

Regional Municipality of York

Appendix 3E-3

Net Effects Analysis of the Short-Listed Alternatives to the Undertaking: Alternative #9

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Net Effects Analysis of the Short-Listed Alternatives to the Undertaking: Alternative #9 – TDM, TSM, Other Public Transit Initiatives, Planned Road and Transit Improvements, Other Additional Area Road Improvements

1 Factors & Criteria	2 Indicators	3 Measures	4 Potential Effects	5 Avoidance / Mitigation / Compensation / Enhancement Measures	6 Net Effects
1. Transportation					
1.1. Potential effects on road transportation capacity within the study area in 2031	1.1.1. Peak hour volume-to-capacity performance on arterial roads within the study area in 2031	➤ Percentage of arterial roads within each congested corridor operating at AM peak hour volume-to-capacity (V/C) ratio of 0.9 or less in 2031	➤ For the AM peak hours in 2031: <ul style="list-style-type: none"> • 100% operating at peak hour V/C ratio of 0.9 or less within <u>Corridor 1</u>¹ • 58% operating at V/C ratio of 0.9 or less within <u>Corridor 2</u>² • 75% operating at V/C ratio of 0.9 or less within <u>Corridor 3</u>³ • 75% operating at V/C ratio of 0.9 or less within <u>Corridor 4a</u>⁴ • 50% operating at V/C ratio of 0.9 or less within <u>Corridor 4b</u>⁵ 	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged
1.2. Potential effects on transportation system efficiency within the study area in 2031	1.2.1. Travel time to, from and within the study area for the AM peak hours in 2031	➤ Average travel time for auto trips originating in and/or destined for the study area for the AM peak hours in 2031	➤ For the AM peak hours in 2031: <ul style="list-style-type: none"> • Average travel time of 15 minutes for auto trips <u>originating</u> in the study area • Average travel time of 18 minutes for auto trips <u>destined</u> for the study area 	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged
	1.2.2. Trip length to, from and within the study area for the AM peak hours in 2031	➤ Average trip length (in km) for auto trips originating in and/or destined for the study area for the AM peak hours in 2031	➤ For the AM peak hours in 2031: <ul style="list-style-type: none"> • Average trip length of 15 km for auto trips <u>originating</u> in the study area • Average trip length of 19 km for auto trips <u>destined</u> for the study area 	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged
1.3. Potential effects on public transit, cycling and pedestrians	1.3.1. Public transit usage for originating and destined travel in 2031	➤ Transit's market share (modal split) for originating and destined travel in 2031	➤ In 2031: <ul style="list-style-type: none"> • 12.2% transit market share for travel <u>originating</u> in the study area • 7.9% transit market share for travel <u>destined</u> for the study area 	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged
	1.3.2. Consistency with the public transit related objectives of the Regional Transportation Master Plan and with the Vaughan Pedestrian and Cycling Master Plan	➤ Relative consistency with the public transit related objectives of the Regional Transportation Master Plan and with the Vaughan Pedestrian and Cycling Master Plan based on improvements to public transit, and walking and cycling infrastructure	➤ Consistent with public transit related objectives of the <u>Regional Transportation Master Plan</u> policies through its provision of additional transit service and accommodation of an extended transit priority network ➤ Consistent with the <u>Vaughan Pedestrian and Cycling Master Plan</u> policies in terms of accommodating improvements in the approved cycling network and proposed pedestrian system, and in developing urban areas that are more pedestrian/bicycle-oriented	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged
1.4. Potential effects on public safety	1.4.1. Number of collisions within the study area in 2031	➤ Total daily travel within the study area (in-vehicle – kilometres) in 2031, as a proxy for the number of collisions	➤ Total daily travel of approximately 276,000 km within the study area in 2031 (as a proxy for the number of collisions)	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged
	1.4.2. Change in emergency services response times within the study area by 2031	➤ Relative change in emergency services response times (from 2006 to 2031) based on change in % of arterial roads within study area with volume/capacity ratio greater than 0.9	➤ Increase in emergency services response times by 2031 due to 2% increase in arterial roads within study area with V/C ratio greater than 0.9 compared to 2006	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged

1. Highway 50/Highway 27 Corridor from Highway 407 northerly to Teston Road.
 2. Weston Road/Highway 400 Corridor – from Highway 7 northerly to Teston Road
 3. Teston Road/Major Mackenzie Drive/Rutherford Road Corridor – from Highway 50 easterly to Highway 400
 4. Highway 7 / Langstaff Road – from Highway 50 easterly to Highway 427 and its planned extension
 5. Highway 7 / Highway 407 – from Kipling Avenue easterly to east of Pine Valley Drive

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Alternative #9 – TDM, TSM, Other Public Transit Initiatives, Planned Road and Transit Improvements, Other Additional Area Road Improvements

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1.5. Potential approval requirements	1.5.1. Local/regional approval and permit requirements	➤ Type of local/regional approvals / permits anticipated	➤ Four local / regional approvals / permits are anticipated for: <ul style="list-style-type: none"> • Development / interference with wetlands (TRCA) • Alterations to shorelines and watercourses (TRCA) • Effects on local roads (City of Vaughan) • Regional Official Plan amendments (York Region) 	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged
	1.5.2. Provincial approval and permit requirements	➤ Type of provincial approvals / permits anticipated	➤ Two provincial approvals / permits are anticipated for: <ul style="list-style-type: none"> • Disturbance or displacement of designated heritage features (Ministry of Culture) • Disturbance or displacement of archaeological features (Ministry of Culture) 	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged
	1.5.3. Federal approval and permit requirements	➤ Type of federal approvals / permits anticipated	➤ Four federal approvals / permits are anticipated for: <ul style="list-style-type: none"> • Railroad crossings (Transport Canada) • Navigable water crossings (Transport Canada) • Harmful alteration, disruption, or destruction of fish habitat (DFO) • Federal Environmental Assessment (to be determined based on potential triggers) 	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged
2. Natural Environment					
2.1. Potential effects on the Aquatic Environment	2.1.1. Effects on aquatic habitats and functions	➤ Number and width of potential stream crossings (width of proposed road) by thermal assessment (warmwater, coolwater, coldwater and unknown)	➤ Loss of / disturbance to aquatic habitats and functions as a result of: <ul style="list-style-type: none"> • 33 warmwater stream crossings along Highway 27, Major Mackenzie Drive, Highway 50, Rutherford Road, Weston Road, and Teston Road totalling 940 m in width • 12 coolwater stream crossings along Major Mackenzie Drive, Rutherford Road, Weston Road, Highway 27 and Pine Valley Drive totalling 310 m in width • 12 coldwater stream crossings along Major Mackenzie Drive, Rutherford Road, Weston Road, Pine Valley Drive and Teston Road totalling 230 m in width • 5 unknown stream crossings along Highway 27 and Rutherford Road totalling 70 m in width 	➤ Design the bridge structures to fully span the crossing where possible ➤ Where full span bridges are not possible, use open bottom culverts to reduce negative effects to channel attributes and to maintain surface water connection to ground water, where present. ➤ Implement standard erosion and sedimentation control measures during construction ➤ Compensate for any loss of aquatic habitat or function resulting from the stream crossing where required ➤ Enhance adjacent areas of the stream crossing wherever possible	➤ The loss of and/or disturbance to aquatic habitats and functions associated with 62 stream crossings along Highway 27, Major Mackenzie Drive, Highway 50, Rutherford Road, Weston Road, Teston Road, and Pine Valley Drive would be avoided by constructing full span bridges, minimized through the use of open bottom culverts and implementation of standard erosion and sedimentation control measures during construction, compensated for where required, and enhanced where possible, thus resulting in no net loss of aquatic habitat

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	2.1.2. Effects on wetland habitats and functions	<ul style="list-style-type: none"> ➤ Total length of physical improvements crossing through or adjacent to wetland habitat (in km) ➤ Total area of wetland removed (in ha) 	<ul style="list-style-type: none"> ➤ Disturbance of wetland habitat north of Langstaff Road due to 1 km of physical improvements <u>crossing through</u> wetland habitat and 2 km of physical improvements <u>within 30 m</u> of wetland habitat. ➤ Removal of 1 ha of wetland north of Langstaff Road due to 1 km of physical improvements <u>crossing through</u> wetland habitat 	<ul style="list-style-type: none"> ➤ Consider relocating physical improvement along Langstaff Road to the south side to avoid wetland removal and minimize disturbance ➤ Implement standard erosion and sedimentation control measures during construction ➤ Apply mitigation measures for edge management during operation ➤ Compensate for wetland removal by restoring habitat equivalent to area of wetland removed, preferably adjacent to existing landscape linkages. ➤ Enhance adjacent areas of wetland habitat wherever possible 	<ul style="list-style-type: none"> ➤ Disturbance to wetland habitat associated with 3 km of physical improvements and removal of 1 ha of wetland north of Langstaff Road would be avoided where possible, minimized through standard erosion and sedimentation control measures during construction and operation through edge management, compensated for where required, and enhanced where possible
	2.1.3. Effects on fish species at risk (according to COSSARO and COSEWIC), including endangered, concern/rare species and provincially rare species (S1-S3 NHIC)	<ul style="list-style-type: none"> ➤ High likelihood of occurrence (fish species located upstream and downstream of crossing) and low likelihood of occurrence (fish species located either upstream or downstream of similar thermal regime) of fish species at risk, including endangered, threatened and special concern/rare species, and provincially rare species (S1-S3 NHIC). 	<ul style="list-style-type: none"> ➤ Loss of / disturbance to fish species at risk as a result of: <ul style="list-style-type: none"> • 8 highly likely occurrences of <u>endangered</u> fish species in the vicinity of stream crossings at Teston Road, Pine Valley Drive and Major Mackenzie Road and 1 low likelihood of occurrence of <u>endangered</u> fish species in the vicinity of stream crossings at Pine Valley Drive • 8 highly likely occurrences of <u>threatened</u> fish species in the vicinity of stream crossings at Teston Road, Pine Valley Drive and Major Mackenzie Road and 1 low likelihood of occurrence of <u>threatened</u> fish species in the vicinity of stream crossings Pine Valley Drive • 2 low likelihood of occurrences of <u>special concern/rare fish</u> species in the vicinity of stream crossings at Rutherford Road • 16 highly likely occurrences of <u>provincially rare fish species</u> in the vicinity of stream crossings at Teston Road, Pine Valley Drive, Major Mackenzie Road and Rutherford Road and 4 low likelihood of occurrences of <u>provincially rare fish species</u> in the vicinity of stream crossings at Rutherford Road, Pine Valley Drive and Highway 7 	<ul style="list-style-type: none"> ➤ Design the bridge structures to fully span the crossings where possible ➤ Where full span bridges are not possible, use open bottom culverts to reduce negative effects to channel attributes and to promote connection to ground water, where present ➤ Schedule construction to avoid fish spawning or migration periods ➤ Implement standard erosion and sedimentation control measures during construction ➤ Compensate for any loss of aquatic habitat or function resulting from the stream crossing where required ➤ Enhance adjacent areas of the stream crossing wherever possible 	<ul style="list-style-type: none"> ➤ The highly likely loss of and/or disturbance to fish species at risk associated with 32 stream crossings along Major Mackenzie Drive, Rutherford Road, Teston Road, and Pine Valley Drive and the low likelihood of loss of and/or disturbance to fish species at risk associated with 8 stream crossings along Rutherford Road, Pine Valley Drive and Highway 7 would be avoided where possible by using full span bridges, mitigated through the use of open bottom culverts, construction out of fish spawning or migration periods, and implementation of standard erosion and sedimentation control measures, compensated for where required, and enhanced where possible, thus resulting in no net effects on fish species at risk.
	2.1.4. Changes to surface water quality (increased pollutants) and quantity (flood levels and erosion)	<ul style="list-style-type: none"> ➤ Relative changes to surface water quality (increased pollutants) and quantity (flood levels and erosion) 	<ul style="list-style-type: none"> ➤ Degradation in surface water <u>quality</u> due to: <ul style="list-style-type: none"> • increased water temperature and turbidity due to construction runoff • increased salt concentrations resulting from increased salt application on expanded road system • increased pollutants due to increased runoff from increased impervious area • increased erosion due to increased flow via stream straightening (culvert) 	<ul style="list-style-type: none"> ➤ Minimize temporary removal of vegetation during construction and re-vegetate disturbed areas as soon as possible ➤ Implement standard erosion and sedimentation control measures during construction ➤ Utilize a variety of environmental management measures during operation that may include embankment filter strips, flat-bottom ditches, catch basins and 	<ul style="list-style-type: none"> ➤ Short and long-term changes to water quality and quantity downstream of road crossings would be minimized by applying mitigation measures during construction and operation, including minimizing temporary removal of vegetation, implementing standard erosion and sedimentation control measures, and implementing a salt management plan

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			<ul style="list-style-type: none"> ➢ Increase in surface water <u>quantity</u> due to: <ul style="list-style-type: none"> • increased overland flow resulting from a temporary reduction in vegetation during construction • increased runoff due to increased impervious area 	<ul style="list-style-type: none"> stormwater management facilities. ➢ Implement a salt management plan to reduce salt use and wastage during operations, which could incorporate salt storage techniques ➢ Use open bottom culverts to reduce negative effects to channel attributes and to promote connection to groundwater, where present ➢ Enhance adjacent vegetation areas of the stream crossing wherever possible 	
2.2. Potential effects on the Terrestrial Environment	2.2.1. Effects on wildlife habitats / forest cover	<ul style="list-style-type: none"> ➢ Total length of physical improvements or crossing through or adjacent to wildlife habitat / forest cover (in km) ➢ Total area of natural cover removed (in ha) 	<ul style="list-style-type: none"> ➢ 26 km of physical improvements <u>crossing through</u> (14 km) and <u>adjacent to</u> (12 km) wildlife habitat / forest cover resulting in increased barrier to wildlife movement and increased wildlife mortality ➢ Removal of 6 ha of natural cover 	<ul style="list-style-type: none"> ➢ Apply edge management plans at all newly created edges to reduce edge effects during operation. ➢ Retrofit/replace culverts with dry ledges and funnelling fences where wildlife species are predicted to cross to facilitate safe wildlife passage and minimize wildlife mortality as an enhancement ➢ Compensate for area of natural cover removed by restoring equivalent habitat area, preferably adjacent to existing landscape linkages 	<ul style="list-style-type: none"> ➢ The increased barrier to wildlife movement and increase in wildlife mortality associated with the operation of 26 km of physical improvements crossing through/adjacent to wildlife habitat/forest cover would be minimized through the application of edge management plans with the potential to enhance existing culvert crossings. ➢ The removal of 6 ha of natural cover would be compensated for in the long-term through the restoration of equivalent habitat area.
	2.2.2. Effects on terrestrial species at risk (according to COSSARO and COSEWIC), including endangered, threatened and special concern/rare species, provincially rare (S1-S3 NHIC) and locally significant sensitive species (according to MNRs Significant Wildlife Habitat Manual)	<ul style="list-style-type: none"> ➢ Occurrence of terrestrial species at risk, including endangered, threatened and special concern/rare species, provincially rare (S1-S3 NHIC) and locally significant area sensitive bird species (according to MNRs Significant Wildlife Habitat Manual) in the vicinity of physical improvements 	<ul style="list-style-type: none"> ➢ 4 occurrences of locally significant sensitive bird species within 30 m of physical improvements resulting in disturbance to these species, and no occurrences within 30 m of physical improvements of endangered, threatened, special concern / rare species, and provincially rare sensitive bird species 	<ul style="list-style-type: none"> ➢ Apply edge management plans at all newly created edges during construction and pre-restoration to reduce edge effects experienced by area sensitive bird species ➢ Compensate for area of forest cover removed by restoring equivalent habitat area, preferably adjacent to existing landscape linkages 	<ul style="list-style-type: none"> ➢ The disturbance to locally significant sensitive bird species inhabiting habitats within 30 m of physical improvements would be minimized by applying edge management plans, and would be compensated for through the restoration of equivalent habitat area
	2.2.3. Effects on ANSIs, ESAs, or PSWs	<ul style="list-style-type: none"> ➢ Total length of physical improvements crossing through or adjacent to ANSIs, ESAs, or PSWs (in km) ➢ Total area of natural cover removed from ANSIs, ESAs and PSWs (in ha) 	<ul style="list-style-type: none"> ➢ 8 km of physical improvements crossing through (2 km) or within 30 m (6 km) of the 3 ANSIs (Boyd Conservation Area and Adjacent Lands, Kleinberg Woodlots, Humber River Valley-Kleinberg) and 5 ESAs (Elder Mill's Forest, McLean's Forest, Boyd Forest, Graham's Forest Complex, Pine Valley Forest) ➢ 1 ha of natural cover removed from the same 3 ANSIs 	<ul style="list-style-type: none"> ➢ Avoid removal of 3 ANSI properties (Boyd Conservation Area and Adjacent Lands, Kleinberg Woodlots, Humber River Valley-Kleinberg) and 4 ESA properties (McLean's Forest, Boyd Forest, Graham's Forest Complex, Pine Valley Forest) by realigning Major Mackenzie Drive, Rutherford Road and Pine Valley Drive to avoid these designated features where possible ➢ Widen only to the north of Rutherford Road in the vicinity of Elder Mill's Forest ESA to minimize disturbance to this feature ➢ Apply edge management plans at all newly created edges during construction and pre-restoration to reduce edge effects ➢ Compensate for area of ANSIs, ESAs, or PSWs removed by restoring equivalent habitat area, preferably adjacent to existing landscape linkages, if avoidance is not possible 	<ul style="list-style-type: none"> ➢ Disturbance to 3 ANSIs due to 2 km of physical improvements crossing through them and 6 km of physical improvements within 30 m of them would be minimized by applying edge management plans ➢ The removal of 1 ha of natural cover associated with 3 ANSIs (Boyd Conservation Area and Adjacent Lands, Kleinberg Woodlots, Humber River Valley-Kleinberg) and 5 ESAs (Elder Mill's Forest, McLean's Forest, Boyd Forest, Graham's Forest Complex, Pine Valley Forest) would be avoided by realigning Major Mackenzie Drive, Rutherford Road and Pine Valley Drive and otherwise compensated for

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2.3. Potential Effects on Groundwater	2.3.1. Effects on groundwater recharge areas.	➤ Total area (ha) of low and high permeability soils covered by physical improvements	➤ 42 ha of low permeability clayey silt till and 85 ha of high permeability alluvial or glaciolacustrine sediments (dominantly fine to coarse sand) covered by physical improvements, resulting in a marginal loss of groundwater recharge areas (due to the relatively small surface area affected compared to its surroundings)	➤ No avoidance / mitigation / compensation / enhancement measures required because there is only a marginal loss of groundwater recharge areas	➤ Potential effects remain unchanged
	2.3.2. Effects on groundwater discharge areas.	➤ Relative effect on groundwater discharge areas	➤ Negligible effect on groundwater discharge areas within the 42 ha of till soils covered by physical improvements because the clay silt till soils inhibit groundwater flow, and marginal effect on groundwater discharge areas within the 85 ha of sandy soils covered by physical improvements due to the relatively small surface area affected compared to its surroundings	➤ No avoidance / mitigation / compensation / enhancement measures required because there is only a marginal effect on groundwater discharge areas	➤ Potential effects remain unchanged
	2.3.3. Effects on water supply and groundwater quantity in shallow wells	➤ Number of shallow wells (<15 m deep) within 500 m of physical improvements and relative changes to groundwater quantity (e.g. groundwater flow direction)	➤ Loss of an estimated 33 wells ⁶ within the footprint of physical improvements as a result of decommissioning ➤ Short-term construction-related effects (i.e., dewatering) and longer term effects (i.e., loss of groundwater yield) on an additional 60 wells within 500 m of physical improvements that are in the sandy cap soils	➤ Use trench plugs in the bedding of buried services to stop the inadvertent drainage of the shallow sand aquifer should these services intersect sandy cap soils ➤ Provide alternate water supply to compensate for short or long-term adverse effects on water supply (e.g., connection to local municipal system, or trucked water supply (short-term solution) and drilling new wells (long-term solution) in the areas where municipal water services are not available).	➤ Loss of an estimated 33 wells within the footprint of physical improvements would be compensated for and short-term construction-related effects (i.e., dewatering) and longer term effects (i.e., loss of groundwater yield) on an additional 60 wells would be mitigated or compensated for
	2.3.4. Changes to groundwater quality	➤ Relative changes to groundwater quality	➤ A negligible reduction in groundwater quality due to the high residence time of any contaminated runoff (e.g., hydrocarbons and road salt) from the 42 ha footprint that covers low permeability material and infiltrates the surrounding till surface ➤ A marginal reduction in groundwater quality due to any contaminated runoff from the 85 ha footprint that covers the high permeability material and infiltrates the surrounding sand surfaces	➤ Utilize a variety of environmental management measures during operation that may include embankment filter strips, flat-bottom ditches, catch basins and stormwater management facilities. ➤ Implement a salt management plan to reduce salt use and wastage during operations, which could incorporate salt storage techniques	➤ The negligible reduction in groundwater quality from the 42 ha footprint that covers low permeability material and the marginal reduction in groundwater quality from the 85 ha footprint that covers the high permeability material would be minimized through the implementation of environmental management measures and a salt management plan
2.4. Potential effects on the broader regional Natural Heritage System	2.4.1. Effects on ecological connectivity, within and outside of the study area	➤ Relative loss of the broader regional natural cover and connectivity	➤ Loss of connectivity with broader regional natural heritage system due to (1) further fragmentation and severance of a main linkage by widening of Major Mackenzie Drive and Rutherford Road between Pine Valley Drive and Islington Avenue and (2) severance of a main linkage along East Humber River by widening of Teston Road, Major Mackenzie Drive West and Rutherford Road, and reductions in natural cover resulting in reduced movement of wildlife and/or increased wildlife mortality during road crossing	➤ Retrofit/replace culverts with dry ledges and funnelling fences where wildlife species are predicted to cross to facilitate safe wildlife passage and minimize wildlife mortality as an enhancement. ➤ Compensate for area of natural cover removed by restoring equivalent habitat area within an undisturbed portion of the linkage	➤ Loss of connectivity with broader regional natural heritage system due to further fragmentation and severance of 2 main linkages within the study area and to reductions in natural cover would be minimized by enhancing existing culvert crossings and compensated for through the restoration of equivalent habitat area

6. Estimates of the number of wells are approximate only, as the accuracy of the MOE water well database is very poor. In addition there may be up to 30% more wells because of unrecorded or unreported wells.

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	2.4.2. Effects on Natural Heritage System or open space	<ul style="list-style-type: none"> ➤ Total length of physical improvements crossing through or adjacent to potential natural cover (defined as Potential Cover in TRCAs Natural Heritage System mapping) (in km) ➤ Total area of potential natural cover removed (in ha) 	<ul style="list-style-type: none"> ➤ Reduced size, shape, and/or connectivity of Natural Heritage System and open space as a result of 2 km of physical improvements <u>crossing through</u> and 2 km of physical improvements <u>adjacent to</u> potential natural cover ➤ Removal of less than 1 ha of potential natural cover 	<ul style="list-style-type: none"> ➤ Compensate for area of potential natural cover removed by restoring equivalent habitat area, preferably adjacent to existing landscape linkages. 	<ul style="list-style-type: none"> ➤ Effects on Natural Heritage System or open space as a result of 2 km of physical improvements crossing through and 2 km of physical improvements adjacent to potential natural cover, and removal of less than 1 ha of potential natural cover would be compensated for by restoring equivalent habitat area elsewhere
3. Socio-Economic Environment					
3.1. Potential effects on existing land uses/resources	3.1.1. Disturbance to residential communities, businesses, institutions, and/or recreational/community facilities.	<ul style="list-style-type: none"> ➤ Total length of physical improvements adjacent to or crossing through developed areas⁷ (in km). 	<ul style="list-style-type: none"> ➤ 27 km of physical improvements <u>adjacent to</u> developed areas resulting in <ul style="list-style-type: none"> • Short-term disturbance from construction related nuisance effects (e.g., noise, dust, and vibration) on residential areas and users of parks/sports fields (Rainbow Creek, Napa Valley), reduced access to businesses along ROW, and reduced access to and nuisance effects on schools (Castle Heights Montessori School, Emily Carr Secondary School) during construction • Effects on student safety at schools and pedestrian safety during operation as a result of wider intersections and increased crossing times 	<ul style="list-style-type: none"> ➤ Apply standard construction mitigation measures to minimize or eliminate nuisance effects (e.g., limit hours of construction as per City by-law, conduct watering as necessary to prevent visible dust emissions) ➤ Provide crossing guards and crosswalks for schools on Weston Road between Rutherford and Major Mackenzie and change traffic signal timing to minimize effects on student and pedestrian safety 	<ul style="list-style-type: none"> ➤ Short-term construction-related nuisance effects on residential areas, users of parks/sports fields, and schools, and reduced access to businesses and schools along ROW associated with 27 km of physical improvements would be minimized or eliminated through standard construction mitigation measures ➤ Effects on student and pedestrian safety would be minimized through providing crossing guards and crosswalks for schools on Weston Road and by changing traffic signal timing to benefit pedestrians
	3.1.2. Disturbance to individual residences outside of residential communities	<ul style="list-style-type: none"> ➤ Total length of physical improvements adjacent to homes in undeveloped areas⁸ (in km) 	<ul style="list-style-type: none"> ➤ 25 km of physical improvements adjacent to homes in undeveloped areas resulting in: <ul style="list-style-type: none"> • Short-term construction-related nuisance effects (e.g., noise, dust, and vibration) • Reduced access to residences during construction 	<ul style="list-style-type: none"> ➤ Apply standard construction mitigation measures to minimize or eliminate nuisance effects (e.g., limit hours of construction as per City by-law, conduct watering as necessary to prevent visible dust emissions) 	<ul style="list-style-type: none"> ➤ Short-term construction-related nuisance effects (e.g., noise dust, and vibration) and reduced access for residents in undeveloped areas associated with 25 km of physical improvements would be minimized or eliminated through standard construction mitigation measures
	3.1.3. Loss of / disturbance to open space land uses	<ul style="list-style-type: none"> ➤ Total length of physical improvements adjacent to or crossing through open space land uses (in km) 	<ul style="list-style-type: none"> ➤ 8 km of physical improvements <u>adjacent to</u> open space land uses resulting in: <ul style="list-style-type: none"> • Short-term construction-related nuisance effects (e.g., noise dust, and vibration) on users of open space land uses, such as Kortright Centre for Conservation • Increase in distance between sections of Humber Trail on either side of Major Mackenzie Drive 	<ul style="list-style-type: none"> ➤ Apply standard construction mitigation measures to minimize or eliminate nuisance effects (e.g., limit hours of construction as per City by-law, conduct watering as necessary to prevent visible dust emissions) ➤ Consider constructing a grade-separated pedestrian crossing for the Humber Trail (William Granger Greenway) on either side of Major Mackenzie Drive 	<ul style="list-style-type: none"> ➤ Short-term construction-related nuisance effects (e.g., noise dust, and vibration) on users of open space land uses associated with 8 km of physical improvements would be minimized or eliminated through standard construction mitigation measures ➤ Increase in distance between sections of Humber Trail on either side of Major Mackenzie Drive would be mitigated through construction of a grade-separated pedestrian crossing
	3.1.4. Loss of Class 1, 2, and 3 agricultural soils	<ul style="list-style-type: none"> ➤ Total length of physical improvements adjacent to or crossing through Class 1, 2, or 3 agricultural soils (in km) 	<ul style="list-style-type: none"> ➤ Loss of agricultural soils as a result of: <ul style="list-style-type: none"> • 28 km of physical improvements <u>crossing through</u> Class 1 (23 km) and Class 2 (5 km) agricultural soils 	<ul style="list-style-type: none"> ➤ Avoid property taking of Class 1 and Class 2 agricultural soils where possible ➤ Compensate for property taking where avoidance is not possible 	<ul style="list-style-type: none"> ➤ Loss of Class 1 and Class 2 agricultural soils associated with 28 km of physical improvements would be avoided where possible and otherwise compensated for

7. **Developed areas** are defined as identifiable subdivisions or clusters of homes, businesses or community features.

8. **Undeveloped areas** are defined as sparse development patterns of residential, businesses or institutional uses.

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	3.1.5. Changes to noise levels	➤ Relative change in roadway noise levels ⁹	<ul style="list-style-type: none"> ➤ Insignificant to just noticeable increases in roadway noise levels for most noise sensitive receptors based on likely increase of less than 5 dB ➤ Significant increases in roadway noise levels at approximately 150 receptors based on likely increase of 5 dB or greater. 	➤ Investigation of noise mitigation may be required at up to 150 receptors. Based on review of aerial photographs, assume mitigation may be technically feasible at approximately 60 receptors.	<ul style="list-style-type: none"> ➤ Insignificant to just noticeable roadway noise levels for most noise sensitive receptors based on likely increase of less than 5 dB ➤ Post mitigation, 90 to 150 receptors may have significant roadway noise level increases of 5 dB or greater
	3.1.6. Changes to air quality	➤ Estimated criteria and greenhouse gas emissions in 2031	<ul style="list-style-type: none"> ➤ Estimated criteria and greenhouse gas emissions in 2031 of: <ul style="list-style-type: none"> • CO2 total emissions = 214 tonnes • N2O total emissions = 0.026 tonnes • CH4 total emissions = 0.028 tonnes • CO total emissions = 3.0 tonnes • NOX total emissions = 0.17 tonnes • Total VOCs total emissions = 0.011 tonnes • TSP total emissions = 1.3 tonnes • PM10 total emissions = 0.19 tonnes • PM_{2.5} total emissions = 0.013 tonnes 	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged
3.2. Potential effects on approved/draft approved land uses	3.2.1. Effects on approved/draft approved development plans	➤ Relative effect on approved/draft approved development plans	<ul style="list-style-type: none"> ➤ Land takings from 4 approved and 16 draft approved development applications including: <ul style="list-style-type: none"> ➤ EAST/WEST ROUTES: <ul style="list-style-type: none"> • Teston Road –1 draft approved application on the south side of Teston Road between Highway 400 and Weston Road • Major Mackenzie Drive –1 draft approved application on the south side of Major Mackenzie Drive between Highway 400 and Weston Road; 3 draft approved applications on the south side of Major Mackenzie Drive between Weston Road and Pine Valley Drive • Rutherford Road –2 approved applications on the north and south sides of Rutherford Road between Weston Road and Pine Valley Drive ➤ NORTH/SOUTH ROUTES: <ul style="list-style-type: none"> • Weston Road –3 draft approved applications on both the east and west sides of Weston Road between Teston Road and Major Mackenzie Drive; 2 draft approved and 1 approved application on the east and west sides of Weston Road between Major Mackenzie Drive and Rutherford Road; 2 draft approved applications on the west side of Weston Road between Rutherford Road and Langstaff Road 	<ul style="list-style-type: none"> ➤ Align the physical improvements to avoid or minimize the removal of land from approved/draft approved applications ➤ Compensate for land takings where avoidance is not possible 	➤ Land takings from 4 approved and 16 draft approved development applications would be avoided and/or minimized by realigning the physical improvements or compensated for where avoidance / minimization is not possible

9. 0 to 3 dB Insignificant; >3 to 5 dB Just Noticeable; >5 to 10 dB Significant; > 10 dB Very Significant. Changes in noise levels were estimated by examining the change in number of lanes, changes in roadway alignments and speeds. It was assumed that future traffic volumes were a direct function of the number of lanes of a given roadway. Thus, doubling the number of lanes (e.g., from 2 to 4) would double the traffic volume. Due to the logarithmic nature of sound, lane / volume increases would translate into the following noise increases: 4 to 6 lanes – 2 dB increase; 2 to 4 lanes, 3 to 6 lanes –3 dB increase; 2 to 6 lanes – 5 dB increase.

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			<ul style="list-style-type: none"> Pine Valley Drive – 2 draft approved and 1 approved application on the east and west sides of Pine Valley Drive between Major Mackenzie Drive and Rutherford Road Islington Avenue - 1 draft approved development application on the west side of Islington Avenue between Major Mackenzie Drive and Rutherford Road Highway 27 –1 draft approved application on the east side of Highway 27 between Nashville Road and Major Mackenzie Road 		
3.3. Potential for conforming with approved local, regional and provincial plans and policies (including City and Regional Official Plans, Provincial Policy Statement, Growth Plan, and Greenbelt Plan)	3.3.1. Conformance with local plans and/or policies	➤ Relative potential to conform with approved local policies	<ul style="list-style-type: none"> ➤ Protection of Environmental Features <ul style="list-style-type: none"> Not consistent with OPA 600 as the Teston Road – Pine Valley Drive to Kipling Avenue improvement extends beyond the planned ROW into the <i>Major Open Space & Valley Lands</i> designation ➤ Protection of Existing Community Character <ul style="list-style-type: none"> Not consistent with the City's objectives for protecting existing character of rural areas as outlined in Sections 1.7, 2.9 and 3.7 of OPA 600 as well as Policy 4.4.1.2 of OPA 601 ➤ Accommodation of Intensification Initiatives <ul style="list-style-type: none"> Consistent with the objectives in OPA 600 to support intensification and infill projects within the built-up areas of Western Vaughan (Kleinburg-Nashville, Vellore Urban Village, Woodbridge, employment areas along Highway 50 and Weston Road) ➤ Anticipation of Future Growth/ Promotion of Alternative Modes of Transportation <ul style="list-style-type: none"> Supports the City's objective in OPA 600 (Section 1.11) for enhancing the transportation network efficiency; Consistent with the City's objectives for developing urban areas that are more transit and pedestrian/bicycle-oriented (OPA 600 Section 2.1(iv & xi), 2.10) 	<ul style="list-style-type: none"> ➤ Protection of Environmental Features <ul style="list-style-type: none"> Consider amendments to OPA 600 to address widening of ROW ➤ Protection of Existing Community Character <ul style="list-style-type: none"> Develop design guidelines for physical improvements to minimize effects on rural character and to ensure that existing character is retained/enhanced 	<ul style="list-style-type: none"> ➤ Protection of Environmental Features <ul style="list-style-type: none"> Consistent with OPA 600 and Regional Map 8 if amendments are made to address widening of ROW ➤ Protection of Existing Community Character <ul style="list-style-type: none"> Not consistent with the City's objectives for protecting existing character of rural areas ➤ Accommodation of Intensification Initiatives <ul style="list-style-type: none"> Consistent with the objectives in OPA 600 to support intensification and infill projects within the built-up areas of Western Vaughan ➤ Anticipation of Future Growth/ Promotion of Alternative Modes of Transportation <ul style="list-style-type: none"> Supports the City's objective in OPA 600 for enhancing the transportation network efficiency; Consistent with the City's objectives for developing urban areas that are more transit and pedestrian/bicycle-oriented
	3.3.2. Conformance with regional plans and/or policies	➤ Relative potential to conform with approved regional policies	<ul style="list-style-type: none"> ➤ Protection of Environmental Features <ul style="list-style-type: none"> Not consistent with the York Region Official Plan as the Teston Road – Pine Valley Drive to Kipling Avenue improvement extends beyond the planned ROW into the <i>Significant Forested Lands</i> and the <i>Conservation Areas Regional Forests</i> 	<ul style="list-style-type: none"> ➤ Protection of Environmental Features <ul style="list-style-type: none"> Consider amendments to Regional Map 8 to address widening of ROW 	<ul style="list-style-type: none"> ➤ Protection of Environmental Features <ul style="list-style-type: none"> Consistent with York Region Official Plan if amendments are made to Regional Map 8 to address widening of ROW. ➤ Accommodation of Intensification Initiatives <ul style="list-style-type: none"> Consistent with the objectives of the York Region Official Plan to support

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			<ul style="list-style-type: none"> ➤ Accommodation of Intensification Initiatives <ul style="list-style-type: none"> • Consistent with the objectives of the York Region Official Plan to support intensification and infill opportunities within the identified Urban Areas, Regional Corridors, and Local Corridors ➤ Conformity with planned road improvements/ ROW widths <ul style="list-style-type: none"> • Not consistent with the planned ROW identified on Regional Map 8 for the Teston Road – Pine Valley Drive to Kipling Avenue improvement. Also, the Alternative does not consider opportunities to reduce rights-of-way in order to enhance street character and does not promote alternative modes of transportation ➤ Promotion of Alternative Modes of Transportation <ul style="list-style-type: none"> • Consistent with the York Region Official Plan's objective in Section 6.1 to ensure that roads are improved in a manner that is supportive of all modes of transportation 		<p>intensification and infill opportunities within the identified Urban Areas, Regional Corridors, and Local Corridors.</p> <ul style="list-style-type: none"> ➤ Conformity with planned road improvements/ ROW widths <ul style="list-style-type: none"> • Not consistent with the York Region Official Plan in considering opportunities to reduce ROWs in order to enhance street character ➤ Promotion of Alternative Modes of Transportation <ul style="list-style-type: none"> • Consistent with the York Region Official Plan in ensuring that roads are improved in a manner that is supportive of all modes of transportation
	<p>3.3.3. Conformance with provincial plans and/or policies</p>	<p>➤ Relative potential to conform with approved provincial policies</p>	<ul style="list-style-type: none"> ➤ Protection of Environmental Features <ul style="list-style-type: none"> • Not consistent with the Greenbelt Plan as the Teston Road – Pine Valley Drive to Kipling Avenue improvement extends beyond the planned ROW into the <i>Protected Countryside</i> designation. ➤ Promotion of Alternative Modes of Transportation <ul style="list-style-type: none"> • Consistent with the objectives of section 1.6.5.3 of the Provincial Policy Statement and section 3.2.2 (1a) of the Growth Plan to provide additional connectivity among the transportation system; and supports the overall intent of section 1.6 of the Provincial Policy Statement and section 3.2.2 of the Growth Plan to provide new opportunities for multi-modal transportation choices. ➤ Accommodation of Intensification Initiatives <ul style="list-style-type: none"> • Consistent with the objective of the Growth Plan (sections 2.2.2 and 2.2.3) to support intensification and infill projects within the built-up areas of Western Vaughan. 	<ul style="list-style-type: none"> ➤ Protection of Environmental Features <ul style="list-style-type: none"> • Consider amendments to OPA 600 and Regional Map 8 to address widening of ROW 	<ul style="list-style-type: none"> ➤ Protection of Environmental Features <ul style="list-style-type: none"> • Consistent with the Greenbelt Plan if the City and Regional Official Plans are amended to include a widening of ROW ➤ Promotion of Alternative Modes of Transportation <ul style="list-style-type: none"> • Consistent with the objectives of the Provincial Policy Statement and Growth Plan to provide additional connectivity among the transportation system and to provide new opportunities for multi-modal transportation choices. ➤ Accommodation of Intensification Initiatives <ul style="list-style-type: none"> • Consistent with the objective of the Growth Plan to support intensification and infill projects within the built-up areas of Western Vaughan

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3.4. Potential effects on existing community character and sustainability	3.4.1. Change in the perception of the community as a place to live, work or do business.	<ul style="list-style-type: none"> ➤ Relative potential to change the perception of the community as a place to live, work or do business based on the location/extent of physical improvements, number/type of transportation options available in the study area 	<ul style="list-style-type: none"> ➤ Positive long-term change in perception of the community as a place to live, work or do business due to 60 km of infrastructure improvements, a tripling in transit service frequency compared to current conditions, and TDM and TSM features ➤ Negative short-term change in perception of the community due to nuisance effects 	<ul style="list-style-type: none"> ➤ Apply standard construction mitigation measures to minimize or eliminate nuisance effects (e.g., limit hours of construction as per City by-law, conduct watering as necessary to prevent visible dust emissions) 	<ul style="list-style-type: none"> ➤ Positive long-term change in perception of the community as a place to live, work or do business due to 60 km of infrastructure improvements, a tripling in transit service frequency compared to current conditions, and TDM and TSM features ➤ Negative short-term change in perception of the community due to nuisance effects would be minimized to the extent possible through standard construction related mitigation measures
4. Cultural Environment					
4.1. Potential effects on archaeological resources	4.1.1. Loss or disturbance of known archaeological sites	<ul style="list-style-type: none"> ➤ Number of documented archaeological sites adjacent to physical improvements 	<ul style="list-style-type: none"> ➤ No documented sites in the vicinity of the proposed physical improvements would be affected by expansion of existing ROWs. (Note: All known sites in the vicinity have been mitigated &/or destroyed). 	<ul style="list-style-type: none"> ➤ No avoidance / mitigation / compensation / enhancement measures required 	<ul style="list-style-type: none"> ➤ Potential effect remains unchanged
	4.1.2. Loss or disturbance of lands with potential for archaeological sites	<ul style="list-style-type: none"> ➤ Total length of land frontage (in m) with potential for archaeological sites (on one or the other side of the ROW) that would be affected by expansion of the existing ROW (Note: total length of land frontage is twice the length of the ROW) 	<ul style="list-style-type: none"> ➤ 24,000 m of land frontage with potential for archaeological sites would be lost or disturbed due to physical improvements crossing those lands. ➤ Largest concentration of lands with potential for sites in north end of study area along: <ul style="list-style-type: none"> • Nashville – Highway 50 to Huntington • Pine Valley Drive – Teston to Major Mackenzie • Major Mackenzie – Islington to Highway 50 • Rutherford – Highway 27 to Highway 50 	<ul style="list-style-type: none"> ➤ Avoid significant sites by realigning the physical improvements after conducting a Stage 2 assessment to identify sites and, where warranted, a Stage 3 assessment to define the nature and extent of the site. ➤ Mitigate construction related effects on significant sites by conducting a Stage 4 archaeological assessment (complete excavation) 	<ul style="list-style-type: none"> ➤ Construction-related loss or disturbance of 24,000 m of land frontage with potential for archaeological sites would be avoided or minimized where possible through further archaeological assessments, which would identify actual site locations and cleared lands
4.2. Potential effects on cultural/heritage resources	4.2.1. Disturbance or removal of built heritage features	<ul style="list-style-type: none"> ➤ Number of built heritage features that will be disturbed or removed 	<ul style="list-style-type: none"> ➤ 19 built heritage features would be disturbed or removed by physical improvements, including: <ul style="list-style-type: none"> • 3 built features that would experience construction-related disturbance to elements that contribute to the structure's heritage significance, such as fence lines, tree lines, windbreaks, laneways, and entrances • 8 built features that would experience noise, vibration, and health and safety issues during operation resulting from the feature being situated very close to the ROW, possibly causing premature deterioration • 8 built features that would be removed ➤ These resources are generally concentrated on Weston Road, between Major Mackenzie Road and Rutherford Road, the Teston Road and Pine Valley intersection, Highway 7 between Islington and Pine Valley, and on Rutherford Road between Highway 27 and Huntington Road 	<ul style="list-style-type: none"> ➤ Avoid removal of 8 built features by realigning the physical improvements where possible ➤ Undertake detailed site analysis and archival research to define the specific heritage significance of the sites to be affected and develop mitigation measures such as landscaped buffering or detailed documentation prior to impact ➤ Investigate compensation measures in cases where land expropriation will be undertaken ➤ Where possible, maintain mature tree lines framing entrances to historic properties 	<ul style="list-style-type: none"> ➤ Removal of 8 built heritage features and construction-related disturbance of an additional 3 features would be avoided by realigning the physical improvements where possible or would otherwise be compensated for ➤ Disturbance to 8 built heritage features during operation would be minimized and compensated for if required, with the potential for enhancements

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	4.2.2. Disturbance or removal of cultural landscape units	<ul style="list-style-type: none"> ➤ Number of cultural landscape units that will be disturbed or removed 	<ul style="list-style-type: none"> ➤ 10 cultural landscape units would be disturbed or removed including: <ul style="list-style-type: none"> • 6 cultural landscapes that would experience construction-related disturbance to aspects that contribute to their heritage significance, such as fence lines, tree lines, windbreaks, laneways, and entrances • 4 cultural landscapes that would experience noise, vibration, and health and safety issues during operation resulting from significant features being situated very close to the ROW, possibly causing premature deterioration ➤ These resources are generally concentrated on Weston Road, between Major Mackenzie Road and Rutherford Road, the Teston Road and Pine Valley Drive intersection, Highway 7 between Islington and Pine Valley Drive, and on Rutherford Road between Highway 27 and Huntington Road 	<ul style="list-style-type: none"> ➤ Avoid significant structures associated with 6 cultural landscapes by realigning the physical improvements where possible ➤ Undertake detailed site analysis and archival research to define the specific heritage significance of the sites to be affected and develop mitigation measures such as landscaped buffering or detailed documentation prior to impact ➤ Investigate compensation measures in cases where land expropriation will be undertaken ➤ Where possible, maintain mature tree lines framing entrances to historic properties 	<ul style="list-style-type: none"> ➤ Construction-related disturbance to 6 cultural landscapes and disturbance to 4 cultural landscapes during operation would be minimized and compensated for if required, with the potential for enhancements
	4.2.3. Disturbance or removal of cemeteries	<ul style="list-style-type: none"> ➤ Number of cemeteries that will be disturbed or removed 	<ul style="list-style-type: none"> ➤ 6 cemeteries will be disturbed or removed during construction including: <ul style="list-style-type: none"> • 2 cemeteries with potential disturbance to fence lines, entranceways, and tree lines): <ul style="list-style-type: none"> ➤ Hillcrest Cemetery, located north of Highway 7, east of Islington Avenue ➤ Elderville Cemetery, located on north side of Rutherford, east of McGillivray Road • Removal of part or all of 4 cemeteries <ul style="list-style-type: none"> ➤ Purpleville Cemetery (CHR 140a), located on the east side of Pine Valley Drive, south of Teston Road ➤ Presbyterian Free Church Pioneer Cemetery, located on the east side of Pine Valley Drive, between Major Mackenzie and Teston Road. ➤ St. Paul's Presbyterian Church and Cemetery (CHR 227), west side of Pine Valley Drive, north of Major Mackenzie Drive ➤ Coleraine Cemetery, located on the south side of Major Mackenzie Drive, west of Huntington Road. 	<ul style="list-style-type: none"> ➤ Avoid cemetery disturbance and displacement by realigning the physical improvements where possible ➤ Undertake a more detailed field review to fully determine depth of impact to Elderville cemetery ➤ Investigate compensation measures in cases where burials will require relocation ➤ Develop commemoration strategies should burial grounds require relocation 	<ul style="list-style-type: none"> ➤ Removal of 4 cemeteries and disturbance to 2 cemeteries would be avoided and/or minimized and compensated for if required, with the potential for enhancements

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5. Financial					
5.1. Potential Implementation Costs	5.1.1. Capital costs	➤ Approximate net present value in current CDN \$ of York Region improvements within the study area	➤ Approximately \$255M capital costs (\$75M for road improvements and \$180M for transit improvements)	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged
	5.1.2. Land acquisition costs	➤ Estimated area of land to be acquired (as a proxy for cost)	➤ Total of 27 ha of land may need to be acquired including: <ul style="list-style-type: none"> • 0.5 ha for Major Mackenzie Drive jog elimination immediately west of Highway 27 • 20 ha for widening along Major Mackenzie Drive between Weston Road and Highway 50, Rutherford Road between Highway 27 and Highway 50, Highway 27 between Rutherford Road and Nashville Road; Highway 50 between Major Mackenzie Drive and Nashville Road; and Weston Road between Major Mackenzie Drive and Teston Road • 6.5 ha for widening of Teston Road from Weston Road to Kipling Avenue and Nashville Road from Huntington Road to Highway 50 	➤ Reduce footprint of physical improvements to minimize land acquisition costs	➤ Acquisition of approximately 27 ha of land would be reduced where possible
	5.1.3. Annual operating and maintenance costs	➤ Approximate net present value in current CDN \$ of operating and maintenance costs associated with road improvements within the study area ➤ Relative operations and maintenance costs for transit	➤ \$630,000 per year (based on 60 km of road improvements) ➤ High relative operations and maintenance costs for transit	➤ No specific avoidance / mitigation / compensation / enhancement measures	➤ Potential effect remains unchanged