London
CANADA

Ontario

Transportation and Environmental Study Report

Veterans Memorial Parkway Extension and Highway 401 Interchange Improvements

Class Environmental Assessment

MRC McCORMICK RANKIN
A member of MMM GROUP

May 2013

Veterans Memorial Parkway Extension and Highway 401 Interchange Improvements

G.W.P. 3033-11-00

CLASS ENVIRONMENTAL ASSESSMENT AND PRELIMINARY DESIGN STUDY

GROUP 'B' PROCESS

TRANSPORTATION ENVIRONMENTAL STUDY REPORT

Prepared for the City of London and the Ministry of Transportation by:
McCormick Rankin (a member of MMM Group)

Prepared by:

Gillian Thompson, B.Sc. MCIP, RPP
Environmental Planner/Project Manager
MRC

Reviewed by:

Michael Chiu, P.Eng.
Project Manager

THE PUBLIC RECORD

This Transportation Environmental Study Report is available for public review from May 31 to July 5, 2013, during regular business hours at:

City of London City Hall
Clerk's Office, 3rd Floor
300 Dufferin Avenue, London ON
Hours of Operation:
Monday-Friday: 8:30 AM – 4:30 PM
Saturday/Sunday: Closed

Ontario Ministry of Transportation
West Region, Front Lobby
659 Exeter Road, London ON
Hours of Operation:
Monday-Friday: 8:00 AM – 5:00 PM
Saturday/Sunday: Closed

London Public Library – Pond Mills Branch
1166 Commissioners Road East, London ON
(519) 685-1333
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Veterans Memorial Parkway Extension and Highway 401 Interchange Improvements Class Environmental Assessment

NOTICE OF COMPLETION

OVERVIEW

The Ministry of Transportation (MTO) and the City of London have jointly completed a Class Environmental Assessment (EA) and Preliminary Design Study for the extension of Veterans Memorial Parkway (VMP) from Highway 401, south to Wilton Grove Road, and the associated reconfiguration and expansion of the Highway 401 Interchange. The Recommended Plan encompasses the following key components:

- Extension of VMP as a 2-lane expressway with a rural cross section within a 60 m right-of-way
- A new intersection at Wilton Grove Road and extended VMP
- Replacement of the existing VMP Bridge on its current alignment
- Interchange improvements that include new ramps and modifications to existing ramps

Construction of the new VMP Bridge will require the temporary closure of the bridge and eastbound ramps for several months during construction; closures will be communicated and detour routes will be signed.

THE PROCESS

This study is being carried out under the planning and design process for a Group B project under the Class Environmental Assessment for Provincial Transportation Facilities (2000) and a Schedule C project as outlined in the Municipal Engineers Association's *Municipal Class Environmental Assessment* (2000, as amended in 2007 & 2011) so that the requirements of the Ontario Environmental Assessment Act are met. The Class EA process included public and agency consultation, identifying operational and capacity needs, evaluation of alternatives, assessment of potential impacts and identification of measures to mitigate adverse impacts. Public Information Centres were convened on May 23 and December 12, 2012 and a Public Participation meeting at the Civic Works Committee meeting was held on May 6, 2013 to bring forward the recommendations for public and agency review and comment.

The Environmental Assessment incorporates an Environmental Impact Statement (EIS) in accordance with City of London Guidelines to describe the significant natural features and functions, assess potential impacts of the proposed undertaking and recommend measures to avoid or minimize impacts to significant features.

PUBLIC REVIEW OF THE TRANSPORTATION ENVIRONMENTAL STUDY REPORT

A Transportation Environmental Study Report (TESR) has been completed for this project and will be available starting **Friday May 31, 2013**, for a minimum 30-day public review period. The report summarizes the environmental assessment process for this project and is available for review at the following locations:

City of London City Hall
Clerk's Office, 3rd Floor
300 Dufferin Avenue, London ON
Hours of Operation:
Monday-Friday: 8:30 AM – 4:30 PM
Saturday/Sunday: Closed

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Additional information is available on the City of London website:
http://www.london.ca/d.aspx?s=/Transportation/trans_planning.htm#VMP_South_Extension_Ea

Interested persons are encouraged to provide comments by **Friday July 5, 2013**. If, after consulting with the City and MTO, you still have serious unresolved concerns, you have the right to request the Minister of the Environment make a Part II Order for this project. A Part II Order may lead to preparation of an individual environmental assessment. For more information on the Part II Order request process, you are encouraged to contact the Ministry of the Environment. The Minister of the Environment (Ferguson Block, 11th Floor, 77 Wellesley St. W. Toronto ON M7A 2T5) must receive your Part II Order request by **Friday July 5, 2013**. A copy of the request should also be forwarded to the City, MTO and MRC at the addresses below. If there are no outstanding Part II Order requests after **Friday July 5, 2013**, the project will be considered to have met the requirements of the Class Environmental Assessment.

COMMENTS

To obtain additional information or provide comments, please contact:

Michael Chiu
Consultant Project Manager
McCormick Rankin (MRC)
2655 North Sheridan Way
Mississauga, ON L5K 2P8
Tel: (905) 823-8500 Ext. 1243
Email: mchiu@mrc.ca

Doug MacRae
Manager, Transportation Planning and Design
City of London
P.O. Box 5035
London, ON N6A 4L9
Tel: (519) 661-2500 Ext. 4637
Email: dmacrae@london.ca

Brian Goudeseune
Senior Project Manager
Ministry of Transportation
659 Exeter Road
London, ON N6E 1L3
Tel: (519) 873-4546
Email: brian.goudeseune@ontario.ca

Information collected will be used in accordance with the *Freedom of Information and Protection of Privacy Act* and the *Access to Information Act*. With the exception of personal information, all comments will become part of the public record. If you have any accessibility requirements in order to participate in this project, please contact one of the team members listed above.

Pour des renseignements en français veuillez communiquer avec Yannick Garnier au 905-823-8500 Poste 1471. Courriel: ygarnier@mrc.ca.

This notice issued on May 27, 2013.

EXECUTIVE SUMMARY

Veterans Memorial Parkway (VMP) is a key corridor providing one of five accesses from the provincial highway network to the City of London and providing the main access between Highway 401 and London International Airport.

In April of 2011, Municipal Council requested the commencement of an environmental assessment study for the extension of VMP south to Wilton Grove Road in order to prepare for future development opportunities in that area. This study has been undertaken to meet the requirements of the MTO Group 'B' and Municipal Schedule 'C' Class EA processes.

Subject to completion of the study, the VMP extension will be a rural 2-lane road and will necessitate reconstruction of the existing interchange. Property acquisition will be required for both the interchange and road extension. The new Highway 401 bridge structure will accommodate the expansion of Highway 401 to a future 8-lane cross-section.

Construction of the VMP interchange improvements will require the closure of the bridge and eastbound ramps for several months during construction; closures will be communicated and detour routes will be signed.

Needs and Opportunities

The key economic opportunities and transportation needs can be summarized as follows:

- One of the key components of the City of London's long-term economic development strategy is the concept of "Economic Gateways".
- A key component of these "Economic Gateways" is the employment lands in the Highway 401 corridor.
- The Industrial Lands Development Strategy (ILDS) Update recommends that the Urban Growth Area along the Highway 401 corridor be expanded. This will be considered in the Official Plan review and implemented through Official Plan policy.
- The ILDS Update recommends an extension of VMP to Wilton Grove Road.
- Transportation analysis confirms that future traffic volumes generated by economic growth along the Highway 401 corridor will lead to traffic congestion at the Highbury Avenue/Wilton Grove Road intersection.
- The Transportation Master Plan indicates that VMP interchange improvements and an extension the Parkway south of Highway 401 to Wilton Grove Road is a key part of the 2030 Recommended Road Network Improvements.

Alternatives and Evaluation

Extending VMP and upgrading the Highway 401 Interchange is selected as the preferred alternative *planning solution* because it is the only alternative that reasonably addresses the identified needs and opportunities by:

- Creating a transportation network that fully supports the future economic growth opportunities in southeast London, as identified in the Industrial Lands Development Strategy Update and supported by the Official Plan review;
- Implementing the recommendations of the Smart Moves by providing additional capacity and improving traffic operations; and ultimately,
- Supporting the realization of City Council's economic growth objectives.

The assessment of *design alternatives* considered two aspects:

- Highway 401 Interchange.
- Veterans Memorial Parkway Bridge

Given the high number of constraints around the interchange, a long list of concept design alternatives was developed to explore how various constraints may be avoided or impacts minimized through design. The long-list of concept design alternatives was screened and two of the concepts (Parclo A3-Modified and Parclo AB) were set aside from further consideration due to poor safety and operations, property, and natural environmental impacts.

The four remaining concept design alternatives were assessed and evaluated in more detail.

- Alternative 1: Parclo A4
- Alternative 2: Parclo A4-Modified
- Alternative 3: Parclo A3
- Alternative 4: Diamond-Parclo A

The selection process included *assessment* (potential benefits and impacts of each alternative were assessed against a comprehensive set of criteria for socio-economic, cultural, natural environment) and *evaluation* (a comparative examination of the relative advantages and disadvantages of the alternatives).

Based on the assessment and evaluation, the preferred interchange concept design was identified as Alternative 3, the Parclo A3 for the following reasons:

- In Socio-Economic Environment, Alternative 3 is preferred because it avoids impacts to the high investment business currently in development in the NW quadrant, within Innovation Park.

- In Cultural Environment, Alternatives 3 and 4 are slightly preferred since Alternatives 1 and 2 are deemed to have slightly higher risk of archaeological finds since they result in greater footprint impacts (i.e., a larger area impacted).
- In Natural Environment, Alternative 4 is preferred over Alternative 3 because it has less impact to the undesignated NE forest patch. However, both Alternatives 3 and 4 avoid impacts to the designated Natural Heritage System (NHS) in the SE, considered a higher constraint. Alternatives 1 and 2 are least preferred because they impact the designated NHS.
- In Technical Considerations, Alternative 1 is preferred due to its performance in capacity, safety and operations. Alternative 4 is least preferred due to safety reasons; the merging of higher speed southbound to westbound traffic with slower moving northbound to westbound traffic, from the left, is considered highly undesirable. Alternatives 2 and 3 are equally slightly less preferred than Alternative 1 due to shorter weaving distance on Highway 401 (Alt 2) and a left turn at the north to east ramp terminal (Alt 3). In both cases, these aspects are considered acceptable given the low traffic volumes anticipated in the northbound direction.
- In comparing Alternatives 3 and 4, the benefits of avoiding the undesignated forest patch in the NE quadrant, associated with Alternative 4, are far outweighed by safety considerations on the westbound on-ramp.

The evaluation of Bridge Alternatives was a 2-stage process: Stage 1 – Bridge Expansion Alternatives; and Stage 2 – Bridge Replacement Alternatives. The Stage 1 and 2 evaluations were carried out at a high level, comparing only key criteria.

Bridge replacement is the Preferred Bridge Expansion Alternative because it is fully compatible with geometric standards, has high flexibility for future Highway 401 expansion, and has a lower Life-Cycle Cost.

Three basic bridge replacement alternatives were developed first, based on the replacement of the existing bridge west of its current alignment (West 1), on its current alignment (Central) and east of its current alignment (East). The West 1 option resulted in substantial impacts to Innovation Park and as such, a second west option was developed (West 2) that still proposed a bridge replacement west of the existing bridge, but minimized impacts to Innovation Park.

Based on the assessment, the Central Alternative is the Preferred Bridge Replacement Alternative because, it avoids impacts to Innovation Park, has minimal edge impacts to the Natural Heritage System and has straightforward construction staging, with the shortest construction duration and lowest estimated cost.

Recommended Plan

The Recommended Plan encompasses the following key components:

- Extension of Veterans Memorial Parkway as a 2-lane expressway with a rural cross section within a 60 m right-of-way (consistent with Official Plan designation);
- A new intersection at Wilton Grove Road and extended Veterans Memorial Parkway;
- Replacement of the existing VMP Bridge on its current alignment;
- Interchange improvements that include:
    - Reconfigured southbound to westbound ramp in the NW quadrant;
    - Slightly modified eastbound to northbound ramp, modified southbound to eastbound ramp incorporating a new northbound to eastbound move in the SW quadrant;
    - Reconfigured westbound to northbound ramp, new westbound to southbound ramp and new northbound to westbound ramp in the NE quadrant;
- Retaining wall in the SE quadrant to minimize encroachment into the designated significant Natural Heritage System;
- Realigned Crinklaw Drain to avoid a long enclosure under the VMP extension and ramp terminals south of Highway 401;
- Enhancement of fish habitat in the Crinklaw Drain through natural channel design; and
- Provision of wildlife passage opportunities at the Crinklaw Drain crossing.

Road Alignment

The VMP extension from Highway 401 to Wilton Grove Road will be constructed as a basic 2-lane road with a centre median, shoulders and rural cross-section (ditch drainage). The proposed right-of-way is 60 m, consistent with the City's expressway designation for VMP. The new road alignment, interchange ramps, interchange ramp terminals and the new intersection at Wilton Grove Road have been designed to accommodate Long Combination Vehicles (LCVs).

Veterans Memorial Parkway Bridge

The proposed replacement structure will be a two-span (38m – 38m) continuous bridge with integral abutments. This configuration requires a pier situated in the median of Highway 401. The abutment locations were selected in order to provide adequate space to not preclude potential future widening of Highway 401 to 4-lanes in each direction. The structure will be constructed with a slight skew angle relative to Highway 401.

Typical VMP Road Cross-Section

The proposed VMP extension is a rural cross-section that includes two 3.75 m travel lanes, a raised 2 m median and a 2.5 m shoulder. Consistent with the overall designation of VMP as an expressway, there is no provision for sidewalks, multi-use paths or cycle lanes. Highway drainage is conveyed via roadside drainage ditches to appropriate outlets at the Crinklaw Drain.

The cross-section on the bridge will include a 2 m raised median, 3.75 m through lanes and speed change lanes of variable width associated with the highway on and off-ramps, and 2.5 m shoulders.

Retaining Wall

A retaining wall at the base of the roadway embankment in the SE quadrant is recommended as a key *design mitigation* in order to restrict encroachment into the woodland and minimize impacts to the natural heritage system; the primary natural environmental constraint in the study area. The retaining wall is intended to largely maintain the existing property line adjacent to the woodland. As noted in Section 7.5, non-retaining wall approaches can also be considered, recognizing that approaches that involve slopes may actually extend intrusion effects further into the woodland. The feasibility of alternative methods will be examined during detailed design, with an overriding objective of minimizing intrusion into the forest edge. The embankment/slope and retaining wall will ultimately be compatible with the slope around the bridge abutment.

Wilton Grove Road Intersection

The VMP extension will terminate at an un-signalized, at-grade “T” intersection at Wilton Grove Road. Wilton Grove Road will be reconstructed at the intersection to include turning lanes. In the vicinity of the VMP intersection, the Wilton Grove Road through lanes will be widened to 3.75 m and the turn lanes will be 3.5 m.

Stormwater Management and Drainage

The key aspects of the drainage and stormwater management plan are:

- Modifications and additions to the existing culvert network that will serve the VMP extension and interchange;
- Provision of a dry stormwater management pond in the NE quadrant of the Highway 401 Interchange;
- Provision of linear treatment swales along the east and west sides of the VMP extension; and
- The realignment of the Crinklaw Drain.

Landscape Design

The Recommended Plan includes a landscape design concept that encompasses roadside / aesthetic plantings; plantings along the Crinklaw Drain realignment to create a riparian zone and enhance wildlife use and movement through this area; and possible relocation and enhancement of gateway features. The City of London Environmental Management Guidelines (Revised January 2007) provides guidance with respect to plant selection for natural heritage areas and buffers. This guide will be used during the further development of the design concept into the Landscape Plan during the detailed design. The Landscape Plan developed for the interchange will reflect MTO standards.

Illumination and Traffic Signals

Partial illumination at the Highway 401 and Veterans Memorial Parkway Interchange for decision areas and critical points for ramps is warranted in accordance with Ministry Directive PLNG-B-05. Specifically, illumination is recommended along all on and off-ramps as well as the ramp terminals at VMP.

Traffic signals are warranted at both ramp terminals and will be implemented at the outset. Traffic signals at the VMP / Wilton Grove Road intersection are not warranted for opening day but will be warranted for the 2032 traffic volumes. Therefore traffic signals at this location are not recommended at this time.

Construction Staging and Detours

The proposed construction staging will minimize the duration of the project. It will allow the construction of the VMP extension and the improvements to the Highway 401 Interchange to be completed within a 12-month duration. There may be opportunities to reduce the construction duration based on the detailed design.

In addition to the closure of the VMP Bridge, short-term single lane closures are anticipated on Highway 401 (for bridge demolition) and on the westbound to northbound off-ramp and the southbound to westbound on-ramp, to facilitate traffic shifts. Full closure of Highway 401 may be required for short duration during night time depending on construction method and associated traffic impacts.

Detour alternatives will be subject to further study and consultation during detailed design.

Property and Access

The Recommended Plan and proposed new right-of-way will impact five properties (approximately 7.2 ha) through encroachment. No residences or business will be directly impacted. Property requirements depicted are preliminary in nature and subject to further review during detailed design.

Additional property east and west of the VMP extension will be required for the realignment of Crinklaw Drain and its floodplain, just south of its existing location; the property required will be occupied by the watercourse and riparian corridor / floodplain.

Two farm accesses from Wilton Grove Road can likely remain in their current location since a raised median on Wilton Grove Road is not proposed. Driveway accesses on Wilton Grove Road will not be affected.

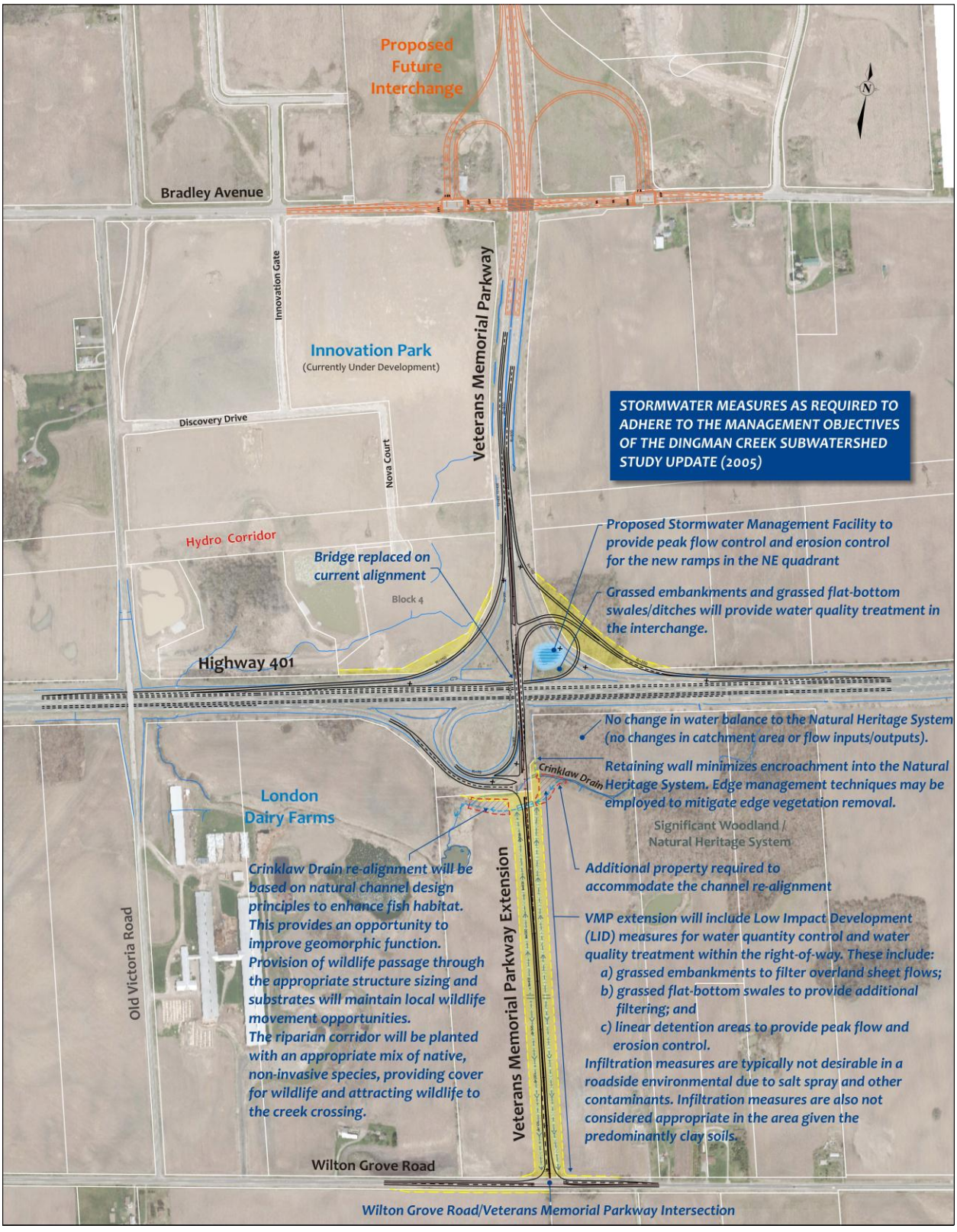
Consultation

External agencies, utilities, emergency service providers, municipalities and other stakeholders, as well as property owners in proximity to the study area were contacted during the study and requested to provide input and to comment on the study findings. Members of the general public were notified of the study through notifications in local newspapers, and invited contact the project team to join the project mailing list.

Mitigation Measures

Mitigation measures as well as environmental protection and enhancement measures will be employed during implementation of the Recommended Plan to reduce or avoid environmental impacts. The table below summarizes the key concerns identified to date, the mitigation measures based on the identified environmental sensitivities and commitments to future work. A complete list of environmental protection and mitigation measures is provided in Chapter 8.

Recommended Plan



ENVIRONMENTAL ISSUE/CONCERN	CONCERNED AGENCIES	PROPOSED MITIGATION / COMMITMENT TO FURTHER WORK
Property and Access (Section 8.1.2 of TESR)		
• The Recommended Plan will impact five properties through encroachment. • No residences or business will be directly impacted. • Two farm accesses can likely remain in their current location since a raised median on Wilton Grove Road is not proposed. • Drive access from Wilton Grove Road will not be affected.	MTO City of London Property Owners	• MTO / City of London will negotiate with individual property owners to provide fair market value for the required property. • Potential impacts to farm access locations and driveways on Wilton Grove Road will continue to be assessed during detailed design. If impacts are deemed to occur at that time, appropriate access mitigation will be developed in consultation with the landowners
Agriculture (Section 8.1.3 of TESR)		
• The VMP extension will result in some Class II farm land being taken out of production. Direct impacts to agricultural lands and related impacts to production will be mitigated / compensated through the property acquisition process. • Any indirect impacts to agricultural operations would be temporary in nature (construction vehicles on side roads). • Agricultural fields which may have tile drainage, whereby land acquisition may require removal and / or modifications to existing drainage works.	MTO City of London OMAFRA Property Owners	• Impacts to Class I to Class II agricultural lands will be minimized where possible. • Contractors will be required to allow farm equipment movement. Access to farm properties will be maintained during and after construction. • Tile drainage systems within and adjacent to the proposed new right-of-way will be identified in consultation with property owners, during detailed design. Tile drains will be avoided where possible and the tile drain network will be modified, as required, to ensure that impacted tiles are removed / closed and that remaining tiles continue to function. Given landowner concerns about drainage, it will be important to demonstrate to landowners that farm drainage will continue to function.
Vegetation (Section 8.3.1 of TESR)		
• Removal of vegetation in the NE quadrant to accommodate Recommended Plan • Minimizing vegetation removal and edge impacts to the woodland in the SE quadrant • Removal of species of conservation concern	MTO City of London UTRCA MNR Nature London	**Site Specific Mitigation Measures** NE Quadrant • Apply an edge treatment to promote the early re-establishment of the forest edge, including the use of buffer plantings which may include tall, fast-growing shrubs and early successional trees. • Opportunities for the transplantation of displaced populations of Rough Avens and Arrow-leaved Aster into suitable habitat in the residual forest stand will be considered where timing and logistics are favorable. SE Quadrant • A retaining wall at the base of the roadway embankment in the SE quadrant is recommended as a key design mitigation in order to restrict encroachment into the woodland and minimize impacts to the natural heritage system. The design of the embankment slope and retaining wall will be finalized in detailed design, based on site-specific ground stability/foundations information. • Following construction of the retaining wall, apply an edge treatment to promote the early re-establishment of the forest edge, in consultation with a qualified Arborist. • During construction, apply measures to reduce/avoid rutting and compaction of forest soils within the work space to

ENVIRONMENTAL ISSUE/CONCERN	CONCERNED AGENCIES	PROPOSED MITIGATION / COMMITMENT TO FURTHER WORK
		minimize stress to adjacent trees. The measures should be identified in consultation with a qualified Arborist.
		Standard Construction Mitigation Measures • Delineate "Environmental Sensitive Areas" in Contract Drawings and Specifications and in the field use temporary vegetation protection fencing or other appropriate fencing or other appropriate measures to prevent encroachment into sensitive areas. • Install temporary erosion and sediment control measures on the margins of woodlands and wetlands prior to construction, and maintain throughout construction per Ontario Provincial Standard Specification (OPSS) 805 - Temporary Erosion and Sediment Control Measures. Maintain all temporary erosion and sediment control measures in an effective, functioning, stable condition. This will require routine inspections, including after storm events, and repair as required. • Re-stabilize and re-vegetate exposed soil surfaces as soon as possible, using MTO approved seed mix per OPSS 804 - Seed and Cover, or other suitable field mix identified by the Landscape Architect during detailed design.
Wildlife Habitat (Section 8.3.1 of TESR)		
• Loss of wildlife during construction • Localized impacts due to removal of vegetation/habitat. • Localized potential for nesting by some species in adjacent vegetation that may be disturbed by the construction activities. • Wildlife passage and maintenance of the amphibian movement corridor.	MTO City of London UTRCA MNR Nature London	**Amphibian Movement Corridor** • During construction of the realigned Crinklaw Drain, install silt fencing along the edge of the work zone to prevent amphibians and reptiles from moving into the work space. • The culvert will be designed to facilitate passage by a variety of small to mid-sized mammals, as well as amphibians and reptiles, including Snapping Turtle, a species of Special Concern. The proposed structure meets and exceeds this guideline, with an OR index of 0.27. • The proposed culvert will accommodate 1 m wide terrestrial wildlife "benches" on either side. The benches will be tied into the existing ground at the culvert entrance/exit to provide a seamless transition for wildlife to and from the riparian corridor. Wingwalls will be incorporated to minimize the length of the structure (and therefore wildlife travel distance) to the extent possible. **Migratory Birds** • No work is permitted to proceed that would result in the destruction of active nests (nests with eggs or young birds), or the wounding or killing of birds, of species protected under the Migratory Birds Convention Act, 1994 and/or Regulations under that Act. • Ensure that timing constraints are applied to avoid vegetation clearing (including grubbing) during the breeding bird season for tree nesting (approximately April 1 to August 15). It should be noted that occasionally bird species will precede or exceed the approximate breeding bird season window. • Migratory bird species that use structures for nesting often commence nesting later, and may continue nesting beyond, the above period. For this reason, MTO West Region has adopted the timing window of May 1 to August 31 nesting period constraint to guide structure maintenance activities and mitigation. • Targeted surveys for Barn Swallow will need to be undertaken by a qualified biologist prior to the commencement of physical work on the existing bridge to confirm the presence / absence of nests for this species.

ENVIRONMENTAL ISSUE/CONCERN	CONCERNED AGENCIES	PROPOSED MITIGATION / COMMITMENT TO FURTHER WORK
		Other Wildlife Species • In the event that an animal encountered during construction does not move from the construction zone and construction activities are such that continuing construction in the area would result in harm to the animal, all activities will stop and the Contract Administrator will be notified. • In the event that a SAR or possible SAR is found in the construction area, all construction that could potentially harm the animal will cease immediately and the Contract Administrator will be notified. The Contract Administrator will then contact the MNR SAR Biologist for direction, as these animals are protected under the ESA (2007).
Fisheries & Aquatic Habitat (Section 8.3.2 of TESR)		
• Impact on fish habitat due the proposed realignment and culvert crossing of Crinklaw Drain. The proposed works include realignment/removal of an approximately 223 m long section of Crinklaw Drain and replacement with a 224 m long section of channel and installation of a new 37 m long concrete box culvert along the new channel section. Crinklaw Drain is managed as a municipal drain with intermittent flows while supporting seasonal warmwater baitfish habitat. This drain has been previously channelized and subject to periodic clean-out. • Overall risk to fish and fish habitat is Low given that, despite the removal of a reach level section of the drain, the sensitivity of the fish and fish habitat in this intermittent warmwater system is low.	MTO City of London UTRCA MNR Nature London	The assessment of impacts on fish and fish habitat will be refined based on the detailed design, as will the assessment of the risk of works to fish and fish habitat, based on the criteria outlined in the MTO Fish Guide and MTO/DFO Fisheries Protocol. General construction mitigation measures to minimize potential impacts during and following construction activities, including for example: • For all in-water works, which includes the transfer of flow from the old to new channel, a warmwater timing window permitting in-water work from July 2 through to March 14 of the following year will be employed (no work permitted March 15 to July 1). • Comprehensive erosion and sediment control BMPs will be implemented to prevent migration of sediment laden runoff from the construction zone. Inspection and maintenance will occur until the site is stable and final cover is established. These measures will include, but not be limited to, isolation of all near-water construction zones that drain to the watercourse using properly installed, inspected and maintained perimeter silt fencing (or appropriate alternative). • Prior to transferring flow to the new channel section, fish will be rescued from the existing channel section to be abandoned and relocated to appropriate habitat away from the works by qualified fish biologists under Scientific Collector's Permit obtained in advance of construction from MNR. • All activity will be controlled so as to prevent entry of any petroleum products, debris and sediment or other potential contaminants/deleterious substances to the watercourse. Storage, maintenance or refuelling of equipment will be conducted well away from the watercourse in properly sited and contained areas. A Spills Prevention and Response Plan will be developed by the Contractor and kept on site at all times. All materials necessary for containment, including a supply of silt control fabric, will be readily available on the site. • Any temporarily stockpiled material, construction or related materials and debris will be properly sited and contained (e.g. within silt fencing) on level ground separated at least 30 m from the watercourse. All construction materials and debris will be removed and appropriately disposed of following construction. • No equipment shall ford or otherwise enter the watercourse unless authorized by MNR. • An environmental inspector experienced in working around watercourses will be responsible for ensuring the sediment and erosion control measures are functioning effectively and being maintained, and all of the other general mitigation measures are being implemented as intended. • The inspector will ensure all environmental mitigation and

ENVIRONMENTAL ISSUE/CONCERN	CONCERNED AGENCIES	PROPOSED MITIGATION / COMMITMENT TO FURTHER WORK
		design measures are properly installed/constructed and maintained, and appropriate contingency and response plans are in place and implemented if required. Appropriate support from a fish biologist, landscape architect and channel specialist/fluvial geomorphologist will be obtained during specific aspects of the works (e.g., fish rescue, low flow channel installation, channel construction, landscaping).
Erosion and Sediment Control (Section 8.3.3 of TESR)		
• Excavation and grading may result in erosion of exposed soils that can be carried via overland flow and drainage channels to the Crinklaw Drain and downstream receiving waters during storm events. • Given the erosion issues and concerns within the Dingman Creek subwatershed generally, a high level of diligence with respect to managing erosion and sedimentation and maintaining fully functioning control systems will be expected by the City, MOE, UTRCA and MTO.	MTO City of London MOE MNR UTRCA	Relevant mitigation measures will include the following, many of which are also identified in Sections 8.3.1 and 8.3.2 since they contribute to the protection of terrestrial and aquatic habitats: • Vegetation removal will be limited to only what is required for grading and ditching operations, and will be clearly identified on the drawings. • Erosion and sediment control BMPs will be implemented throughout construction to prevent migration of sediment to the watercourses/municipal drains within the study area and all other natural features. • Any works in the watercourse or along the banks will be isolated from the main flow and conducted 'in the dry' using flow passage systems including cofferdams. Any dewatering operations will be directed onto a suitable vegetated area at least 30 m away from Crinklaw Drain, or into a sediment settling basin or filter bag which will allow sediments to settle out prior to discharging to the watercourse. The discharge point for dewatering activities shall be suitable so as not to create additional erosion or sediment related impacts. • New or re-constructed ditches will be properly stabilized using vegetation or rock protection depending on slope. Rip rap or other clean granular stabilizing materials free of fines, will be installed at outlets and spillways. • Stabilization and re-vegetation of all disturbed surfaces will be established as soon as possible following excavation and construction to protect against erosion and sedimentation of local drainage.
Surface Water (Section 8.3.4 of TESR)		
• Runoff from Highway 401 and crossing roads could impact water quality if not properly handled. • Erosion and flood risk in the receiving watercourses. • Changes to the hydrologic characteristics of adjacent wetlands and woodlots.	MTO City of London MOE UTRCA Nature London Property Owners	• The proposed stormwater management strategy will provide stormwater quality and quantity control. The key elements are: • Dry stormwater management pond in the northeast quadrant of the VMP/401 interchange for stormwater quantity and quality control. • Linear treatment swales along the east and west sides of the southerly extension of the VMP for stormwater quality control. • The detailed design for the VMP will be undertaken in a manner that minimizes any impact on the hydrologic characteristics of the adjacent wetlands and woodlots; design and construction of the drainage works will be such that road runoff is not directed to the woodland/wetlands and that local groundwater table is not permanently altered by grading and excavation. • Relevant standard construction mitigation measures will ensure that surface water quality is protected during construction. These measures have been outlined above, in Sections 8.3.1, 8.3.2 and 8.3.3 since they contribute to the protection of terrestrial and aquatic habitats and focus mainly on erosion and sediment control.

ENVIRONMENTAL ISSUE/CONCERN	CONCERNED AGENCIES	PROPOSED MITIGATION / COMMITMENT TO FURTHER WORK
Groundwater Resources (Section 8.3.5 of TESR)		
• Impacts to existing wells and groundwater resources.	MTO City of London MOE UTRCA Nature London	• A Permit to Take Water (PTTW) must be obtained from MOE if the amount of water taken exceeds 50,000 L/day as per the Ontario's Water Taking Regulation (O. Reg. 387/04 made under the Ontario Water Resources Act). • Unused and unreported water wells may be encountered during construction, and any unused water wells within the construction footprint must be abandoned as per O. Reg. 903, as amended by O. Reg. 372/07, prior to any further work where they are located. In addition, a well monitoring program should be undertaken, as appropriate, to monitor the impacts to the wells that will be potentially affected by the VMP Bridge, prior to, during and after the construction activities. • The Stormwater Management Plan discussed in Section 7.7 will ensure that all road runoff from the VMP and the interchange ramps will be controlled for quantity and quality to mitigate potential impacts (i.e., interrupt contaminant pathways) to groundwater. • BMPs will be implemented by the Contractor to prevent impacts to groundwater. These may include: o Use of additional sediment and erosion control measures as necessary to minimize erosion of exposed soils, and prevent sediment from entering natural watercourses in the vicinity, or from negatively impacting drainage works in the vicinity; o Monitoring and regular maintenance of sediment and erosion control measures as required throughout the construction period; o No storage, maintenance or refuelling of equipment will be permitted near any sensitive areas including the drainage routes within the study area; o Appropriate dewatering measures will be implemented to manage any groundwater encountered during grading activities, and dewatering discharge water will be filtered as necessary to prevent transport of sediment to natural surface water receptors.
Utilities (Section 8.5 of TESR)		
• Existing Union Gas pipeline, Bell underground plant and London Hydro distribution lines may be impacted by the Recommended Plan and may require relocation or mitigation. • Based on Preliminary Design, no impacts/conflicts are anticipated at the Hydro One 230 kV corridor that crosses VMP north of Highway 401.	MTO City of London Union Gas Bell Canada London Hydro	• Relocation or mitigation of affected utilities will occur through consultation with the affected utility providers in the subsequent detailed design phase. • Confirm with Hydro One that no impacts to 230 kV corridor will occur as a result of proposed design. • The utilities information noted is based on mark-ups / information received from the agencies. Therefore, the location of all plant and specific relocation strategies must be established during detailed design.