identified a Preferred Network Concept that does not recommend rapid transit in the CN Rail corridor at its intersection with Terry Fox Drive. Nonetheless, the City of Ottawa intends to protect the corridor for potential future use. The City's Official Plan identifies policies for rights-of-way protection (Section 2.3.1 Transportation, Other Rights-of-Way Protection):

> "The City will purchase surplus railway rights-of-way and select utility (e.g., hydro line) corridors, as they become available, for use as future transportation and utility corridors. When such rights-of-way are acquired, recreational and agricultural uses may be permitted as interim uses. Future use as a transportation or utility corridor will have priority over any interim use. Provision will be made for recreational uses to continue, wherever possible."

In addition, the Draft Transport Canada Technical Standards for Road/Railway Grade Crossings (last draft March 7, 2002) and current MTO policies support the grade-separation of the Terry Fox Drive/ CN Rail crossing, if the rail line has the potential to be a part of the City's future rail-based rapid transit system.

Therefore, Do-Nothing does not provide an acceptable level of protection at the Terry Fox Drive/ CN Rail crossing and this Option was not considered further.

6.2.1.2 Rail Overpass Option

This option considered leaving Terry Fox Drive at grade and crossing the rail line over the roadway. The impacts for this option extend too far, given typical rates of change in grade that are acceptable for rail lines (in the order of 1% to 2%). To reach an appropriate clearance height, the rail grade changes would have to take place over kilometres of railway in both directions. Also, a rail overpass would create a true barrier within the community. For these reasons this option was dismissed.

6.2.2 Grade-Separation Options Carried Forward

The Study Area for all options was set between Station 14+200 and 15+500 to allow for a common basis of comparison. Plan and centreline profile drawings were prepared for all four options. Given the anticipation that the grade-separation would likely be implemented in the longer term, designs for the grade-separation assumed a four-lane cross-section for Terry Fox Drive.

Four basic options were identified and carried forward for the grade-separation of Terry Fox Drive / CNR crossing:

1. Overpass (i.e., Terry Fox Drive passes over the rail line) using a long bridge that spans from northeast of the rail line to the pair of rock knolls referred to as the Saddle (Overpass/ Long Bridge);
2. Overpass using a short bridge that only spans the rail line (Overpass/ Short Bridge);
3. Underpass (i.e., Terry Fox Drive passes under the rail line) using an open cross-section on Terry Fox Drive. This Option requires the realignment/ renaturalization of Shirley's Brook to run close to the rail line in an engineered channel (Underpass/ Open Section); and
4. Underpass using a closed cross-section on Terry Fox Drive. This Option requires the realignment/ renaturalization of Shirley's Brook to run close to the rail line in an engineered channel (Underpass/ Closed Section)

These options are depicted graphically on **Exhibits 6-1 and 6-2**.

6.2.3 Environmental Impact Assessment Criteria for Grade-Separation

To address the requirements of the EA process, the impacts of the four grade-separation options were assessed using multi-disciplinary criteria groups and criteria. To determine criteria relevant to the evaluation of rail grade-separation alternatives the list of Criteria and Indicators used in the October 2000 ESR was reviewed/refined. Also, other criteria more specifically related to rail grade-separation alternatives were added since the original Criteria and Indicators were more focused on comparing roadway corridors. **Table 6-1** summarises the criteria used in this assessment.

TABLE 6-1 Environmental Impact Assessment Criteria	
Criteria Group	**Criteria**
Natural Environment	Impacts on Wetlands
	Impacts on Aquatic Environment
	Impacts on Terrestrial Environment
Human Environment	Noise Impacts on Residents of Future Developments
	Visual Impacts on Residents of Future Developments
	Impacts on Planned Land Uses
	Impacts on Heritage Features
	Impacts on Potential Archaeological Features
	Air Quality Impacts
Transportation Environment	Level of Service Provided for Pedestrians/ Cyclists
	Level of Service Provided for Transit
	Level of Service Provided for Automobiles
	Potential for Access to Adjacent Lands
Engineering Environment	Impacts on Existing Utilities
	Impacts on Existing Stormwater Management Facilities
	Impacts on Existing Overland and Roadway Drainage patterns
Costs	Capital Costs
Staging	Staging Costs
	Additional Environmental Affects of Staging/Construction

6.2.4 Comparative Evaluation Process

A Pair-Wise Comparison methodology was used to evaluate the four options and select a preferred alternative. The pair-wise comparison method is a qualitative evaluation method that involves comparing all alternatives in pairs. It is based on the premise that people can more easily understand trade-offs when only two alternatives are considered at a time. At a minimum, the method requires that data be collected for each criterion and that the alternatives be rated/ranked on the basis of each criterion. The pair-wise comparison method can recognise criteria rankings and the magnitude of differences in trading off the advantages and disadvantages of alternatives being considered.

The method involves the following steps:

1. Select an alternative to be used as the first alternative in the comparison.
2. Compare this alternative to a second alternative. Of these two alternatives, the one that has the most advantages and least disadvantages is identified as preferred and is then compared to the next alternative.
3. If the first preferred alternative is still preferred, it is then compared to all other alternatives to confirm that it is the preferred alternative overall.
4. If at any point in the comparisons the first alternative selected is found to be less preferred the process must be re-initiated with the "new" preferred alternative.

An alternative that can be justified as being preferred to all other alternatives in the list is identified as the preferred alternative overall.

The Criteria Groups and Criteria were assumed to have equal relative levels of importance.

The results of the evaluation are shown in **Table 6-2**.

TABLE 6-2 - COMPARATIVE EVALUATION OF GRADE-SEPARATION OPTIONS				
Criteria	**Option 1 Overpass/Long Bridge**	**Option 2 Overpass/Short Bridge**	**Option 3 Underpass/Open Section**	**Option 4 Underpass/Closed Section**
Natural Environment				
Wetlands	**Ranked First** Option 1 has the smallest area of impact (approx 0.6 ha) on the wetlands around the rail line. No groundwater impacts due to overpass design.	**Ranked Second** Options 2, 3 & 4 have larger and approximately equivalent areas of impact (approx 1.3 ha) on the wetlands around the rail line. No groundwater impacts due to overpass design.	**Ranked Third** Options 2, 3 & 4 have larger and approximately equivalent areas of impact (approx 0.9 ha) on the wetlands around the rail line. The need to pump water from the underpass would also impact groundwater levels in the area and result in additional impacts to the wetland.	**Ranked Third** Options 2, 3 & 4 have larger and approximately equivalent areas of impact (approx 0.8 ha) on the wetlands around the rail line. The need to pump water from the underpass would also impact groundwater levels in the area and result in additional impacts to the wetlands.
Aquatic	Option 1 has no impact on Shirley's Brook.	Option 2 requires that Shirley's Brook be accommodated in 100m ± of concrete culverts under Terry Fox Drive, which is the least desirable treatment for the crossing of Shirley's Brook.	Options 3 & 4 both require the realignment/ renaturalization of approx 500m Shirley's Brook, which would have more impact than Option 2, but less than Option 2. In this Option, Shirley's Brook would be located in an aqueduct to cross over Terry Fox Drive.	Options 3 & 4 both require the realignment/ renaturalization of approx 500m Shirley's Brook, which would have more impact than Option 2, but less than Option 2. In this Option, Shirley's Brook would be located in an aqueduct to cross over Terry Fox Drive.
Terrestrial	Options 1 and 2 provide a grade-separated ground level connection (e.g. ecological crossing –see **Appendix A**) between the natural environment communities on either side of future Terry Fox Drive. Options 1 and 2 are both considered preferred for this criterion.	Options 1 and 2 provide a grade-separated ground level connection between the natural environment communities on either side of future Terry Fox Drive. Options 1 and 2 are both considered preferred for this criterion.	Options 3 and 4 cannot accommodate a grade-separated ground level connection between the natural environment communities on either side of future Terry Fox Drive. These options are therefore considered to be less preferred than Options 1 and 2 for this criterion. See **Appendix A** of this report.	Options 3 and 4 cannot accommodate a grade-separated ground level connection between the natural environment communities on either side of future Terry Fox Drive. These options are therefore considered to be less preferred than Options 1 and 2 for this criterion. See **Appendix A** of this report.

TABLE 6-2 - COMPARATIVE EVALUATION OF GRADE-SEPARATION OPTIONS				
Criteria	**Option 1 Overpass/Long Bridge**	**Option 2 Overpass/Short Bridge**	**Option 3 Underpass/Open Section**	**Option 4 Underpass/Closed Section**
Human Environment				
Noise Visual	**Ranked Third** Overpass options (Options 1 & 2) will result in higher noise and visual (aesthetic) impacts on residents of adjacent future developments than underpass options (Options 3 & 4).	**Ranked Third** Overpass options (Options 1 & 2) will result in higher noise and visual (aesthetic) impacts on residents of adjacent future developments than underpass options (Options 3 & 4).	**Ranked First** Underpass options (Options 3 & 4) will have lower noise impacts than overpass options (Options 1 & 2) and will have no/ minimal visual impacts on residents of adjacent future developments.	**Ranked First** Underpass options (Options 3 & 4) will have lower noise impacts than overpass options (Options 1 & 2) and will have no/ minimal visual impacts on residents of adjacent future developments.
Planned Land Use	Options 1 and 4 require the least amount of potentially developable land to be removed (1.5 hectares)	Options 2 and 3 require larger amounts of potentially developable land to be removed (3.5 hectares)	Options 2 and 3 require larger amounts of potentially developable land to be removed (2.0 hectares)	Options 1 and 4 require the least amount of potentially developable land to be removed (1.5 hectares)
Heritage Archeological Air Quality	All Options will have similar limited potential impacts for the Heritage, Archeological and Air Quality criterion due to similar footprint areas.	All Options will have similar limited potential impacts for the Heritage, Archeological and Air Quality criterion due to similar footprint areas.	All Options will have similar limited potential impacts for the Heritage, Archeological and Air Quality criterion due to similar footprint areas.	All Options will have similar limited potential impacts for the Heritage, Archeological and Air Quality criterion due to similar footprint areas.
Transportation Environment				
Pedestrians, Bikes, Transit, Auto LOS, Access	**Ranked Equally** All options will provide the same level of service for all transportation modes and the same level of access to adjacent lands.	**Ranked Equally** All options will provide the same level of service for all transportation modes and the same level of access to adjacent lands.	**Ranked Equally** All options will provide the same level of service for all transportation modes and the same level of access to adjacent lands.	**Ranked Equally** All options will provide the same level of service for all transportation modes and the same level of access to adjacent lands.

TABLE 6-2 - COMPARATIVE EVALUATION OF GRADE-SEPARATION OPTIONS				
Criteria	**Option 1 Overpass/Long Bridge**	**Option 2 Overpass/Short Bridge**	**Option 3 Underpass/Open Section**	**Option 4 Underpass/Closed Section**
Engineering Environment				
Utilities SWMF Drainage	**Ranked Equally** All options will adequately accommodate utilities, SWMF, and drainage features.	**Ranked Equally** All options will adequately accommodate utilities, SWMF, and drainage features.	**Ranked Equally** All options will adequately accommodate utilities, SWMF, and drainage features. Options 3 & 4 require pumping stations and separate collection/ conveyance systems. The associated costs are discussed in the next section -Costs Criteria.	**Ranked Equally** All options will adequately accommodate utilities, SWMF, and drainage features. Options 3 & 4 require pumping stations and separate collection/ conveyance systems. The associated costs are discussed in the next section -Costs Criteria.
Costs				
Capital	**Ranked Fourth** The capital cost of Option 1 is estimated to be in the order of $39.5 Million. Capital cost estimates are in $2002, including engineering, and contingencies, but not including taxes, and account for all capital cost to construct Terry Fox Drive in the Study Area from existing conditions (i.e., assumes that no road is in place before construction of this Option). Overpass options (Options 1 & 2) do not require a Pumping Station for stormwater management, as the underpass options do (Options 3 & 4).	**Ranked Second** The capital cost of Option 2 is estimated to be in the order of $26.5 Million. Capital cost estimates are in $2002, including engineering, and contingencies, but not including taxes, and account for all capital cost to construct Terry Fox Drive in the Study Area from existing conditions (i.e., assumes that no road is in place before construction of this Option). Overpass options (Options 1 & 2) do not require a Pumping Station for stormwater management, as the underpass options do (Options 3 & 4).	**Ranked First** The capital cost of Option 3 is estimated to be in the order of $21.5 Million. Capital cost estimates are in $2002, including engineering, and contingencies, but not including taxes, and account for all capital cost to construct Terry Fox Drive in the Study Area from existing conditions (i.e., assumes that no road is in place before construction of this Option). Underpass options (Options 3 & 4) require a Pumping Station for stormwater management, which the overpass options (Options 1 & 2) do not require.	**Ranked Third** The capital cost of Option 4 is estimated to be in the order of $30.0 Million. Capital cost estimates are in $2002, including engineering, and contingencies, but not including taxes, and account for all capital cost to construct Terry Fox Drive in the Study Area from existing conditions (i.e., assumes that no road is in place before construction of this Option). Underpass options (Options 3 & 4) require a Pumping Station for stormwater management, which the overpass options (Options 1 & 2) do not require.

TABLE 6-2 - COMPARATIVE EVALUATION OF GRADE-SEPARATION OPTIONS				
Criteria	**Option 1 Overpass/Long Bridge**	**Option 2 Overpass/Short Bridge**	**Option 3 Underpass/Open Section**	**Option 4 Underpass/Closed Section**
Staging				
Environmental Impact	**Ranked Fourth** All Options are considered to have equal environmental impacts from construction staging (e.g., construction detours, etc.). Staging options are available that would avoid significant environmental impact.	**Ranked First** All Options are considered to have equal environmental impacts from construction staging (e.g., construction detours, etc.). Staging options are available that would avoid significant environmental impact.	**Ranked Second** All Options are considered to have equal environmental impacts from construction staging (e.g., construction detours, etc.). Staging options are available that would avoid significant environmental impact.	**Ranked Second** All Options are considered to have equal environmental impacts from construction staging (e.g., construction detours, etc.). Staging options are available that would avoid significant environmental impact.
Relative Staging Costs	Option 1 would have the highest staging costs, if the grade-separation were to be delayed to a future stage. Either a number of interim significant infrastructure features (e.g. Large Passageway (see **Appendix A**), Ecological culverts and Storm Water Management Facilities) would be required in the first stage of Terry Fox Drive construction that are not required in the ultimate configuration for this Option, or a relatively expensive interim stage would be required (e.g., construction of an initial 2 lane long bridge, which would be twinned in the future). The specific costs for staging have not been accounted for in the Capital Cost estimate.	Option 2 would not require the construction of any significant features in the first stage of Terry Fox Drive construction that would not be required as a part of the future grade-separation. The specific costs for staging have not been accounted for in the Capital Cost estimate.	Options 3 & 4 would have higher staging costs than Option 2, but lower staging costs than Option 2. Culverts would likely be required in the first stage of Terry Fox Drive construction that are not required in the ultimate configuration for this Option. The specific costs for staging have not been accounted for in the Capital Cost estimate.	Options 3 & 4 would have higher staging costs than Option 2, but lower staging costs than Option 2. Culverts would likely be required in the first stage of Terry Fox Drive construction that are not required in the ultimate configuration for this Option. The specific costs for staging have not been accounted for in the Capital Cost estimate.

TABLE 6-2 - COMPARATIVE EVALUATION OF GRADE-SEPARATION OPTIONS				
Criteria	**Option 1 Overpass/Long Bridge**	**Option 2 Overpass/Short Bridge**	**Option 3 Underpass/Open Section**	**Option 4 Underpass/Closed Section**
Summary				
Nat Environ	1	2	3	3
Human Environ	3	3	1	1
Transport Environ	Equally	Equally	Equally	Equally
Engineering Environ	Equally	Equally	Equally	Equally
Costs	4	2	1	3
Staging	4	1	2	2
Overall Ranking	***4***	***1***	***2***	***3***

6.2.5 Paired Comparison

The following describes the paired comparison process. As all options were ranked equally for the Transportation and Engineering criteria groups, they were therefore not considered further in the comparison process as described below.

Option 1 vs. Option 2

The paired comparison process was initiated through Option 1 being compared to Option 2. The Options were ranked equal with respect to the Human Environment criteria group, noise and visual impacts being more critical indicators. The advantages of Option 1 were with respect to Natural Environment, whereas Option 2 was considered preferred with respect to the Cost and Staging criteria groups. Option 1's advantage with respect to the smaller area of wetland removed (0.6 hectares vs. 1.3 hectares) and having no impact on Shirley's Brook was considered to be less of an advantage than Option 2 being less expensive ($13 million less) as well as having lower staging costs. Impacts to the natural environment can be partially mitigated (through natural channel design) to reduce the significance of the impact. Based on the above, Option 2 was considered preferred over Option 1 and carried forward to the next comparison.

Option 2 vs. Option 3

Option 2 was considered preferred with respect to Natural Environment (Option 3 cannot accommodate an at-grade wildlife crossing), as well as preferred with respect to Staging (less staging costs). Option 3 is preferred with respect to the Human Environment (the underpass would have less visual and noise impacts to future surrounding communities), and Cost (Option 3 is $5 million cheaper). The advantages of Option 2 with respect to the Natural Environment were considered more significant than those associated with the Human Environment (noise impacts could be mitigated whereas an underpass would largely act as a barrier to wildlife movement in the area as an above grade wildlife crossing is not expected to be very effective). As well, the capital cost difference between the two Options will be less significant when considering the long-term staging costs. As a result, Option 2 was considered preferred over Option 3 and carried forward to the final paired comparison.

Option 2 vs. Option 4

Option 2 is preferred with respect to Natural Environment (Option 4 cannot accommodate an at-grade wildlife crossing), as well as preferred with respect to Cost ($3.5 million less) and Staging (less staging cost expected). Option 4 is preferred with respect to Human Environment, as the underpass will result in less noise and visual impacts to surrounding future communities. Based on this, the advantages of Option 2 are considered to be more significant than for Option 4. The higher noise and visual impacts of Option 2 can be partially mitigated through landscaping and noise mitigating measures. Option 2 is considered preferred over option 4.

Overall, Option 2 was identified to be preferred over the other options and is therefore considered as the preferred overall option.

6.2.6 Assessment of Alternatives and Preferred Option

Option 2 (Overpass/Short Bridge) was selected as the most preferred grade-separation strategy, and is shown in **Exhibit 6-3.** This Option ranked First in Staging, and Equally Preferred in the Transportation and Engineering Environment Criteria Groups. Option 2 ranked Second in Natural Environment and Cost, and Third in Human Environment.

Option 3 (Under/Open section) was ranked Second overall. For the most part Option 3 was very comparable to Option 2, with a relatively equal number of advantages and disadvantages. The differentiating factor in favour of Option 2 was the inability of Option 3 to provide an effective Environmental Passage. A ground level Environmental Passage connecting the environmental communities on either side of Terry Fox Drive was established as a key mitigation measure to offset the impact of the roadway construction on the South March Highlands environmental area. The inability of Option 3 to provide this connection was judged to be an insurmountable disadvantage.

7.0 PROJECT DESCRIPTION

7.1 SELECTED DESIGN

Exhibits C-01 to C-12 represent the proposed EA Addendum plan and profile for Terry Fox Drive between Richardson Side Road and the Realigned Goulbourn Forced Road/ Second Line Road ***as developed during the study and through discussions with adjacent land owners (i.e. Regional Realty, Kanata Highlands Property).***

The road construction footprint varies in width throughout the alignment to identify the 45-metre roadway ROW, and a grading easement where required.

8.0 NEXT STEPS

8.1 COMMITMENT TO FUTURE WORK

The following commitments to future work have been identified within either the EA Addendum of the Preliminary Design Report and should be addressed:

- A detailed mitigation plan is required for the Carp River floodplain;
- ***The City should*** work with adjacent landowners to combine Stormwater Management Facility strategies;
- Three archaeological sites were identified as part of the Preliminary Design work and they will require Stage 3 archaeological investigations during the detailed design;
- ***The City should*** pursue realignment of Shirley's Brook as a commitment with the adjacent landowner, KNL;
- ***The City should*** review and update ***intersection*** locations pending development proposals;
- ***The City should*** review of need for wildlife crossing culverts prior to detailed design to ensure that land use/development plans are consistent with wildlife culverts proposed; and
- A wildlife monitoring program should be established following the construction of Terry Fox Drive to ensure that a linkage function is being served by the wildlife crossings.

8.2 APPROVALS REQUIRED

The following approvals must be pursued as a result of the EA Addendum and/or the Preliminary Design work:

- Official Plan Right-of-way and alignment for Terry Fox Drive Extension to be revised;
- CEAA Screening and Department of Fisheries and Oceans (DFO) approvals must be sought with respect to the realignment of Shirley's Brook;
- Prior to commencement of project work, a Fill, Construction and Alternation permit must be sought from the Mississippi Valley Conservation Authority for all fish-bearing waterways requiring culverts;
- An Ontario Ministry of Natural Resources Working Around Water permit may be needed, and
- Where mitigation of fish-bearing waterways is required, a compensation plan must be approved by the DFO.