

Net Effects Analysis – Alternative S1-1

COLUMN 1 Evaluation Factors and Sub-Factors	COLUMN 2 Potential Effects	COLUMN 3 Avoidance / Mitigation / Compensation / Enhancement Measures	COLUMN 4 Potential Net Effects
1.0 Natural Environment			
1.1 Fish and Fish Habitat			
1.1.1 Fish Habitat	<p><i>Watercourse description</i> 6 watercourses are within the interchange alternative.</p> <ul style="list-style-type: none"> 1 crossing is a permanent coolwater system (East Branch Sixteen Mile Creek, ~1.1 km within the TPR) 1 is an intermittent tributary of East Branch Sixteen Mile Creek tributary classified as cool water (total ~1.8 km within the TPR) 4 are intermittent tributaries, unclassified (2 associated with highway ditches), part of a tributary system to East Branch Sixteen Mile Creek tributary (unconfirmed fish) (Total ~12 km within the TPR) <p><i>Habitat sensitivity</i></p> <ul style="list-style-type: none"> East Branch Sixteen Mile creek supports a coolwater fish community East Branch Sixteen Mile Creek flows into Silver Shiner habitat downstream (~6.9 km downstream) in Middle Sixteen Mile Creek¹ Agriculture, linear highway corridor (Highway 401) and major roadways Existing impairment of all tributaries (intermittent) due to agriculture and road/highway crossings <p><i>Complexity of crossing</i></p> <ul style="list-style-type: none"> East Branch Sixteen Mile Creek is highly meandering within the interchange alternative in the vicinity of the Highway 401 crossing The East Branch Sixteen Mile tributaries in the east are parallel to alternative The East Branch Sixteen Mile Creek intermittent tributary is skewed relative to interchange location <p><i>Realignments</i></p> <ul style="list-style-type: none"> High potential for realignment based on presence of several intermittent features at interchange location 	<p><i>Site Specific Avoidance / Mitigation / Offsetting / Enhancement Measures</i></p> <ul style="list-style-type: none"> Review opportunities to refine highway / interchange to avoid crossing watercourses at skewed alignments or minimize skews Where possible, do not enclose but consider minor channel realignments of the intermittent stream and intermittent features in the interchange to consolidate flows to cross perpendicular to crossing/interchange <p><i>Standard design and construction mitigation assumed to be implemented as outlined in accompanying memo.</i></p>	<p>Standard net effects to watercourses as outlined in the accompanying memo at the following:</p> <p>6 watercourses:</p> <ul style="list-style-type: none"> 1 crossing is a permanent coolwater system (East Branch Sixteen Mile Creek, ~1.1 km within the TPR) 1 is an intermittent tributary of East Branch Sixteen Mile Creek tributary classified as cool water (total ~1.8 km within the TPR) 4 are intermittent tributaries, unclassified (2 associated with highway ditches), part of a tributary system to East Branch Sixteen Mile Creek tributary (unconfirmed fish) (Total ~12 km within the TPR) <p>Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, offsetting / enhancement measures; until confirmed, net effects remain the same as potential effects:</p> <ul style="list-style-type: none"> Impacting a long reach of intermittent watercourse that either contain or are upstream of moderately sensitive coolwater fish communities Several intermittent drainage features that are within the alternative are likely to be impacted; however, these are highly impacted / modified by the existing Highway 401 / 407 corridor <p style="text-align: center;">LOW NET EFFECT</p>
1.1.2 Fish Community	<p><i>Presence of SAR</i></p> <ul style="list-style-type: none"> No crossings with SAR present <p><i>Fish community sensitivity</i></p> <ul style="list-style-type: none"> Moderately sensitive coolwater fish community present in East Branch Sixteen Mile Creek and its intermittent tributary 	<p><i>Typical Mitigation Measures</i></p> <ul style="list-style-type: none"> Consult MNRF for species appropriate “no in-water work” timing windows to protect fish during critical life stages (e.g. spawning) As applicable, fish salvage will be undertaken whereby fish in the work area are captured and released unharmed downstream of the affected reach 	<p>Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, offsetting / enhancement measures; until confirmed, net effects remain the same as potential effects:</p> <ul style="list-style-type: none"> Impacting a long reach of intermittent watercourse with moderately sensitive coolwater fish community <p style="text-align: center;">LOW NET EFFECT</p>
1.2 Terrestrial Ecosystems			

¹ MECP (April 22, 2020) confirmed that the main branch of East Branch Sixteen Mile Creek and the associated intermittent tributary would not be considered contributing/indirect habitat for Silver Shiner, therefore no permit would be required.

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<p>1.2.1 Wildlife and Wildlife Habitat</p>	<p>Wildlife habitat units consist of areas identified through field Ecological Land Classification (ELC), agency-supplied data, air photo interpretation and Southern Ontario Land Resource Information System (SOLRIS).</p> <p>Wildlife habitat features in this alternative are fragmented and/or small and isolated with moderate habitat diversity, but are representative features within this section. These features are common within the surrounding landscape. Features include SM-EB-1 (~12.9 ha), SM-EB-2 (~11.0 ha), SM-EB-3 (~0.9 ha), SM-EB-4 (~0.6 ha), SM-EB-8 (~2.9 ha), SM-EL-5 (~0.6 ha) and SM-EB-35 (~1.7 ha).</p> <p>Potential landscape movement corridor is already bisected by the existing Highway 401. This alternative widens the existing bisection. The landscape surrounding these features is predominately agricultural and generally permeable to wildlife movement.</p> <p>Habitat function of features includes low to moderate opportunities for maternity roosting habitat for bats, amphibian and bird breeding habitat and amphibian and mammal movement.</p> <p>Species at Risk (SAR) and species of conservation concern (SCC) were not noted within these features. However, due to limited access, field investigations could not be completed.</p> <p>Candidate Significant Wildlife Habitat (SWH) identified in this alternative based on habitat suitability include:</p> <ul style="list-style-type: none"> • Seasonal Concentration Areas of Animals; • Rare Vegetation Communities or Specialized Habitat for Wildlife; • Habitat for Species of Conservation Concern; • Animal movement Corridors. <p>Removals through this alternative would represent 16.7 ha losses, or complete removal for many habitat patches.</p> <p>Loss of habitat would impact critical life stages by removing habitat requirements (e.g. wetlands for amphibian breeding or upland forest habitat for foraging and nesting, etc.).</p> <p>Indirect impacts include light and noise impacts – avoidance, impacts to call / response; animal-vehicle collisions; reductions to movement / landscape permeability; introduction of invasive species (habitat quality); salt and other road contaminants (water quality, vegetation impacts on habitat quality).</p>	<p>Wildlife and wildlife habitat will be affected by this alternative. Design and mitigation are to be developed in consideration of The Guideline for Planning and Design of the GTA West Corridor through the Greenbelt (<i>The Guideline</i>) with specific reference to Section 2: Community Sensitive Design.</p> <p>Avoidance. Opportunities to avoid or minimize impacts to some wildlife habitat features may be possible through geometric design (e.g. shifting alignment, constraining the right-of-way [ROW]). Potential avoidance of key features is as follows:</p> <ul style="list-style-type: none"> • Limited opportunity to avoid SM-EB-4, SM-EL-5 and SM-EB-8 • Little to no opportunity to avoid SM-EB-1, SM-EB-2, SM-EB-3 and SM-EB-35 <p>Mitigation. Mitigation measures to consider at preliminary design should be developed in consideration of key feature and species sensitivities and existing / defined natural heritage systems (i.e. Halton Region, Greenbelt). General mitigation measures for wildlife and wildlife habitat include:</p> <ul style="list-style-type: none"> • Design considerations <ul style="list-style-type: none"> ○ Reducing footprint through use of retaining walls and a constrained ROW ○ Wildlife passage measures (e.g., wildlife fencing, wildlife crossing structures). ○ Mitigate highway lighting that extends into adjacent wooded areas (no lighting or lighting design that minimizes the light alternative). • Construction measures <ul style="list-style-type: none"> ○ Planting (e.g. pre-planting, use of salt tolerant vegetation) ○ Temporary wildlife exclusion measures (e.g., silt fencing). ○ Application of appropriate construction timing windows to avoid sensitive periods (e.g., protection of nesting migratory birds). <p>Restoration, Enhancement and Compensation. General measures to consider include restoration/enhancement plans for woodland and wetland communities (e.g., edge management, successional plantings, use of tolerant species).</p> <p>Opportunities to enhance existing features as compensation for habitat removals are limited through this alternative because most will be removed / substantively affected and others are of low ecological quality.</p>	<p>Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation / enhancement measures; until confirmed, net effects remain the same as potential effects. Large portions of small existing wildlife habitats will be removed.</p> <p>Net effects include:</p> <ul style="list-style-type: none"> • Permanent loss of candidate wildlife habitat including potential habitat for SAR and SCC • Loss of tracts of candidate SWH and other areas for breeding and rearing of young (e.g. amphibian breeding habitat) • Fragmentation of one moderately sized natural corridor associated with Sixteen Mile Creek • Removals through this alternative would represent 16.7 ha losses, or complete removal for many habitat patches. • Reduction of wildlife habitat quality through indirect effects that cannot be fully mitigated including edge effects (e.g. increased light and noise and the introduction of pathways for invasive species) and increased potential for animal-vehicle collisions <p style="text-align: center;">HIGH NET EFFECT</p>
<p>1.2.2 Wetlands</p>	<p>Wetland vegetation units consist of areas identified through field Ecological Land Classification (ELC), agency-supplied data, air photo interpretation and Southern Ontario Land Resource Information System (SOLRIS).</p> <ul style="list-style-type: none"> • 5 unevaluated wetlands are affected by this alternative: 	<p>Wetlands will be affected by this alternative. Design and mitigation are to be developed in consideration of The Guideline for Planning and Design of the GTA West Corridor through the Greenbelt (<i>The Guideline</i>) with specific reference to Section 2: Community Sensitive Design.</p>	<p>Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation / enhancement measures; until confirmed, net effects remain the same as potential effects.</p>

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	<ul style="list-style-type: none"> ○ The unevaluated wetland consists of deciduous swamp, swamp thicket and marsh habitat. Large communities are present east of Trafalgar Road and Highway 401 and are associated with riparian areas. • No LSWs or PSWs are affected by this alternative <p>The large wetland feature east of Trafalgar Road and Highway 401 is currently fragmented by the existing highway. Other wetlands present are small and isolated.</p> <p>This alternative will impact ~9.2 ha of unevaluated wetland including 6.3 ha of deciduous swamp.</p> <p>Impacts to features are significant with complete or substantial removal of most features within this alternative.</p> <ul style="list-style-type: none"> • The largest wetland in this section (Patch SM-EB-1 and SM-EB-2) will be significantly affected by this alternative, removing ~4.2 ha of SM-EB-1 and 4.3 ha of SM-EB-2. <p>Wetland features through this alternative have limited natural buffers. Changes to adjacent land use have the potential to impact hydrological inputs to portions of features remaining.</p> <p>Indirect impacts include effects from road contaminants (e.g. salt, heavy metals, sediment / debris), introduction of pathways for invasive species, edge / exposure impacts (e.g. canopy blow down) and impacts to hydrologic and groundwater inputs that support these features.</p>	<p>Avoidance. Wetlands cannot be fully avoided by this alternative. Opportunities to avoid or minimize impacts to some wetland features may be possible through geometric design (e.g. shifting alignment, constraining the right-of-way [ROW]). Potential avoidance of key features is as follows:</p> <ul style="list-style-type: none"> • Limited opportunity to avoid SM-EB-4 and SM-EL-5 • Little to no opportunity to avoid SM-EB-1, SM-EB-2 • SM-EB-8 edge impacts could potentially be minimized or avoided by constraining the ROW to the south. <p>Mitigation. Mitigation measures to consider at preliminary design should be developed in consideration of key feature and species sensitivities and existing / defined natural heritage systems (i.e. Halton Region, Greenbelt). General mitigation measures for wetlands include:</p> <ul style="list-style-type: none"> • Design considerations <ul style="list-style-type: none"> ○ reducing footprint through use of retaining walls and a constrained ROW • Construction measures <ul style="list-style-type: none"> ○ planting (e.g. pre-planting, use of salt tolerant vegetation) ○ temporary vegetation protection measures (e.g., silt fencing). ○ Application of appropriate construction timing windows to avoid sensitive periods (e.g., active growing season). <p>Specific mitigation measures for key wildlife habitat features and functions include:</p> <ul style="list-style-type: none"> • Minimizing footprint / impacts to SM-EB-4, SM-EL-5, SM-EB-8, SM-EB-1 and SM-EB-2 through constrained ROW or ROW shifts within the alternative. <p>Restoration, Enhancement and Compensation. General measures to consider include restoration / enhancement plans for woodland and wetland communities (e.g., edge management, successional plantings, use of tolerant species, seedbank salvage).</p>	<p>Net effects include:</p> <ul style="list-style-type: none"> • Impacts to 5 unevaluated wetlands including approximately ~9.2 ha of unevaluated wetland, including ~6.3 ha of deciduous swamp. • Significant removals to several large wetlands communities throughout the section. • The largest wetland in this section (Patch SM-EB-1 and SM-EB-2) will be significantly affected by this alternative, removing ~4.2 ha of SM-EB-1 and 4.3 ha of SM-EB-2. • Reduction in wetland quality through Indirect effects that cannot be fully mitigated including edge effects (e.g. increased light, wind, road contaminants and the introduction of pathways for invasive species) and impacts to hydrologic and groundwater inputs that support these features <p>Affected wetlands are generally small but several areas, such as the swamps and marshy complexes are expected to provide higher structural and native-species diversity and other functions.</p> <p style="text-align: center;">HIGH NET EFFECT</p>
1.2.3 Woodlands and Vegetation	<p>Upland and Woodland vegetation units consist of areas identified through field Ecological Land Classification (ELC), agency-supplied data, airphoto interpretation and Southern Ontario Land Resource Information System (SOLRIS).</p> <ul style="list-style-type: none"> • Upland and Woodland vegetation removals and woodland feature removals through this alternative include a total of ~ 13.8 ha from 7 features, including: <ul style="list-style-type: none"> ○ ~1.4 ha of Forest ○ ~6.3 ha of Swamp ○ ~6.0 ha of Meadow • No significant woodlands are affected by this alternative. • No interior woodland habitat is affected by this alternative. • No significant valley lands are affected by this alternative. 	<p>Woodlands and other vegetation will be affected by this alternative. Design and mitigation are to be developed in consideration of The Guideline for Planning and Design of the GTA West Corridor through the Greenbelt (“<i>The Guideline</i>”) with specific reference to Section 2: Community Sensitive Design.</p> <p>Avoidance. Vegetation communities cannot be fully avoided by this alternative. Opportunities to avoid or minimize impacts to some vegetation features may be possible through geometric design (e.g. shifting alignment, constraining the right-of-way [ROW]). Potential avoidance of key features is as follows:</p> <ul style="list-style-type: none"> • Limited opportunity to avoid SM-EB-4, SM-EL-5 and SM-EB-35 	<p>Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation / enhancement measures; until confirmed, net effects remain the same as potential effects. Route alignment constraints along the existing highway will allow for a small reduction in the amount of woodland removed.</p> <p>Net effects include:</p> <ul style="list-style-type: none"> • Removal of ~13.8 ha of vegetation communities from 19-unit features including forest, swamp and meadow • No significant woodlands are affected by this alternative

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	<p>Large portions of SM-EB-1 and SM-EB-8 will be removed as a result of this alternative. These features represent the majority of natural habitat within the landscape.</p> <p>No SAR plant or rare vegetation communities have been identified. However, not all communities could be assessed in the field due to access restrictions (Permission To Enter).</p> <p>Other vegetation communities in this alternative are generally small and isolated, but are the representative features within the landscape.</p> <p>Indirect impacts include effects from road contaminants (e.g. salt, heavy metals, sediment / debris), introduction of pathways for invasive species, edge / exposure impacts (e.g. canopy blow down).</p>	<ul style="list-style-type: none"> • Little to no opportunity to avoid SM-EB-1, SM-EB-2 and SM-EB-8 • No opportunity to avoid SM-EB-3 <p>Mitigation. Mitigation measures to consider at preliminary design should be developed in consideration of key feature sensitivities and existing / defined natural heritage systems (i.e. Halton Region, Greenbelt). General mitigation measures for woodlands / other vegetation include:</p> <ul style="list-style-type: none"> • design considerations <ul style="list-style-type: none"> ○ reducing footprint through use of retaining walls and a constrained ROW • construction measures <ul style="list-style-type: none"> ○ planting (e.g. pre-planting, use of salt tolerant vegetation) ○ temporary vegetation protection measures (e.g., silt fencing). <p>Specific mitigation measures for key terrestrial vegetation:</p> <ul style="list-style-type: none"> • Minimizing footprint of disturbance in the larger woodlands (SM-EB-1 and SM-EB-2). <p>Restoration, Enhancement and Compensation. General measures to consider include restoration/enhancement plans for woodland and swamp communities (e.g., edge management, successional plantings, use of tolerant species).</p>	<ul style="list-style-type: none"> • No interior woodland habitat is affected by this alternative. • No significant valley lands are affected by this alternative. • Reduction in vegetation community quality through Indirect effects that cannot be fully mitigated including effects from road contaminants (e.g. salt, heavy metals, sediment / debris), introduction of pathways for invasive species, edge / exposure impacts (e.g. canopy blow down) <p>Aside from SM-EB-1 and SM-EB-2, vegetation communities within this alternative are generally small and of low diversity, or early-successional and containing higher abundances of non-native and disturbance-tolerant species, however, higher quality habitats are also present. These features represent the only remaining patches of natural vegetation in the general landscape.</p> <p style="text-align: center;">HIGH NET EFFECT</p>
<p>1.2.4 Designated/Special/ Natural Areas</p>	<p>There are no ESA, ESPAs, ANSI or other designated areas within this alternative.</p> <p>There are no national or provincial parks within this alternative.</p> <p>There are no Conservation Authority lands within this alternative.</p> <p>There are no Greenbelt Area Natural Heritage System crossings within this alternative.</p> <p>Regional Natural Heritage Systems:</p> <ul style="list-style-type: none"> • Region of Halton Official Plan – intersects with Key Features at one location including fragmentation of a minor riparian zone and partial removal of associated woodlot (~25%) 	<p>Key Features identified within the Region of Halton Official Plan (OP) will be affected. These features are consistent with the woodland and wetland features mentioned in sub-factors 1.2.1, 1.2.2 and 1.2.3.</p> <p>Avoidance. Key Features identified in the OP cannot be avoided by this alternative.</p> <p>Mitigation. Mitigation measures are generally addressed through other factors, which address components of the broader natural heritage system.</p> <p>The key objectives are minimizing impacts to higher quality components of the natural heritage system and maintaining connectivity at a landscape scale.</p> <p>Restoration, Enhancement and Compensation. Restoration, enhancement and compensation are generally addressed through other factors, which address components of the broader natural heritage system.</p>	<p>Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation / enhancement measures; until confirmed, net effects remain the same as potential effects.</p> <ul style="list-style-type: none"> • There are no ESA, ESPAs, ANSI or other designated areas within this alternative. • There are no national or provincial parks within this alternative. • There are no Conservation Authority lands within this alternative. • There are no Greenbelt Area Natural Heritage System crossings within this alternative. • Impacts Greenbelt River Valley System <p>Net Effects include removals of portions of Regional Natural Heritage System -- Region of Halton Official Plan, alternative intersects with Key Features at one location including fragmentation of a minor riparian zone and partial removal of associated woodlot (~25%) as described in sections above.</p> <p style="text-align: center;">HIGH NET EFFECT</p>

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<p>1.3 Ecosystem Services</p>	<p>Ecosystem Services (ES) is a means by which to assign monetary value to services provided by ecological functions that do not have 'market value' (e.g. pollination, flood control, habitat refugia). Each land cover type offers a different combination of ecological services and therefore has a different ecosystem service value (\$/ha). These land cover values were summed per alternative based on the total representation of each land cover type that falls within it (i.e. \$/ha x ha of land cover type a, b, c, etc. in the alternative).</p> <p>To assess relative differences between alternatives in each Section (i.e. S1-S9) of GTA West, land cover and values were grouped as 'Agriculture' and 'Natural Cover'. Potential impacts to Ecosystem Services were assessed by assigning Low, Moderate or High value ranges to the Agriculture and Natural Cover classes. Relative representation of Natural Cover (i.e. % cover in the alternative) was categorized as Low, Moderate High and used as an additional weighting factor in assessing net effects as Natural Cover types (e.g. forest, wetland) generally offer a greater diversity and higher total ecosystem service values per ha.</p> <p>For additional information on the ranking process associated with this analysis, please refer to supplementary information available with these tables.</p> <p>Land Cover²</p> <ul style="list-style-type: none"> Alternative Total Area: 290.18 ha Agriculture: 53% Natural Cover: 26% (High) <p>Relative ES Value³</p> <ul style="list-style-type: none"> Agriculture: Moderate Natural Cover: Moderate Cumulative: Moderate <p>ES Value Representation</p> <ul style="list-style-type: none"> Agriculture: 25% Natural Cover: 75% 	<ul style="list-style-type: none"> Mitigation is addressed through other factors and criteria. There is no specific mitigation associated with this analysis. 	<p>Relative ES Value⁴</p> <ul style="list-style-type: none"> Agriculture: Moderate Natural Cover: Moderate Cumulative: Moderate <p>ES Value Representation</p> <ul style="list-style-type: none"> Agriculture: 25% Natural Cover: 75% <p style="text-align: center;">MODERATE NET EFFECT</p>
1.4 Groundwater			
<p>1.4.1 Areas of Groundwater Recharge or Discharge</p>	<ul style="list-style-type: none"> Based on Ontario Geological Survey surficial geology mapping, the alternative footprint of S1-1 alternative covers about 797 ha of low permeability Halton Till deposits (clayey silt to clayey silt till) and fine grained Late Wisconsinan glaciolacustrine deposits (i.e. silt and clay). The runoff from the impermeable road surface would flow to these surrounding till areas, which have limited capacity for infiltrating additional water, and surface runoff instead of recharge would occur. The amount of lost recharge would likely be negligible / low due to low permeability soils. 	<ul style="list-style-type: none"> Till has such low permeability and widespread exposure at surface that avoidance and/or mitigation are not possible. Given the negligible potential loss of recharge, however, compensation and/or enhancement are not required. Highway/interchange construction may locally enhance recharge in sandy areas, so mitigation is unnecessary. Mitigation, compensation, or enhancement is not required because no anticipated change in discharge volume from the till is expected. 	<ul style="list-style-type: none"> Small loss of recharge due to footprint and small loss of discharge due to interception. <p style="text-align: center;">LOW NET EFFECT</p>

² Calculated relative to the total area (ha) for the alternative.

³ Calculated relative to the range of ecosystem service values for each category (Agriculture, Natural Cover, Total) across all sections & alternatives (i.e. S1-S9 alternatives cumulatively).

⁴ Calculated relative to the range of ecosystem service values for each category (Agriculture, Natural Cover, Total) across all sections & alternatives (i.e. S1-S9 alternatives cumulatively).

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	<ul style="list-style-type: none"> Based on Ontario Geological Survey surficial geology mapping, the footprint of S1-1 covers about 141 ha of relatively high permeability Modern Alluvium deposits of undifferentiated gravel, sand, silt, clay, muck and Ice-contact deposits consisting of predominantly poorly sorted gravel. The runoff from the road would drain to these surrounding areas, which are capable of infiltrating additional water, and recharge would be enhanced. The amount of gained recharge would likely be marginal due to the relatively small surface area of the highway with permeable soils compared to its surroundings. There are discharge areas (water courses and wetlands) within the alternative that could be intercepted through cut or fill. Negligible changes to groundwater discharge will occur within the 797 ha of till and fine grained lacustrine sediment covered by the highway/interchange footprint because the low permeable soils inhibit groundwater flow. 	<ul style="list-style-type: none"> Highway/interchange construction in the sandy deposits areas will indirectly enhance discharge to stream valleys, for example, so mitigation for loss of discharge volumes is unnecessary. 	
1.4.2 Groundwater Source Areas and Wellhead Protection Areas	<ul style="list-style-type: none"> There are no municipal water wells and their associated WHPAs within 500 m of the alternative. 	<ul style="list-style-type: none"> No measures are necessary. 	NO NET EFFECT
1.4.3 Large Volume Wells	<ul style="list-style-type: none"> There are no large volume wells (>50 gpm) within 500 m of the alternative based on MECP well records. 	<ul style="list-style-type: none"> No measures are necessary. 	<ul style="list-style-type: none"> No effects to large capacity wells NO NET EFFECT
1.4.4 Private Wells	<ul style="list-style-type: none"> There are 77 shallow wells (<15 m deep) located within 500 m of S1-1 that may be affected by highway construction, 7 of the shallow wells are within the footprint (250 m) of the highway that will require decommissioning. There are 11 wells in total within the footprint that will require decommissioning. Based on MECP well records, there are 30 deep wells within 500 m of S1-1 and 4 deep wells within the footprint of the alternative. Shallow (<15 m deep) wells within 500 m of the alternative are located in areas of surficial low permeability till or glaciolacustrine fines. Due to a negligible effect on recharge and discharge rates in these low permeable soils, water quantity in these wells would correspondingly be negligibly affected, while water quality may be reduced slightly. 5 shallow (<15 m deep) wells are within 500 m of the footprint and located in areas of surficial sand and gravel deposits. Due to marginal enhancement of recharge by road surface runoff, which may contain contaminants, the quality of water in these wells could be reduced, especially in the areas which are too close to the highway. 	<ul style="list-style-type: none"> The necessary decommissioning of some water wells cannot be avoided. Opportunities for compensation of removed water supply wells include drilling new wells. Municipal servicing is not available everywhere. Opportunities for mitigation of reduced water quality include storm water collection, treatment, and polishing (in ditches and lined ponds in sandy areas); establishment of alternate water supplies (i.e., new wells) into deeper aquifers (if present) less susceptible to contamination from surface runoff. Drilling into deeper aquifer, which is protected from potential salt contamination by confining aquitard, to reduce shallow well contamination. 	<ul style="list-style-type: none"> Potential reduction in water quality within the shallow aquifer in at least 5 wells due to potential salt issue only. At least 11 wells are to be removed/ decommissioned by alternative. LOW NET EFFECT
1.4.5 Groundwater-Dependent Commercial Enterprises	<ul style="list-style-type: none"> Based on the MECP well records, there are 8 commercial use wells located within the footprint of S1-1. In addition, 3 industrial, 4 livestock and 3 public wells are located within 500 m of alternative S1-1. 	<ul style="list-style-type: none"> 8 commercial wells are located within the footprint of the alternative. Water well survey to confirm the presence of the commercial use wells and well monitoring prior to construction, during and after construction if deemed necessary. 	<ul style="list-style-type: none"> 8 commercial use and wells displaced. MODERATE NET EFFECT
1.4.6 Groundwater-Sensitive Ecosystems	<ul style="list-style-type: none"> There are 4 swampy/discharge areas within 500 m of S1-1. Streams are primarily cool water fisheries and somewhat dependent on groundwater discharge. 	<ul style="list-style-type: none"> Minimize grade changes and therefore changes to groundwater flow patterns. Groundwater contributions may be enhanced in permeable soils. 	<ul style="list-style-type: none"> Low potential to affect sensitive ecosystems with wetland areas in buffer zone and coolwater streams that are somewhat dependent on groundwater due to the presence of relatively

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		<ul style="list-style-type: none"> SWM facilities will contribute to flow and support for wetlands where groundwater flow is reduced. 	<p>small number of water courses and wetlands. Some loss of discharge function anticipated.</p> <p>LOW NET EFFECT</p>
1.5 Surface Water			
1.5.1 Watershed / Subwatershed Drainage Features / Patterns	<ul style="list-style-type: none"> Corridor is adjacent to major watercourse corridor (East 16 Mile Creek) and will impact buffer for that corridor. Realignment of the meander upstream of 401-Trafalgar on East 16 Mile Creek would be required. Alternative will cover completely a tributary section of East 16 Mile Creek, requiring removal of that system. Widening of Highway 401 to north will impact creek in an area where significant meandering and cutting is occurring. Widening of the 407ETR southwest side will encroach on tributary drainage feature. A minimum of 6 culvert extensions beneath Highway 401 and 407ETR would be required. Drainage along north and south sides of highways will require repositioning. 	<ul style="list-style-type: none"> Shifting of the corridor to avoid the active outside meander would create the required buffer; buffer would require toe protection along edge of road embankment and enhanced plantings along creek. Realignment of the meander upstream of 401-Trafalgar on East 16 Mile Creek would be required. Compensation would be required to accommodate loss of tributary to East 16 Mile Creek. An opportunity to utilize SWM as feeder water would be possible to maintain flow contributions. Culvert extensions are mitigable effects, some opportunity for enhancement is there if culverts are not operating properly. 	<ul style="list-style-type: none"> In summary there are a number of proximity and loss / realignment potential surface watercourse issues which would be costly to accommodate. <p>MODERATE NET EFFECT</p>
1.5.2 Surface Water Quality and Quantity	<ul style="list-style-type: none"> Introduces 116 ha impervious area to East Sixteen Mile Creek including 60 ha to Lisgar subwatershed; Frequency flooding was reported at Lisgar neighborhood south of Highway 401; Control post-peak flows to pre-peak flows for all the storm events including the Regulatory storm is required for Lisgar reaches; Impacts more than 10 watercourses including one major watercourse with permanent coolwater system (East Sixteen Mile Creek); Potential impacts/encroachment to Highway 407 stormwater management ponds (6 ponds); Potential modification of drainage patterns at interchange. 	<ul style="list-style-type: none"> Design and implement stormwater management measures to maximize runoff quality and minimize changes to hydrology and flow regime in permanent watercourses as well as intermittent / ephemeral agricultural swales; Avoid alteration of existing surface drainage features; Instream works will be in accordance with appropriate timing windows. 	<ul style="list-style-type: none"> Medium impacts on quality through direct and indirect discharges of contaminated and sediment-laden run-off, thermal impact on the coolwater system; High impacts on hydrology due to changes in ground permeability; High effects on modifications to surface drainage patterns and alterations of water bodies. <p>MODERATE NET EFFECT</p>
<ul style="list-style-type: none"> 1.6 Air Quality and Climate Change 			
1.6.1 Local and regional air quality impacts; greenhouse gas emissions	<ul style="list-style-type: none"> Most residences are sufficiently far from GTAW to experience little change in local air quality. A few (around Steeles Ave.) are close enough to experience a larger change, but pollutants will remain within acceptable levels. 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Most residences are sufficiently far from GTAW to experience little change in local air quality. A few (around Steeles Ave.) are close enough to experience a larger change, but pollutants will remain within acceptable levels. <p>LOW NET EFFECT</p>
2.0 Land Use / Socio-Economic Environment			
2.1 Land Use Planning Policies, Goals, Objectives			
2.1.1 Indigenous Land Claims	<p>Treaties including Nanfan (1701), Treaty 3 (1795), Treaty 3.75 (1795), Treaty 13 (1805), Treaty 13A (1805), Treaty 18, 1818, Treaty 19 (1918), Williams Treaty (1923), as well as various Assertions and Claims.</p> <ul style="list-style-type: none"> Additional Indigenous Assertions and/or Claims may be filed and/or proven at any time. 	<ul style="list-style-type: none"> Ongoing consultation with Indigenous communities 	<p>MODERATE NET EFFECT</p>
2.1.2 Provincial / Federal Land Use Planning Policies / Goals / Objectives	<ul style="list-style-type: none"> Consistent with the Growth Plan policies. Less consistent with the Greenbelt Plan policies. Impacts PPS agricultural lands, employment lands, public space, recreation policies and Urban River Valleys. Impacts 211 hectares of employment lands. 	<ul style="list-style-type: none"> Align route along property lines to avoid agricultural lands. Ensure agricultural machinery can access properties on either side of the highway. 	<ul style="list-style-type: none"> Low impacts to agricultural and employment lands. Low impacts to environmental policy area. <p>MODERATE NET EFFECT</p>

COLUMN 1 Evaluation Factors and Sub-Factors	COLUMN 2 Potential Effects	COLUMN 3 Avoidance / Mitigation / Compensation / Enhancement Measures	COLUMN 4 Potential Net Effects
	<ul style="list-style-type: none"> Impacts 53 hectares of Agricultural Lands. Impacts 28 hectares of environmental policy area lands. <p style="text-align: center;">MODERATE EFFECT</p>	<ul style="list-style-type: none"> Possible land exchanges for larger contiguous parcels on either side of the highway. Possibility to designate additional lands for employment areas by re-designating agricultural lands to employment lands. This has a related impact on agricultural lands and Agricultural System. Through preliminary design, reduce impacts to environmental policy area lands, if possible. 	
2.1.3 Municipal (local and regional) Land Use Planning Policies / Goals / Objectives	<ul style="list-style-type: none"> Impacts 211 hectares of employment area adjacent to Highway 401. Impacts 53 hectares of Agricultural Lands. Impacts 28 hectares of open space / recreational lands. Impacts 7 hectares of rural lands. Impacts 196 hectares of future urban area lands. Impacts 28 hectares of environmental policy area. Low impact on City of Mississauga Ninth Line Study Area. Consistent with Halton Corridor Protection Lands (ROPA 43). <p style="text-align: center;">MODERATE EFFECT</p>	<ul style="list-style-type: none"> Align route along property lines to avoid agricultural lands. Ensure agricultural machinery can access properties on either side of the highway. Possible land exchanges for larger contiguous parcels on either side of the highway. Possibility to designate additional lands for employment areas / future urban areas by re-designating agricultural lands to employment lands (Halton ROPA 47 adopted). This has a related impact on agricultural lands. Through preliminary design, reduce impacts to environmental policy area lands, if possible. 	<ul style="list-style-type: none"> Low impacts to agricultural and employment/ future urban area lands. Low impacts to environmental policy area. <p style="text-align: center;">LOW NET EFFECT</p>
2.1.4 Development Objectives of Private Property Owners	<ul style="list-style-type: none"> Likely interest to develop lands but no applications made because of the GTA West Study Area. 	<ul style="list-style-type: none"> Designate additional lands and compensate impacted landowners (Halton ROPA 47). 	<ul style="list-style-type: none"> Low impact to future potential development. <p style="text-align: center;">LOW NET EFFECT</p>
2.2 Land Use – Community			
2.2.1 First Nation Reserves	<ul style="list-style-type: none"> No reserves in study area 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> NO NET EFFECT
2.2.2 Indigenous Sacred Areas	<ul style="list-style-type: none"> No known or reported Indigenous Sacred Areas 	<ul style="list-style-type: none"> Ongoing consultation with Indigenous communities 	<ul style="list-style-type: none"> NO NET EFFECT
2.2.3 Urban and Rural Residential Uses and Properties	<ul style="list-style-type: none"> 6 residential properties impacted. 2.85 hectares of residential lands impacted. <p style="text-align: center;">MODERATE EFFECT</p>	<ul style="list-style-type: none"> Preliminary design could minimize the impacts to two residential properties. 	<ul style="list-style-type: none"> Low impacts on residential properties; continues to impact residential properties. <p style="text-align: center;">LOW NET EFFECT</p>
2.2.4 Commercial/ Industrial Uses and Properties	<ul style="list-style-type: none"> Impacts 4 properties (Redwood Pet Resort, CBC, Toronto Premium Outlets, residential dwelling no named business). Impacts 1 vacant industrial use. <p style="text-align: center;">LOW EFFECT</p>	<ul style="list-style-type: none"> Detailed design could minimize impact to Toronto Premium Outlets, Redwood Pet Resort and CBC lands. 	<ul style="list-style-type: none"> Low impacts on commercial uses; continues to impact properties. <p style="text-align: center;">LOW NET EFFECT</p>
2.2.5 Recreational Areas and Tourist Attractions	<ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No impacts. <p style="text-align: center;">NO NET EFFECT</p>
2.2.6 Community Facilities / Institutions	<ul style="list-style-type: none"> Impacts Churchill Meadows Christian Church. <p style="text-align: center;">LOW EFFECT</p>	<ul style="list-style-type: none"> Impacts mitigated through preliminary design. 	<ul style="list-style-type: none"> No impacts through preliminary design. <p style="text-align: center;">NO NET EFFECT</p>
2.2.7 Municipal Infrastructure and Public Service Facilities	<ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No impacts. <p style="text-align: center;">NO NET EFFECT</p>
2.3 Noise Sensitive Areas (NSA's)			
2.3.1 Transportation Noise	<ul style="list-style-type: none"> Residences on 9th line are far enough from Highway 401/407 ETR and close enough to GTAW to result in an increase in average traffic noise. 	<ul style="list-style-type: none"> Some areas have ambient sound levels elevated by Hwy 401/407 ETR. Some Outdoor Living Areas (OLAs) will be shielded by their respective building structures. Technical, administrative and economic feasibility of mitigation measures will need to be reviewed during the preferred alternative analysis. 	<ul style="list-style-type: none"> Residences on 9th line are far enough from Highway 401/407 ETR and close enough to GTAW to result in an increase in average traffic noise. <p style="text-align: center;">LOW NET EFFECT</p>
2.4 Land Use – Resources			

COLUMN 1 Evaluation Factors and Sub-Factors	COLUMN 2 Potential Effects	COLUMN 3 Avoidance / Mitigation / Compensation / Enhancement Measures	COLUMN 4 Potential Net Effects
2.4.1 Indigenous, Treaty Areas and Land Use Management	Treaties including Nanfan (1701), Treaty 3 (1795), Treaty 3.75 (1795), Treaty 13 (1805), Treaty 13A (1805), Treaty 18, 1818, Treaty 19 (1918), Williams Treaty (1923), as well as various Assertions and Claims. <ul style="list-style-type: none"> Additional Indigenous Assertions and/or Claims may be filed and/or proven at any time. 	<ul style="list-style-type: none"> Ongoing consultation with Indigenous communities 	MODERATE NET EFFECT
2.4.2 Agriculture / Specialty Crop <ul style="list-style-type: none"> Removal or sterilization of Class 1 – 3 agricultural lands Specialty Crops/Cropland affected Cropland affected Livestock operations affected Loss of agricultural buildings Agricultural buildings within 50 m Field crop operations affected Farm properties greater than 20 ha affected Farm properties less than 20 ha affected Severed parcels greater than 20 ha created Severed parcels less than 20 ha created Landlocked parcels created High investment operations affected Farm equipment transportation routes affected Division of agricultural community areas Loss of tile drainage 	<ul style="list-style-type: none"> Loss of 14.4 ha of Class 1 – 3 lands No specialty crops or specialty cropland affected Loss of 12.0 ha of common field crop cropland Loss of 0.5 ha of small grains cropland Loss of 1.9 ha of forage cropland One livestock operation affected (Horses) Loss of one machine shed and one retired barn No additional agricultural buildings within 50 m Three field crop properties affected One farm property greater than 20 ha affected Two farm properties less than 20 ha affected No severed parcels greater than 20 ha created Two severed parcels less than 20 ha created One landlocked parcel created No high investment operations affected Ninth Line is an active farm travel corridor No division of agricultural community areas No loss of tile drainage 	<ul style="list-style-type: none"> Compensate for loss No mitigation measures Compensate for loss Compensate for loss Compensate for loss No mitigation measures Compensate for loss Compensate for loss No mitigation measures Compensate for loss No mitigation measures Compensate for loss No mitigation measures Maintain access to and along Ninth Line No mitigation measures No mitigation measure 	<ul style="list-style-type: none"> Potential effect remains the same No effect Potential effect remains the same Potential effect remains the same Potential effect remains the same No effect Potential effect remains the same Potential effect remains the same No effect Potential effect remains the same No effect Potential effect remains the same No effect No effect No effect No effect <p style="text-align: center;">LOW NET EFFECT</p>
2.4.3 Recreation	<ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No impacts.

COLUMN 1 Evaluation Factors and Sub-Factors	COLUMN 2 Potential Effects	COLUMN 3 Avoidance / Mitigation / Compensation / Enhancement Measures	COLUMN 4 Potential Net Effects
			NO NET EFFECT
2.4.4 Aggregate and Mineral Resources	<ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No impacts. <p>NO NET EFFECT</p>
2.5 Major Utility Transmission Corridors and Pipelines			
2.5.1 Major Existing Utility Transmission Corridors and Pipelines	<ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No impacts. <p>NO NET EFFECT</p>
2.5.2 Major Proposed Utility Transmission Corridors and Pipelines	<ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No impacts. <p>NO NET EFFECT</p>
2.6 Contaminated Property and Waste Management - Impacts on known operating and / or closed waste management facilities (e.g., transfer stations, wastewater treatment plans, waste disposal sites, landfills) - Impacts to Properties in Urban and Rural Areas	<ul style="list-style-type: none"> No known active or closed waste disposal sites within footprint of alternative or 250 m radius. <ul style="list-style-type: none"> Seven (7) potential contaminated properties to be directly impacted by the alternative (i.e., within the footprint): <ul style="list-style-type: none"> Six (6) commercial/ light Industrial/ agricultural business properties; One (1) institutional (church). Eight (8) potential contaminated properties to be indirectly impacted by the alternative (i.e., in 250 m area of the footprint): <ul style="list-style-type: none"> Two (2) gas stations; Six (6) commercial/ light Industrial/ agricultural business properties. 	<ul style="list-style-type: none"> For any properties identified as having the potential for contamination, further environmental investigations will be required which may include Phase I ESAs, Phase II ESAs and site remediation (if necessary). If contamination is identified within the footprint of the alternative, site remediation will be completed to mitigate the contamination. 	<ul style="list-style-type: none"> Potential effect remains the same. <p>MODERATE NET EFFECT</p>
2.7 Landscape Composition			
2.7.1 Terrain	<ul style="list-style-type: none"> Mostly flat, level topography with agricultural land use, occasional isolated residences and commercial/industrial uses. This alternative will affect 7 watercourses, including a high level stream and associated floodplain in two places where it crosses Highway 401 just east of Trafalgar Road and northwest of Steeles Avenue and the Ninth Line. 5 unevaluated wetlands are affected by this alternative. Increased noise and light pollution to surrounding uses, primarily agricultural operations, wildlife and vegetation communities. 	<ul style="list-style-type: none"> If this alternative is selected, design to minimize the impact on watercourses and greenways Minor channel realignments of intermittent streams may be possible to allow perpendicular crossings. Avoid isolating habitat and severing wildlife movements zones to the woodlot near the Eighth Line. Reconnect wildlife movement zones through corridors where feasible (aquatic and terrestrial). Mitigate effects on terrain by minimizing alterations (cut/fill) where feasible. Alternatives can be designed to minimize the effect on the waterbodies near Highway 401 and 407ETR interchange. Buffering for noise and light pollution through topography, planting and fencing. 	<ul style="list-style-type: none"> Mostly level agricultural land with occasional isolated residences and commercial / industrial uses Designated primarily employment area and future urban area, with some agricultural, rural and environmental policy areas This alternative will affect 7 watercourses, including a high level stream (ESM Creek) and associated floodplain and woodlot in two places where it crosses Highway 401 just east of Trafalgar Road and northwest of Steeles Avenue and the Ninth Line Increased noise and light pollution to surrounding uses, primarily agricultural operations, wildlife and vegetation communities, buffered through topography, planting and fencing. <p>MODERATE NET EFFECT</p>
2.7.2 Vegetation	<ul style="list-style-type: none"> Alternative interrupts a large linear vegetative community and associated stream at Highway 401 just east of Trafalgar Road. Removal of several small woodlots, the majority of which are fragmented and/or isolated. No identified significant woodlands or valley lands affected. 	<ul style="list-style-type: none"> Avoiding some of the effects on vegetation communities and woodlots may be possible through shifting the alignment of the alternative or constraining the right-of-way. Implement vegetation protection during construction. Review area within alternative at concept design to determine if sensitive species are affected (if this 	<ul style="list-style-type: none"> Alternative interrupts a large linear vegetative community and adjacent high level watercourse at Highway 401 just east of Trafalgar Road. Removal of several small woodlots, the majority of which are fragmented and/or isolated. No identified significant woodlands or valley lands affected.

COLUMN 1 Evaluation Factors and Sub-Factors	COLUMN 2 Potential Effects	COLUMN 3 Avoidance / Mitigation / Compensation / Enhancement Measures	COLUMN 4 Potential Net Effects
		<p>alternative is selected) and develop mitigation strategy in consultation with MNRF, if warranted.</p> <ul style="list-style-type: none"> Restoration / enhancement plans may be required that include edge management and other protection / enhancement measures. Reconnect disrupted vegetation communities, where feasible. Any new information provided through further study will be reviewed and incorporated into subsequent design stages. Identify opportunities for wetland seed bank/organic salvage and reuse in appropriate locations (e.g. stormwater management facilities). Valley restoration plans may include opportunities for wetland protection/reinstatement. Compensation/enhancement may be difficult as most of the high quality existing natural features will be removed or substantially affected by this alternative. 	MODERATE NET EFFECT
2.7.3 Visual Impacts	<ul style="list-style-type: none"> Disrupted and diminished quality of scenic views, such as the view from St. Stephens Anglican Church. Visual effects from key receptor (residential neighbourhood to the southeast). Moderate to high spatial dominance of landscape alterations. Low absorptivity due to primarily flat agricultural lands. 	<ul style="list-style-type: none"> Buffering receptor source through topography, planting and fencing. Consider compensation for affected receptors through enhanced topography, planting and fencing. Views and vistas which have been identified to be conserved or enhanced where possible. 	<ul style="list-style-type: none"> Visual effect from key receptor (residential neighbourhood to the southeast). Diminished aesthetic quality of scenic views, reduced visual effect through mitigation/compensation measures. Moderate to high spatial dominance of landscape alterations. Low absorptivity due to primarily flat agricultural lands. <p>MODERATE NET EFFECT</p>
2.7.4 Aesthetics	<ul style="list-style-type: none"> Longer alternative and separate from the alignment of the existing 407ETR connection, moderate effect on landscape. Effect on view to the north of Highway 401 along the stream corridor and associated woodlot at Eighth Line. 	<ul style="list-style-type: none"> Views from the corridor can be enriched through plantings with strong form and colour to enhance driving experience. In locations of non-favourable views to the corridor, consider buffering with plant material. In locations of view enhancement to the corridor, consider tree placement, spacing and position to frame views. 	<ul style="list-style-type: none"> Potential effect remains the same. <p>MODERATE NET EFFECT</p>
3.0 Cultural Environment			
3.1 Built Heritage Resources and Cultural Heritage Landscapes			
3.1.1 Built Heritage Resources	<ul style="list-style-type: none"> There are 1 designated (BHR 032), 1 listed (BHR 015) and 1 potential (BHR 016) BHRs affected by this alternative. 	<ul style="list-style-type: none"> Avoidance and protection of designated BHRs Mitigation <ul style="list-style-type: none"> Further evaluation of listed and potential BHRs in order to determine their Cultural Heritage Value or Interest. 	<ul style="list-style-type: none"> There are 1 designated (BHR 032), 1 listed (BHR 015) and 1 potential (BHR 016) BHRs affected by this alternative. <p>HIGH NET EFFECT</p>
3.1.2 Heritage Bridges	<ul style="list-style-type: none"> There are no Heritage Bridges within this alternative 	<ul style="list-style-type: none"> There are no Heritage Bridges within this alternative 	<ul style="list-style-type: none"> There are no Heritage Bridges within this alternative <p>NO NET EFFECT</p>
3.1.3 Cultural Heritage Landscapes	<ul style="list-style-type: none"> There are 3 listed (CHL 001, CHL 018 and CHL 019) and 1 designated CHLs affected by this alternative. 	<ul style="list-style-type: none"> Avoidance and protection of designated CHLs Mitigation 	<ul style="list-style-type: none"> There are 3 listed (CHL 001, CHL 018 and CHL 019) and 1 designated CHLs affected by this alternative.

COLUMN 1 Evaluation Factors and Sub-Factors	COLUMN 2 Potential Effects	COLUMN 3 Avoidance / Mitigation / Compensation / Enhancement Measures	COLUMN 4 Potential Net Effects
		<ul style="list-style-type: none"> ○ Further evaluation of listed CHLs in order to determine their Cultural Heritage Value or Interest. 	HIGH NET EFFECT
3.2 Archaeology			
3.2.1 Pre-Contact and Contact Indigenous Archaeological Sites	<ul style="list-style-type: none"> • There are no registered pre-contact or contact Indigenous Archaeological sites within this alternative. However archaeological potential is present within 175 hectares of this alternative. 	<ul style="list-style-type: none"> • Mitigation <ul style="list-style-type: none"> ○ Completion of a Stage 2 Archaeological Assessment, where required, to determine if any archaeological resources are present 	<ul style="list-style-type: none"> • There are no registered pre-contact or contact Indigenous Archaeological sites within this alternative. However archaeological potential is present within 175 hectares of this alternative. <p style="text-align: center;">LOW NET EFFECT</p>
3.2.2 Historic Euro-Canadian Archaeological Sites	<ul style="list-style-type: none"> • There is 1 registered historic Euro-Canadian site (AjGw-253) present within this alternative which will require further archaeological assessment. Additionally, archaeological potential is present within 175 hectares of this alternative. 	<ul style="list-style-type: none"> • Mitigation <ul style="list-style-type: none"> ○ Completion of a Stage 2 Archaeological Assessment, where required, to determine if any archaeological resources are present ○ Completion of a Stage 3 and 4 Archaeological Assessment of the AjGw-253 site will be required 	<ul style="list-style-type: none"> • There is 1 registered historic Euro-Canadian site (AjGw-253) present within this alternative which will require further archaeological assessment. Additionally, archaeological potential is present within 175 hectares of this alternative <p style="text-align: center;">MODERATE NET EFFECT</p>
3.2.3 Indigenous Burial Sites	<ul style="list-style-type: none"> • No known or reported Indigenous Burial Sites 	<ul style="list-style-type: none"> • Ongoing consultation with Indigenous communities 	NO NET EFFECT
3.2.4 Cemeteries	<ul style="list-style-type: none"> • There are no registered cemeteries within this alternative. Archaeological potential is present within 175 hectares of this alternative 	<ul style="list-style-type: none"> • Mitigation <ul style="list-style-type: none"> ○ Completion of a Stage 2 Archaeological Assessment, where required, to determine if any archaeological resources are present • Avoidance <ul style="list-style-type: none"> ○ Implement avoidance and protection measures for any cemeteries or burials identified during Stage 2 Archaeological Assessment and construction 	<ul style="list-style-type: none"> • There are no registered cemeteries within this alternative. Archaeological potential is present within 175 hectares of this alternative <p style="text-align: center;">LOW NET EFFECT</p>
4.0 Transportation			
4.1 System Capacity & Efficiency			
4.1.1 Movement of People	<ul style="list-style-type: none"> • 708,000 auto vehicle km • 2,940,000 auto vehicle km • 85% better than LOS D (80% in base without GTAW) • 68% better than LOS D (60% in base without GTAW) • The GTA West Transitway will positively contribute to a balanced transportation network consisting of a variety of modes, facilities, and services, consistent with Province's vision for the GTHA. • Provides freeway-to-freeway connections to Highway 401 eastbound and westbound and 407ETR eastbound and westbound, but does not allow access from the GTA West Transportation Corridor to/from Trafalgar Road. 	<ul style="list-style-type: none"> • A partial interchange could be considered on GTA West at Steeles Avenue or a new crossing road north of Steeles Avenue. • Transitway alignment and station layout to be detailed in preliminary design phase of study. Impacts to sensitive study area features associated with the implementation of the Transitway alignment and stations (beyond the footprint currently identified) will be mitigated to the extent feasible through context-sensitive design in the preliminary design phase of the study. 	<ul style="list-style-type: none"> • Provides high capacity freeway and transitway operations, but does not allow for a connection to future employment lands via Trafalgar Road. <p style="text-align: center;">MODERATE CAPACITY & EFFICIENCY</p>

COLUMN 1 Evaluation Factors and Sub-Factors	COLUMN 2 Potential Effects	COLUMN 3 Avoidance / Mitigation / Compensation / Enhancement Measures	COLUMN 4 Potential Net Effects
4.1.2 Movement of Goods	<ul style="list-style-type: none"> GTAW (North of Hwy 401 / 407) - 280 vehicles 52,000 truck vehicle km 256,000 truck vehicle km 83% better than LOS D (78% in base without GTAW) 70% better than LOS D (62% in base without GTAW) Provides freeway-to-freeway connections to Highway 401 eastbound and westbound and 407ETR eastbound and westbound, but does not allow access from the GTA West Transportation Corridor to/from Trafalgar Road. 	<ul style="list-style-type: none"> A partial interchange could be considered on GTA West at Steeles Avenue or a new crossing road north of Steeles Avenue. 	<ul style="list-style-type: none"> Provides high capacity freeway and transitway operations, but does not allow for a connection to future employment lands via Trafalgar Road. <p style="text-align: center;">MODERATE CAPACITY & EFFICIENCY</p>
4.1.3 System performance during peak periods	<ul style="list-style-type: none"> South of Steeles Ave - 0.83 North of Derry Rd - 0.82 East of Trafalgar Rd - 0.81 West of Winston Churchill Blvd - 0.72 GTAW (North of Hwy 401 / 407 ETR) – 0.82 Trafalgar Rd (South of Steeles Ave) - 0.84 Trafalgar Rd (North of Derry Rd) - 0.91 Winston Churchill Blvd (South of Steeles Ave) – 1.0 Winston Churchill Blvd (North of Derry Rd) - 0.69 407 ETR (North of Derry Rd) - 0.94 407 ETR (West of Winston Churchill Blvd) - 0.64 Hwy 401 (East of Trafalgar Rd) - 0.84 Hwy 401 (West of Winston Churchill Blvd) - 0.91 Limited to no opportunity for demand management supportive strategies in this section. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Overall V/C ratios indicate high utilization, but V/C ratios are critical on sections of Highway 401, 407ETR, Winston Churchill Blvd, and Trafalgar Road. <p style="text-align: center;">MODERATE PERFORMANCE</p>
4.2 System reliability / redundancy	<ul style="list-style-type: none"> No opportunities for redundancy on the freeway network. Limited opportunity for redundancy on nearby arterial roads. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Limited opportunities for redundancy on the local road network. <p style="text-align: center;">LOW REDUNDANCY</p>
4.3 Safety			
4.3.1 Traffic Safety	<ul style="list-style-type: none"> No anticipated safety concerns. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> No anticipated safety concerns. <p style="text-align: center;">NO NET EFFECT</p>
4.3.2 Emergency Access	<ul style="list-style-type: none"> High potential to improve access. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> High potential to improve access <p style="text-align: center;">HIGH ACCESS</p>
4.4 Mobility & Accessibility			
4.4.1 Modal integration and balance	<ul style="list-style-type: none"> The GTA West Transitway will positively contribute to a balanced transportation network consisting of a variety of modes, facilities, and services, consistent with Province's vision for the GTHA. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Opportunities for intermodal connections at transitway station. <p style="text-align: center;">LOW POTENTIAL FOR IMPROVEMENT</p>
4.4.2 Linkages to Population and Employment Centres	<ul style="list-style-type: none"> Potential to provide inter-regional transit connection on periphery of future employment area through provision of a transitway station in the vicinity of 401/407 interchange. Provides inter-regional freeway connections to Highway 401 and Highway 407 ETR. There are no ramp connections to/from GTA West at Trafalgar Road. This increases the travel time for all commuters to future employment centres on Steeles Avenue in the vicinity of Trafalgar Road. These vehicles would need to exit Highway 401 at James Snow Parkway. 	<ul style="list-style-type: none"> A partial interchange could be considered on GTA West at Steeles Avenue or a new crossing road north of Steeles Avenue. Transitway alignment, station layout, and access configuration to be detailed in preliminary design phase of study. Impacts to existing and future population and employment areas will be mitigated to the extent feasible through context-sensitive design in the preliminary design phase of the study. 	<ul style="list-style-type: none"> Provides freeway-to-freeway connections to Highway 401 and 407 ETR. <p style="text-align: center;">MODERATE ACCESSIBILITY</p>

COLUMN 1 Evaluation Factors and Sub-Factors	COLUMN 2 Potential Effects	COLUMN 3 Avoidance / Mitigation / Compensation / Enhancement Measures	COLUMN 4 Potential Net Effects
4.4.3 Recreation and Tourism Travel	<ul style="list-style-type: none"> Provides inter-regional freeway connection to recreational attractions within the study area and beyond. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Provides inter-regional connections. <p style="text-align: center;">LOW SUPPORT</p>
4.4.4 Accommodation for pedestrians, cyclists, snowmobiles, and specialized vehicles	<ul style="list-style-type: none"> Does not provide accommodation for pedestrians, cyclists, snowmobiles, and specialized vehicles along the corridor. Reduced opportunities to cross the corridor. 	<ul style="list-style-type: none"> Design of crossing roads to accommodate pedestrians, cyclists, snowmobiles, and specialized vehicles can be accommodated where feasible in the preliminary design phase of the study. 	<ul style="list-style-type: none"> Opportunities to maintain existing routes across the corridor. <p style="text-align: center;">LOW ACCOMMODATION</p>
4.5 Network Compatibility			
4.5.1 Network connectivity	<ul style="list-style-type: none"> Provides connections to Highway 401 east and west and 407 ETR east and west. The GTA West Transitway will provide additional transportation network capacity and alternative mode choices between communities. Potential to provide GTA West Transitway station in vicinity of 401/407 interchange, in close proximity to major freeways and arterials (i.e. Steeles Avenue and Winston Churchill Boulevard). <ul style="list-style-type: none"> Potential to connect GTA West Transitway to Highway 407 Transitway and potential future Frequent Regional Express Bus service on Highway 401. High potential to support/ connect to existing/proposed travel modes; transit way stations and existing freeway to freeway interchange at Highway 401 and 407ETR. No connection from GTA West to/from Trafalgar Road. Can accommodate widening of existing Municipal Road network (i.e. Steeles Avenue to 6-lanes). 	<ul style="list-style-type: none"> A partial interchange could be considered on GTA West at Steeles Avenue or a new crossing road north of Steeles Avenue. Transitway alignment, station layout, and access configuration to be detailed in preliminary design phase of study. Impacts to the local road network, pedestrian and cyclist facilities, and other transit facilities will be mitigated to the extent feasible through context-sensitive design in the preliminary design phase of the study. 	<ul style="list-style-type: none"> Provides full freeway-to-freeway connections, but no connection to Trafalgar Road from GTA West. <p style="text-align: center;">MODERATE CONNECTIVITY</p>
4.5.2 Flexibility for future expansion	<ul style="list-style-type: none"> The GTA West freeway can be expanded to an ultimate 10-lane section within the proposed property right-of-way. The GTA West Transitway can be designed to facilitate future conversion to an LRT system. Accommodates expansion of Highway 401 to a 12-lane section. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Opportunities to expand the freeway and transitway within the proposed right-of-way. Accommodates planned expansion of Highway 401. <p style="text-align: center;">MODERATE FLEXIBILITY</p>
4.6 Engineering			
4.6.1 Constructability	<ul style="list-style-type: none"> Requires construction of ramps (including bridges and speed change lanes) near live traffic on Highway 401 and 407ETR. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Requires traffic staging / management on freeways. <p style="text-align: center;">MODERATE POTENTIAL FOR CONSTRUCTABILITY ISSUES</p>
4.6.2 Compliance with design criteria	<ul style="list-style-type: none"> Minor exceptions to the design criteria are anticipated. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Generally conforms to design criteria. <p style="text-align: center;">HIGH CONFORMITY</p>
4.7 Construction Cost	<ul style="list-style-type: none"> 19 structures in the freeway-freeway interchange. 23.9 km of new ramps or roads. \$184 Million. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Estimated cost: \$184 million <p style="text-align: center;">LOW RELATIVE COST</p>
4.8 Traffic Operations	<ul style="list-style-type: none"> V/C ratios on sections of Highway 401, Highway 407ETR, Trafalgar Road, and Winston Churchill Boulevard indicate potential for reduced performance Interchange spacing between GTA West westbound and Trafalgar Road results in a 680 m weaving section along the Highway 401 mainline. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Volumes indicate potential for operational issues. <p style="text-align: center;">MODERATE POTENTIAL FOR NEGATIVE EFFECT</p>