APPENDIX A

ASSESSMENT AND EVALUATION OF PRELIMINARY DESIGN ALTERNATIVES

Assessment and Evaluation of Preliminary Design Alternatives

The following tables summarize the assessment of net effects that was carried out to identify the advantages and disadvantages of each design alternative. This assessment was used to support a comparative evaluation of design alternatives which used the trade-off method to identify a recommended design.

Refer to sub-section 2.2 of the report, titled *Development of the Preliminary Recommended Plan* for illustrations of the design alternatives.

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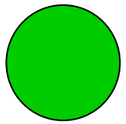
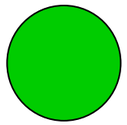
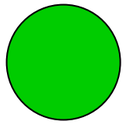
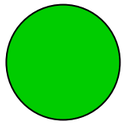
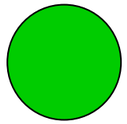
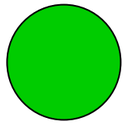
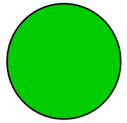
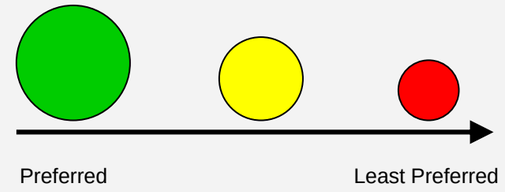
TABLE A-1	EAST SEGMENT - SUMMARY ASSESSMENT OF EFFECTS AND COMPARATIVE EVALUATION OF PRELIMINARY DESIGN ALTERNATIVES				
FACTOR AREAS / CRITERIA	**Alternative A – Maintain Existing Highway Ramp Alignment**		**Alternative B – Relocated Highway Ramp**		**Rationale**
	Under (Alternative A1)	**Over (Alternative A2)**	**Under (Alternative B1)**	**Over (Alternative B2)**	
Factor Area 1: Natural Environment • Fish and Fish Habitat • Designated Natural Environment Features / Areas • Wetlands • Vegetation • Wildlife • Fluvial Geomorphology • Groundwater Effects • Drainage/Hydrology • Construction Impacts					There is no discernable difference in effects between alternatives A2 and B2 from a natural environment perspective. The overall magnitude of anticipated environmental effects associated with these alternatives is low. Both are preferred over alternatives A1 and B1 as the vertical profile required to pass under Holly Acres Road necessitates major modifications to Graham Creek or its tributary – including grade lowering, reconstruction and vegetation/habitat removal. The overall magnitude of anticipated effects to the natural environment resulting from these major creek modifications is considered to be relatively high. Minor construction effects can be expected with Alternatives A2 and B2; however, these effects can be successfully mitigated through implementing standard construction mitigation practices and controlling Contractor operations. An extension of an existing Highway 417 culvert along a previously modified reach of Graham Creek Tributary will be required for all alternatives; however, is considered routine and can be mitigated through standard design and construction practices. **Alternatives A2 and B2 are therefore both preferred from a natural environment perspective.**
	Significant Potential Effects	**Minor Potential Effects**	**Significant Potential Effects**	**Minor Potential Effects**	
Factor Area 2: Social / Cultural Environment • Heritage / Archaeology • Contaminated Property • Noise • Ground Vibration • Visual / Aesthetic Impacts • Recreation Resources • Land Use • Safety / Security • Pedestrian/Cycling Connectivity					All four alternatives perform well from a social /cultural perspective and are not anticipated to result in significant adverse effects that cannot be mitigated through design. While alternatives A2 and B2 are expected to be more visually obtrusive than alternatives that pass under Holly Acres Road (A1 and B1), aesthetic impacts can be minimized through context sensitive structural and landscape design. Anticipated noise and ground vibration levels for all of the alternatives are not predicted to be perceptible over ambient levels. All four alternatives provide opportunities to improve pedestrian and cycling connectivity to the transit station at Bayshore and the broader network. **No preference is given as all alternatives are considered acceptable for this factor area.**
	Minor Potential Effects	**Minor Potential Effects**	**Minor Potential Effects**	**Minor Potential Effects**	
Factor Area 3: Technical Considerations • Illumination • Property • Local / Highway Traffic • Transit Operations • Staging Impacts • Constructability / Capital Cost • Long-Term Maintenance					From a technical perspective, alternatives A1 and B1 are not recommended due to complex constructability issues and associated costs, impacts to local traffic and long term maintenance concerns associated with underpass structures. While Alternative B2 introduces a wider intersection at Holly Acres Road, the local bus access to Bayshore Station and the relocated S-W highway on-ramp, it is slightly preferred over A2 as it requires one fewer structure to construct and maintain. In order to maintain access to the S-W ramp during construction, Alternative A2 would potentially require constructing a detour to the north of the existing ramp, resulting in encroachment to Greenbelt lands and minor impacts to the vegetated berm. Preliminary traffic analysis has demonstrated that the intersection introduced by Alternative B2 operates well beyond the planning horizon. **Alternative B2 is therefore recommended for this factor area.**
	Poor Performance	**Good Performance**	**Poor Performance**	**Moderate Performance**	
OVERALL PERFOMANCE					
	Poor Performance	**Good Performance**	**Poor Performance**	**Good Performance**	
FINAL RECOMMENDATION	The vertical profile required to pass under Holly Acres Road requires significant modifications (grade lowering and reconstruction) of either Graham Creek or its Tributary. These modifications are expected to result in significant adverse effects to the natural environment (fish and fish habitat, vegetation, wildlife habitat etc.). Furthermore, these modifications introduce complex constructability issues which increase capital and maintenance costs. Also, as this alternative maintains the existing ramp alignment, two structures are required (one to span Holly Acres Road and another to span the highway ramp). Alternative A1 is therefore not carried forward.	Alternative A2 avoids significant adverse affects to the natural and social/ cultural environment. While this alternative requires extending the Highway 417 culvert conveying the Graham Creek Tributary, impacts associated with this extension can be mitigated through design. By maintaining the location of the existing S-W on-ramp, this alternative maintains the existing conventional intersection but requires an additional structure to span the highway on-ramp which results in increased capital and maintenance costs. Maintaining the ramp also requires that ramp traffic be detoured to the north during Transitway construction. This alternative is slightly less preferred than Alternative B2 and is therefore not recommended.	By relocating the highway ramp, the additional structure (spanning the highway on-ramp) is not required for Alternative B1. However, as with alternative A1, the vertical profile required to pass under Holly Acres Road requires significant modifications (grade lowering and reconstruction) of either Graham Creek or its Tributary. These modifications are expected to result in significant adverse effects to the natural environment (fish and fish habitat, vegetation, wildlife habitat etc.). Furthermore, these modifications introduce complex constructability issues which increase capital and maintenance costs. Alternative B1 is therefore not carried forward.	Alternative A2 avoids significant adverse affects to the natural and social/ cultural environment. While this alternative requires extending the Highway 417 culvert conveying the Graham Creek Tributary, impacts associated with this extension can be mitigated through design. By relocating the S-W on-ramp, impacts to highway traffic during construction are minimized for this alternative. While the relocation of the S-W on-ramp introduces a wider intersection, it requires one fewer structure to construct and maintain. This alternative is therefore recommended.	
	NOT RECOMMNENDED	NOT RECOMMENDED	NOT RECOMMENDED	**RECOMMENDED**	

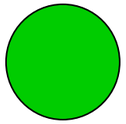
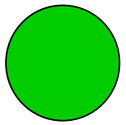
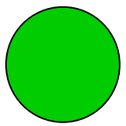
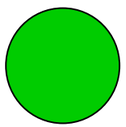
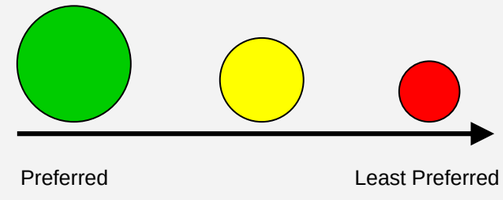
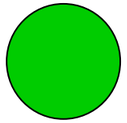
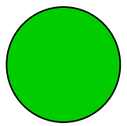
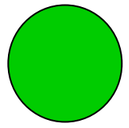
TABLE A-2	CENTRAL SEGMENT COMPARATIVE EVALUATION OF PRELIMINARY DESIGN ALTERNATIVES		
FACTOR AREAS / CRITERIA	**Alternative A**	**Alternative B**	**Rationale**
	Adjacent to Highway 417 WB Lanes	**2 Highway 417 Lanes and Reconstruct Lanes in Median**	
Factor Area 1: Natural Environment • Fish and Fish Habitat • Designated Natural Environment Features / Areas • Wetlands • Vegetation • Wildlife • Fluvial Geomorphology • Groundwater Effects • Drainage/Hydrology • Construction Impacts			Both Alternative A and Alternative B avoid direct impacts to the main treed portion of the Stillwater Creek valley and other associated natural features. For both alternatives, fluvial geomorphological improvements are recommended at C3 to address existing and ongoing erosion at the confluence of Stillwater Creek and its Tributary. While the magnitude of potential natural environmental effects associated with either alternative is not expected to be significant, **Alternative B is given preference for this factor area as it will not require extending Highway 417 culverts (with the potential exception of C3) and has less potential for indirect effects to the valley (salt spray, contaminant drift, minor tree trimming/edge removals etc.).**
	Moderate Potential Effects	**Minor Potential Effects**	
Factor Area 2: Social / Cultural Environment • Heritage / Archaeology • Contaminated Property • Noise • Ground Vibration • Visual / Aesthetic Impacts • Recreation Resources • Land Use • Safety / Security • Pedestrian/Cycling Connectivity			Neither alternative is predicted to result in a perceptible noise level increase over the Future Do Nothing Scenario. The dominant noise source is and will continue to be Highway 417. As these alternatives are bundled within the existing transportation corridor, both are compatible with existing land uses and avoid conflicts with pedestrians, cyclists and recreational pathway users. While Alternative A does bring the transportation facility closer to the recreational pathway in some areas, potential impacts to user experience can be mitigated through the implementation of a 750 m long retaining wall and the use of context sensitive design principles and landscape treatments. **Based on magnitude and significance of potential effects to the social/cultural environment, both Alternative A and Alternative B are given equal preference.**
	Minor Potential Effects	**Minor Potential Effects**	
Factor Area 3: Technical Considerations • Illumination • Property • Local / Highway Traffic • Transit Operations • Staging Impacts • Constructability / Capital Cost • Long-Term Maintenance			Alternative A minimizes impacts to highway operations and can be constructed for approximately $5M less than Alternative B. Alternative B requires the reconstruction of the recently expanded westbound Highway 417 lanes, including the removal and reconstruction of the entire pavement structure and the relocation of high-mast lighting, existing roadway protection systems, storm sewers and advanced traffic management system (ATMS) plant.. This reconstruction would likely be carried out in 4 stages over a period of 2 to 3 years and would require recurring lane and ramp closures on Highway 417 throughout construction. These closures will result in significant delays for the approximately 40,000-50,000 users travelling this corridor every day for the duration of construction. **Based on the magnitude of anticipated disruptions to Highway 417 operations and associated user delays, Alternative A is recommended for this factor area.**
	Good Performance	**Poor Performance**	
OVERALL PERFORMANCE			
	Good Performance	**Poor Performance**	
FINAL RECOMMENDATION	Alternative A results in moderate potential effects to the natural environment due to the required extension of existing Highway 417 culverts (e.g. impacts to fish and fish habitat, impacts to drainage and fluvial geomorphology) and potential indirect edge impacts to forest and wetland vegetation (e.g. salt spray, contaminant drift, minor tree trimming/edge removals etc.). Due to on-going erosion concerns at the confluence of Stillwater Creek and it's Tributary, the culvert extension at C3 presents an opportunity to stabilize the existing condition and implement fluvial geomorphological improvements in this previously modified reach. Due to the separation from noise sensitive receivers, this alternative is not predicted to perceptibly increase noise levels. Noise level increases are predicted to be 0.6 dBA over the Future Do Nothing scenario (an increase of 3.0 dBA is considered just perceptible by most people). This alternative can be accommodated within the MTO right-of-way. While this alignment does bring the transportation facility closer to the recreational pathway in some areas, potential impacts to user experience can be mitigated through the implementation of a 750 m long retaining wall and context sensitive design principles. By avoiding construction within the existing traveled portion of the highway, significant impacts to the travelling public are avoided and capital costs are minimized. As minor impacts to the natural environment can be mitigated and significant impacts to the travelling public are avoided, this alternative is recommended.	By maintaining the existing highway edge, Alternative B minimizes impacts to the Stillwater Creek Valley and does not require extending existing highway culverts. While culvert extensions are not required for this alternative, implementing fluvial geomorphological improvements at C3 are recommended to address ongoing erosion concerns at the confluence of Stillwater Creek and it's Tributary. Due to the separation from noise sensitive receivers, this alternative is not predicted to result in perceptible noise level increases (0.3 dBA increase over the Future Do Nothing scenario) and will not impact recreation facilities (i.e. NCC recreational pathway). This alternative does, however, require reconstructing the recently built Highway 417 lanes which will result in a significant impact to the travelling public. Recurring lane and ramp closures would be required over a period of 2-3 construction seasons in order to reconstruct the recently expanded westbound Highway 417. These closures would result in significant delays for the approximately 40,000 motorists travelling through this corridor daily. Finally, in addition to long term traffic disruptions, this highway reconstruction is estimated to increase capital costs by approximately $5M (more than Alternative A). This does not include the 'throw-away' cost of reconstructing a significant portion of the recently completed highway expansion. Significant disruptions to the travelling public and the increase in construction costs are not considered justifiable given the availability of another feasible alternative that avoids significant impacts in all factor areas. Alternative B is therefore not recommended.	
	RECOMMENDED	NOT RECOMMENDED	

TABLE A-3	WEST SEGMENT COMPARATIVE EVALUATION OF PRELIMINARY DESIGN ALTERNATIVES				
FACTOR AREAS / CRITERIA	**Alternative A - Alignment North of Moodie Interchange**		**Alternative B - Alignment Through Moodie Interchange**		**Rationale**
	Under Moodie w/Station at Corkstown (Alternative A1)	**Over Moodie w/Station at Corkstown (Alternative A2)**	**Under Moodie w/Station at Moodie (Alternative B1)**	**Under Moodie w/Station at Corkstown (Alternative B2)**	
Factor Area 1: **Natural Environment** • Fish and Fish Habitat • Designated Natural Environment Features / Areas • Wetlands • Vegetation • Wildlife • Fluvial Geomorphology • Groundwater Effects • Drainage/Hydrology • Construction Impacts					Alternatives incorporating a station at Corkstown Road (A1, A2 and B2) are generally less preferred from a natural environment perspective over Alternative B1 (Moodie Station), as Corkstown Station will require removing some cultural meadow and riparian vegetation adjacent to the highway within the footprint of the proposed station and may require special design measures to minimize potential bank erosion at the east end of the station where it is close to Stillwater Creek. The overall ecological significance of this meadow area is considered relatively low as it is characterized by low botanical diversity and a high proportion of non-native species, is isolated and therefore provides limited opportunity for wildlife movement and contains habitat that is common and well represented in the study area. When comparing these three alternatives (A1, A2 and B2), B2 is preferred from a natural environmental perspective as it does not require the realignment of Corkstown Road west of Moodie Drive and therefore minimizes footprint impacts. **As alternative B1 incorporates a station under Moodie Drive and does not require the relocation of Corkstown Road west of Moodie Drive, it results in the smallest footprint and is therefore given preference from a natural environmental perspective. Due to the relatively low sensitivity of potentially affected areas, none of the alternatives are expected to result in significant effects.**
	Moderate Potential Impacts	**Moderate Potential Impacts**	**Minor Potential Impacts**	**Moderate Potential Impacts**	
Factor Area 2: **Social / Cultural Environment** • Heritage / Archaeology • Contaminated Property • Noise • Ground Vibration • Visual / Aesthetic Impacts • Recreation Resources • Land Use • Safety / Security • Pedestrian/Cycling Connectivity					No significant impacts to Heritage/Archaeology resources, Contaminated Property, Noise or Ground Vibration are anticipated for any alternative. Alternatives A1, A2 and B2 are preferred over Alternative B1 from a safety, recreation and pedestrian/cycling perspective as the proposed station located at Corkstown Road is fully integrated with the existing recreational infrastructure, provides the greatest opportunity for enhanced active transportation connections and is easily accessible from nearby employment lands. The Corkstown Station location also provides the opportunity to introduce "green" design elements including a vegetated roof and green building materials. Although Alternative B1 is contained within lands currently designated as Infrastructure Corridor in the Greenbelt Master Plan and may not require an amendment to that plan, it does introduce potential personal safety/ security issues due to the grade separation of local and rapid transit platforms which reduces visibility and increases the sense of isolation for passengers boarding and alighting at the station. It also increases potential conflicts with pedestrians and cyclists travelling across Highway 417 on Moodie Drive. **When comparing Alternatives A1, A2, and B2 from a social/cultural perspective, Alternative B2 is given preference as it does not require the relocation of Corkstown Road west of Moodie Drive and therefore avoids additional footprint impacts to Greenbelt lands (National Equestrian Park).**
	Moderate Potential Impacts	**Moderate Potential Impacts**	**Significant Potential Impacts**	**Minor Potential Impacts**	
Factor Area 3: **Technical Considerations** • Illumination • Property • Local / Highway Traffic • Transit Operations • Staging Impacts • Constructability / Capital Cost • Long-Term Maintenance					While Alternative B1 requires the least amount of NCC property (0.1 ha compared to 1.2 - 2.9 ha), from a technical perspective it is least preferred as the proposed station under Moodie Drive does not provide maximum transit service flexibility. Moodie station would operate solely as a transfer facility between local buses on Moodie Drive and rapid transit buses on the Transitway below. This station does not encourage walk-in/ cycle-in ridership, does not provide OC Transpo with the flexibility to terminate or turn around local/shuttle buses at the station, and does not provide the ability for buses to access the Transitway at the station. Alternative B1 also carries the highest capital and operating costs due to the requirement for elevators to service the grade-separated local and Transitway platforms. When comparing Alternatives A1, A2 and B2, Alternative A1 and A2 are less preferred as the curvilinear alignment around the Moodie Drive interchange results in reduced ride comfort. **Alternative B2 is preferred from a technical perspective as the footprint minimizes impacts to Greenbelt lands, the geometric design minimizes ride discomfort, and the proposed station at Corkstown Road maximizes operational flexibility and accessibility and design opportunities.**
	Moderate Performance	**Moderate Performance**	**Poor Performance**	**Good Performance**	

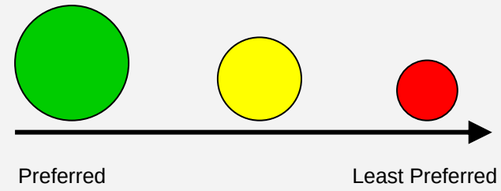
OVERALL PERFORMANCE					
	Moderate Performance	**Moderate Performance**	**Poor Performance**	**Good Performance**	
FINAL RECOMMENDATION	Alternative A1 performs moderately for all factor areas. As with all 3 alternatives that incorporate a station at Corkstown Road (A1, A2, and B2) minor footprint impacts are anticipated between Corkstown Road, Stillwater Creek and the E-NS Highway 417 off-ramp. However, with mitigation measures including erosion protection and the potential salvage/ transplant of impacted vegetation, the magnitude of these potential effects can be minimized. As the proposed alignment also results in additional footprint impacts west of Moodie Drive, moderate impacts to the natural environment are anticipated. From a transit service perspective, the station at Corkstown Road provides maximum operational flexibility by allowing local buses to terminate at the station (i.e. turn around) or access the Transitway. This station is also highly accessible which maximizes opportunities for integration with other modes including pedestrians, cyclists and private automobiles. Specifically, the station location is fully integrated with existing and proposed mutli-use pathway network, is easily accessible from nearby employment and residential lands and provides an opportunity to improve the cycling environment on Moodie Drive. This alternative is therefore expected to improve transit service for the local community. The Corkstown Station location also provides the opportunity to introduce “green” design elements including a vegetated roof and green building materials. While this alternative minimizes structural costs and constructability issues by travelling north of the interchange, the curvilinear alignment required to travel north of the interchange is expected to reduce ride comfort. As this alternative increases impacts to Greenbelt lands west of Moodie Drive, it is not recommended.	Alternative A2 performs moderately for all factor areas. As with all 3 alternatives that incorporate a station at Corkstown Road (A1, A2, and B2) minor footprint impacts are anticipated between Corkstown Road, Stillwater Creek and the E-NS Highway 417 off-ramp. However, with mitigation measures including erosion protection and the potential salvage/ transplant of impacted vegetation, the magnitude of these potential effects can be minimized. As the proposed alignment also results in additional footprint impacts west of Moodie Drive, moderate impacts to the natural environment are anticipated. From a transit service perspective, the station at Corkstown Road provides maximum operational flexibility by allowing local buses to terminate at the station (i.e. turn around) or access the Transitway. This station is also highly accessible which maximizes opportunities for integration with other modes including pedestrians, cyclists and private automobiles. Specifically, the station location is fully integrated with existing and proposed mutli-use pathway network, is easily accessible from nearby employment and residential lands and provides an opportunity to improve the cycling environment on Moodie Drive. This alternative is therefore expected to improve transit service for the local community. The Corkstown Station location also provides the opportunity to introduce “green” design elements including a vegetated roof and green building materials. While this alternative minimizes structural costs and constructability issues by travelling north of the interchange (and over Moodie Drive), the the curvilinear alignment required to travel north of the interchange is expected to reduce ride comfort and the overpass is expected to be more visually obtrusive than all other alternatives. As this alternative increases impacts to Greenbelt lands west of Moodie Drive, it is not recommended.	By locating the station within the Moodie Drive interchange and avoiding footprint impacts to Greenbelt lands west of Moodie Drive, Alternative B1 generally avoids impacts to the natural environment. However, the analysis has determined that this station location does not provide adequate operational flexibility or transit accessibility for people transferring from other modes (pedestrians, cyclists, kiss and ride etc.). The provision of local platforms on the Moodie Drive structure also introduces potential conflicts with cyclists and minimizes the opportunity for improvements to pedestrian and cyclist facilities. Specifically, pedestrian access to the local station is restricted as there are no sidewalks on the Moodie Drive Bridge and although access could be provided via a multi-use pathway under the Moodie Drive structure, visibility would be poor and potential safety concerns would be introduced. Furthermore, the proposed grade separation between Transitway and local bus platforms reduces visibility and increases the sense of isolation for passengers boarding and alighting at the station. The elevators required to service the grade-separated local and Transitway platforms incur long-term maintenance issues that are not present for other alternatives. As moderate footprint impacts associated with other alternatives can be mitigated through design, this alternative is not recommended.	As with all 3 alternatives that incorporate a station at Corkstown Road (A1, A2, and B2) minor footprint impacts are anticipated between Corkstown Road, Stillwater Creek and the E-NS Highway 417 off-ramp. However, with mitigation measures including erosion protection and the potential salvage/ transplant of impacted vegetation, the magnitude of these potential effects can be minimized. From a transit service perspective, the station at Corkstown Road provides maximum operational flexibility by allowing local buses to terminate at the station (i.e. turn around) or access the Transitway. This station is also highly accessible which maximizes opportunities for integration with other modes including pedestrians, cyclists and private automobiles. Specifically, the station location is fully integrated with existing and proposed mutli-use pathway network, is easily accessible from nearby employment and residential lands and provides an opportunity to improve the cycling environment on Moodie Drive. This alternative is therefore expected to improve transit service for the local community. The Corkstown Station location also provides the opportunity to introduce “green” design elements including a vegetated roof and green building materials. Although this alternative results in increased structural costs over Alternatives A1 and A2, by passing through the Moodie Drive interchange, visual impacts are minimized and impacts to Greenbelt lands west of Moodie Drive and avoided. This alternative is therefore recommended.	
	NOT RECOMMENDED	NOT RECOMMENDED	NOT RECOMMENDED	**RECOMMENDED**	

TABLE A-4: ASSESSMENT OF EFFECTS			EAST SEGMENT PRELIMINARY DESIGN ALTERNATIVES			
Criteria		**Performance Measures**	**Alignment A- Maintain Existing Highway Ramp Alignment**		**Alignment B- Relocated Highway Ramp**	
			Under (Alternative A1)	**Over (Alternative A2)**	**Under (Alternative B1)**	**Over (Alternative B2)**
NATURAL ENVIRONMENT						
1	Fish and Fish Habitat	Minimizes permanent direct and indirect effects to fish and fish habitat considering sensitivity and relative magnitude of potential effect.	This alternative requires an extension of the existing Highway 417 culvert along a previously modified (straightened/ channelized) reach of Tributary A of Graham Creek (C7). Potential effects resulting from the culvert extension are limited to potential effects to fish passage through the culvert and temporary disturbance during culvert construction. The vertical profile required to pass under Holly Acres Road requires the grade lowering and significant reconstruction of either Graham Creek (C8) or its tributary (C7), potentially resulting in significant adverse effects to fish and fish habitat (e.g. increased flow velocity, barriers to fish passage).	This alternative requires an extension of the existing Highway 417 culvert along a previously modified (straightened/ channelized) reach of Tributary A of Graham Creek (C7). Potential effects resulting from the culvert extension are limited to potential effects to fish passage through the culvert and temporary disturbance during culvert construction.	This alternative requires an extension of the existing Highway 417 culvert along a previously modified (straightened/ channelized) reach of Tributary A of Graham Creek (C7). Potential effects resulting from the culvert extension are limited to potential effects to fish passage through the culvert and temporary disturbance during culvert construction. The vertical profile required to pass under Holly Acres Road requires the lowering and significant reconstruction of either Graham Creek (C8) or its tributary (C7), potentially resulting in significant adverse effects to fish and fish habitat (e.g. increased flow velocity, barriers to fish passage).	This alternative requires an extension of the existing Highway 417 culvert along a previously modified (straightened/ channelized) reach of Tributary A of Graham Creek (C7). Potential effects resulting from the culvert extension are limited to potential effects to fish passage through the culvert and temporary disturbance during culvert construction.
		Existing Conditions Portions of Graham Creek and its tributaries are located within the study area. Graham Creek and its tributary are located within the Graham Creek Watershed and support a common warmwater baitfish community. No sensitive habitat features (e.g. spawning, nursery habitat) have been identified.				
		OPPORTUNITIES FOR MITIGATION	Fish passage can be maintained at culvert extensions though design measures such as embedded culverts, low flow passages, substrate lining and standard construction mitigation measures. Flow velocity and fish passage can be maintained through major modifications to Graham Creek or its tributary (i.e. profile adjustments; stepped culverts). However, this portion of the creek was recently rehabilitated and would require additional reconstruction following the major creek modifications to maintain the newly implemented enhancements (e.g. pools, riffles, bank protection and other geomorphological stabilization measures).	Fish passage can be maintained at culvert extensions though design measures such as embedded culverts, low flow passages, substrate lining and standard construction mitigation measures.	Fish passage can be maintained at culvert extensions though design measures such as embedded culverts, low flow passages, substrate lining and standard construction mitigation measures. Flow velocity and fish passage can be maintained through major modifications to Graham Creek or its tributary (i.e. profile adjustments; stepped culverts). However, this portion of the creek was recently rehabilitated and would require additional reconstruction following the major creek modifications to maintain the newly implemented enhancements (e.g. pools, riffles, bank protection and other geomorphological stabilization measures).	Fish passage can be maintained at culvert extensions though design measures such as embedded culverts, low flow passages, substrate lining and standard construction mitigation measures.
		PERFORMANCE GRADE	Poor	Good	Poor	Good
		PREFERENCE	*2nd*	*1st*	*2nd*	*1st*
		RATIONALE	There is no discernable difference in effects between alternatives A2 and B2 from a fish and fish habitat perspective and the magnitude of effects is considered low. Both are preferred over Alternatives A1 and B1 as A1 and B1 require the same minor culvert extension in addition to significant modifications (grade lowering and reconstruction) to either Graham Creek or its tributary. The magnitude of these potential effects is considered to be relatively high.			
2	Designated Natural Environment Features/ Areas	Minimizes permanent direct and indirect effects to designated natural environmental features/areas including ESAs, ANSIs, etc.	This alternative has no effects to designated natural environment features/areas.	This alternative has no effects to designated natural environment features/areas.	This alternative has no effects to designated natural environment features/areas.	This alternative has no effects to designated natural environment features/areas.
		Existing Conditions No designated natural environmental features/areas within the study area.				
		OPPORTUNITIES FOR MITIGATION	N/A	N/A	N/A	N/A
		PERFORMANCE GRADE	Good	Good	Good	Good
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	There is no discernable difference in effects between alternatives for this criterion and therefore all are given equal preference.			
3	Wetlands	Minimizes permanent direct and indirect effects to wetland vegetation/communities considering sensitivity, quality and	This alternative requires major creek modifications to lower Graham Creek (C8) or its tributary (C7) which will result in the	The culvert extension works at C7 will require the minor permanent removal of vegetation along the channelized banks of	This alternative requires major creek modifications to lower Graham Creek (C8) or its tributary (C7) which will result in the	The culvert extension works at C7 will require minor permanent removal of vegetation along the channelized banks of

TABLE A-4: ASSESSMENT OF EFFECTS		EAST SEGMENT PRELIMINARY DESIGN ALTERNATIVES				
Criteria		**Performance Measures**	**Alignment A- Maintain Existing Highway Ramp Alignment**		**Alignment B- Relocated Highway Ramp**	
			Under (Alternative A1)	**Over (Alternative A2)**	**Under (Alternative B1)**	**Over (Alternative B2)**
		significance of wetland vegetation (including regionally rare/uncommon plant species) and relative magnitude of potential effect	permanent removal of vegetation along the channelized banks. Wetland vegetation in these areas includes common and tolerant species. The culvert extension works at C7 will require the minor permanent removal of vegetation along the channelized banks of Tributary A of Graham Creek.	Tributary A of Graham Creek. Wetland vegetation in these areas includes occasional common and tolerant species.	permanent removal of vegetation along the channelized banks, Wetland vegetation in these areas includes common and tolerant species. The culvert extension works at C7 will also require the minor permanent removal of vegetation along the channelized banks of Tributary A of Graham Creek.	Tributary A of Graham Creek. Wetland vegetation in these areas includes occasional common and tolerant species.
		Existing Conditions No provincially significant wetlands are present within or adjacent to the study area and no regionally rare/uncommon plant species were recorded. Ditches and occasional wet pockets are present and include occasional common and tolerant wetland species such as Cattail, Common Reed and Reed Canary Grass.				
		OPPORTUNITIES FOR MITIGATION	Reinstate wetland/ riparian vegetation, conduct a seed bank salvage and transplant, etc.	Reinstate wetland/ riparian vegetation, conduct a seed bank salvage and transplant, etc.	Reinstate wetland/ riparian vegetation, conduct a seed bank salvage and transplant, etc.	Reinstate wetland/ riparian vegetation, conduct a seed bank salvage and transplant, etc.
		PERFORMANCE GRADE	Poor	Good	Poor	Good
		PREFERENCE	*2nd*	*1st*	*2nd*	*1st*
		RATIONALE	As alternatives A2 and B2 result in a similar minor impact to wetland vegetation at the extension of Culvert C7, both are given equal preference. A1 and B1 are less preferred as they will require more significant permanent wetland vegetation removals. None of the alternatives are anticipated to result in significant effects as the existing wetland vegetation is considered common/tolerant and would likely regenerate following construction.			
4	Upland Vegetation	Minimizes permanent direct and indirect effects to upland vegetation (including wooded tablelands and valleys and culturally influenced communities such as cultural thicket, meadow and hedgerows) considering sensitivity, quality and significance of vegetation (including regionally rare/uncommon plant species) and relative magnitude of potential effect.	This alternative requires minor removal of cultural vegetation types including cultural meadow and recent restoration plantings of trees and shrubs.	This alternative requires minor removal of cultural vegetation types including cultural meadow and recent restoration plantings of trees and shrubs.	This alternative requires minor removal of cultural vegetation types including cultural meadow and recent restoration plantings of trees and shrubs.	This alternative requires minor removal of cultural vegetation types including cultural meadow and recent restoration plantings of trees and shrubs.
		Existing Conditions Cultural meadow dominated by grass and disturbance tolerant herbs. Pockets of planted young shrubs and trees with some natural regeneration.				
		OPPORTUNITIES FOR MITIGATION	Reinstate removed vegetation with native species.	Reinstate removed vegetation with native species.	Reinstate removed vegetation with native species.	Reinstate removed vegetation with native species.
		PERFORMANCE GRADE	Good	Good	Good	Good
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	There is no discernable difference in effects between alternatives for this criterion and therefore all are equally preferred.			
5	Wildlife	Minimizes permanent direct and indirect effects on habitat considering sensitivity, quality and significance (including migratory birds and known habitat for regional wildlife species of conservation concern) and relative magnitude of potential effect.	The removal of wetland and upland vegetation will result in minor effects to habitat function. The affected habitat is low quality, widespread throughout study corridor, and likely utilized by common wildlife species tolerant of disturbance. One meadow area sensitive species (Savannah Sparrow) is potentially affected by the removal of cultural meadow vegetation and habitat. There is a possibility of a minor reduction in habitat quality associated with a potential incremental increase in indirect	The minor removal of cultural vegetation will result in minor effects to habitat function. The affected habitat is low quality, widespread throughout study corridor, and likely utilized by common wildlife species tolerant of disturbance. One meadow area sensitive species (Savannah Sparrow) is potentially affected by the removal of cultural meadow vegetation and habitat. There is a possibility of a minor reduction in habitat quality associated with a potential incremental increase in indirect	The removal of wetland and upland vegetation will result in minor effects to habitat function. The affected habitat is low quality, widespread throughout study corridor, and likely utilized by common wildlife species tolerant of disturbance. One meadow area sensitive species (Savannah Sparrow) is potentially affected by the removal of cultural meadow vegetation and habitat. There is a possibility of a minor reduction in habitat quality associated with a potential incremental increase in indirect	The minor removal of cultural vegetation will result in minor effects to habitat function. The affected habitat is low quality, widespread throughout study corridor, and likely utilized by common wildlife species tolerant of disturbance. One meadow area sensitive species (Savannah Sparrow) is potentially affected by the removal of cultural meadow vegetation and habitat. There is a possibility of a minor reduction in habitat quality associated with a potential incremental increase in indirect
		Existing Conditions Habitat for a range of common, generalist wildlife species which are tolerant of urban and semi-urban and rural/agricultural conditions. Riparian areas likely provide some habitat for waterfowl, herons and other water-using species.				

TABLE A-4: ASSESSMENT OF EFFECTS		EAST SEGMENT PRELIMINARY DESIGN ALTERNATIVES				
Criteria		**Performance Measures**	**Alignment A- Maintain Existing Highway Ramp Alignment**		**Alignment B- Relocated Highway Ramp**	
			Under (Alternative A1)	**Over (Alternative A2)**	**Under (Alternative B1)**	**Over (Alternative B2)**
			effects. Wildlife in the area is expected to continue to use retained habitat. Removal of riparian vegetation along Graham Creek during creek modifications may result in minor impacts to wildlife habitat.	effects. Wildlife in the area is expected to continue to use retained habitat.	effects. Wildlife in the area is expected to continue to use retained habitat. Removal of riparian vegetation along Graham Creek during creek modifications may result in minor impacts to wildlife habitat.	effects. Wildlife in the area is expected to continue to use retained habitat.
		OPPORTUNITIES FOR MITIGATION	The mitigation measures to protect wetland and upland vegetation will also serve to protect wildlife habitat. Planting of native trees and shrubs will complement retained portion of plantings.	The mitigation measures to protect wetland and upland vegetation will also serve to protect wildlife habitat. Planting of native trees and shrubs will complement retained portion of plantings.	The mitigation measures to protect wetland and upland vegetation will also serve to protect wildlife habitat. Planting of native trees and shrubs will complement retained portion of plantings.	The mitigation measures to protect wetland and upland vegetation will also serve to protect wildlife habitat. Planting of native trees and shrubs will complement retained portion of plantings.
		PERFORMANCE GRADE	Fair	Good	Fair	Good
		PREFERENCE	*2nd*	*1st*	*2nd*	*1st*
		RATIONALE	There is no discernable difference in effects between alternatives A1 and B1. Alternatives A2 and B2 are slightly less preferred due to potential impacts to riparian habitat.			
6	Fluvial Geomorphology	Minimizes permanent direct and indirect impacts on Graham Creek and Tributary A with respect to: flow regime, energy regime, sediment transport, erosion and/or sedimentation and quality and functioning of existing fluvial features.	This alternative requires an extension of the existing Highway 417 culvert along a previously modified (straightened/ channelized) reach of Tributary A of Graham Creek (C7). The vertical profile required to pass under Holly Acres Road requires the grade lowering and significant reconstruction of either Graham Creek (C8) or its tributary (C7). There is a potential for impacts to existing flow velocity resulting from the profile lowering and effective steepening of the creek or its tributary's slope.	This alternative requires an extension of the existing Highway 417 culvert along a previously modified (straightened/ channelized) reach of Tributary A of Graham Creek (C7). Adverse effects to the fluvial geomorphology of the reach are not anticipated.	This alternative requires an extension of the existing Highway 417 culvert along a previously modified (straightened/ channelized) reach of Tributary A of Graham Creek (C7). The vertical profile required to pass under Holly Acres Road requires the grade lowering and significant reconstruction of either Graham Creek (C8) or its tributary (C7). There is a potential for impacts to existing flow velocity resulting from the profile lowering and effective steepening of the creek or its tributary's slope.	This alternative requires an extension of the existing Highway 417 culvert along a previously modified (straightened/ channelized) reach of Tributary A of Graham Creek (C7). Adverse effects to the fluvial geomorphology of the reach are not anticipated.
		Existing Conditions No fluvial geomorphology field survey was conducted for the Graham Creek watershed.				
		OPPORTUNITIES FOR MITIGATION	Major profile adjustments upstream and downstream are likely required to maintain the functioning of existing fluvial features.	None required.	Major profile adjustments upstream and downstream likely required to maintain the functioning of existing fluvial features.	None Required.
		PERFORMANCE GRADE	Poor	Good	Poor	Good
		PREFERENCE	*2nd*	*1st*	*2nd*	*1st*
		RATIONALE	All four alternatives require the same extension of Culvert C7 which is not expected to effect fluvial geomorphological conditions in Tributary A. The vertical profile required for alternatives A1 and B1 require major creek modifications to maintain stream function. As such, Alternatives A1 and B1 are less preferred.			
7	Groundwater Effects	Avoids permanent draw-down and associated environmental impacts **Existing Conditions:** Investigations currently underway.	The excavation may result in localized groundwater impacts.	This alternative is not anticipated to result in effects to groundwater.	The excavation may result in localized groundwater impacts.	This alternative is not anticipated to result in effects to groundwater.
		OPPORTUNITIES FOR MITIGATION	Use watertight structures, implement profile adjustments, install perimeter grow curtains, etc…	N/A	Use watertight structures, implement profile adjustments, install perimeter grow curtains, etc…	N/A
		PERFORMANCE GRADE	Good	Good	Good	Good
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	With mitigation, none of the alternatives are anticipated to have a permanent impact on groundwater. Special design considerations required for alternatives A1 and B1 will increase construction costs but are expected to successfully mitigate effects to groundwater.			
8	Drainage/ Hydrology	Minimizes deleterious runoff to watercourses. Minimizes increases to flood flows. **Existing Conditions**	This alternative will result in added pavement which will slightly increase temporary suspended solid (TSS) loading and runoff volume into the creek and its	This alternative will result in added pavement which will slightly increase temporary suspended solid (TSS) loading and runoff volume into the creek and its	This alternative will result in added pavement which will slightly increase temporary suspended solid (TSS) loading and runoff volume into the creek and its	This alternative will result in added pavement which will slightly increase temporary suspended solid (TSS) loading and runoff volume into the creek and its

TABLE A-4: ASSESSMENT OF EFFECTS		EAST SEGMENT PRELIMINARY DESIGN ALTERNATIVES				
Criteria		**Performance Measures**	**Alignment A- Maintain Existing Highway Ramp Alignment**		**Alignment B- Relocated Highway Ramp**	
			Under (Alternative A1)	**Over (Alternative A2)**	**Under (Alternative B1)**	**Over (Alternative B2)**
		The study area lies within the boundaries of the Graham Creek watershed. The Graham Creek watershed discharges to the Ottawa River just east of Holly Acres Rd. and has been heavily impacted by urban development (has been historically straightened/channelized). There is one tributary to Graham Creek just west of Holly Acres Rd. Graham creek has permanent flow.	tributary. A pump would potentially be required in order to drain the Transitway under Holly Acres Road. If pumping is necessary, connections to the existing sewer system will be required.	tributary.	tributary. A pump would potentially be required in order to drain the Transitway under Holly Acres Road. If pumping is necessary, connections to the existing sewer system will be required.	tributary.
		OPPORTUNITIES FOR MITIGATION	Implement stormwater quantity best management practices including an underground retention facility, a superpipe, etc. Implement stormwater quality best management practices such as Oil Grit Separators (OGS) to mitigate deleterious runoff, stormwater interceptors, hydrocyclones, etc.	Implement stormwater quantity best management practices including an underground retention facility, a superpipe, etc. There is an opportunity to use more vertically-oriented storage facilities assisted by gravity drainage for this alternative. Implement stormwater quality best management practices such as Oil Grit Separators (OGS) to mitigate deleterious runoff, stormwater interceptors, hydrocyclones, etc.	Implement stormwater quantity best management practices including an underground retention facility, a superpipe, etc. Implement stormwater quality best management practices such as Oil Grit Separators (OGS) to mitigate deleterious runoff, stormwater interceptors, hydrocyclones, etc.	Implement stormwater quantity best management practices including an underground retention facility, a superpipe, etc. There is an opportunity to use more vertically-oriented storage facilities assisted by gravity drainage for this alternative. Implement stormwater quality best management practices such as Oil Grit Separators (OGS) to mitigate deleterious runoff, stormwater interceptors, hydrocyclones, etc.
		PERFORMANCE GRADE	Fair	Good	Fair	Good
		PREFERENCE	*2nd*	*1st*	*2nd*	*1st*
		RATIONALE	Stormwater quality best management practices can be implemented for all four alternatives. Alternatives A2 and B2 are preferred as they do not require pumping and can be gravity-drained.			
9	Construction Effects	Minimizes temporary effects during construction such as: vegetation impacts; erosion and sedimentation of watercourses; groundwater impacts; and noise etc.	This alternative requires significant in-water works required to lower the profile of Graham Creek or its tributary. There is potential for disturbance to wetland vegetation and habitat due to major creek modifications. The relocation of existing sanitary force mains is required. There is potential for incidental disturbance of wildlife and migratory birds. There is potential for temporary localized draw-down of water table. There is potential for temporary noise impacts from pile driving.	This alternative has the potential for incidental disturbance to wetland/ upland vegetation and habitat. There is potential for temporary disturbance of wildlife and migratory birds. There is potential for temporary noise impacts from pile driving.	This alternative requires significant in-water works required to lower the profile of Graham Creek or its tributary. There is potential for disturbance to wetland vegetation and habitat due to major creek modifications. The relocation of existing sanitary force mains is required. There is potential for temporary disturbance of wildlife and migratory birds. There is potential for temporary localized draw-down of water table. There is potential for temporary noise impacts from pile driving.	This alternative has the potential for incidental disturbance to wetland/upland vegetation and habitat. There is potential for temporary disturbance of wildlife and migratory birds. There is potential for temporary noise impacts from pile driving.
		OPPORTUNITIES FOR MITIGATION	Implement site-specific mitigation, including diversion of watercourses during stream modifications. Implement special design features to prevent groundwater drawdown. Control Contractor operations to minimize incidental disturbance.	Limit vegetation clearing to that required for construction and install protective fencing to reduce incidental disturbance. Control Contractor operations to minimize incidental disturbance. Use appropriate timing windows to protect local fish and bird species during spawning and nesting seasons.	Implement site-specific mitigation, including diversion of watercourses during modifications. Implement special design features to prevent groundwater drawdown. Control Contractor operations to minimize incidental disturbance.	Limit vegetation clearing to that required for construction and install protective fencing to reduce incidental disturbance. Control Contractor operations to minimize incidental disturbance. Use appropriate timing windows to protect local fish and bird species during spawning and nesting seasons.

TABLE A-4: ASSESSMENT OF EFFECTS		EAST SEGMENT PRELIMINARY DESIGN ALTERNATIVES			
Criteria	**Performance Measures**	**Alignment A- Maintain Existing Highway Ramp Alignment**		**Alignment B- Relocated Highway Ramp**	
		Under (Alternative A1)	**Over (Alternative A2)**	**Under (Alternative B1)**	**Over (Alternative B2)**
		Limit vegetation clearing to that required for construction and install protective fencing to reduce incidental disturbance. Use appropriate timing windows to protect local fish and bird species during spawning and nesting seasons. Abide by the City's Noise Control By Law	Abide by the City's Noise Control By Law	Limit vegetation clearing to that required for construction and install protective fencing to reduce incidental disturbance. Use appropriate timing windows to protect local fish and bird species during spawning and nesting seasons. Abide by the City's Noise Control By Law	Abide by the City's Noise Control By Law
	PERFORMANCE GRADE	Poor	Good	Poor	Good
	PREFERENCE	*2nd*	*1st*	*2nd*	*1st*
	RATIONALE	The vertical profile required for alternatives A1 and B1 will result in significant disturbance to Graham Creek and/or its tributary and will require the relocation of existing underground utilities. These alternatives are therefore least preferred for this criterion. There is no discernable difference in construction effect for alternatives A2 and B2. Both are therefore given equal preference.			
FACTOR AREA SUMMARY	**OVERALL PERFORMANCE GRADE**	**Poor**	**Good**	**Fair**	**Good**
	OVERALL PREFERENCE	***3rd***	***1st***	***2nd***	***1st***
	RATIONALE	There is no discernable difference in effects between alternatives A2 and B2 from a natural environment perspective. The overall magnitude of anticipated environmental effects associated with these alternatives is low. Both are preferred over alternatives A1 and B1 as the vertical profile required to pass under Holly Acres Road necessitates major modifications to Graham Creek or its tributary – including grade lowering, reconstruction and vegetation/habitat removal. The overall magnitude of anticipated effects to the natural environment resulting from these major creek modifications is considered to be relatively high. Minor construction effects can be expected with Alternatives A2 and B2; however, these effects can be successfully mitigated through implementing standard construction mitigation practices and controlling Contractor operations. An extension of an existing Highway 417 culvert along a previously modified reach of Graham Creek Tributary will be required for all alternatives; however, is considered routine and can be mitigated through standard design and construction practices. Alternatives A2 and B2 are therefore both preferred from a natural environment perspective.			
SOCIAL/CULTURAL ENVIRONMENT					
10 Heritage/ Archaeology	Avoids areas with heritage/archaeological potential. **Existing Conditions** The area has been previously disturbed and is characterized by a large man made earthwork that extend approximately 800m from west of Holly Acres Road. No recorded pre-contact archaeological sites.	A Stage 1 archaeological assessment has determined that this area exhibits low archaeological potential and no further investigations are required.	A Stage 1 archaeological assessment has determined that this area exhibits low archaeological potential and no further investigations are required.	A Stage 1 archaeological assessment has determined that this area exhibits low archaeological potential and no further investigations are required.	A Stage 1 archaeological assessment has determined that this area exhibits low archaeological potential and no further investigations are required.
	OPPORTUNITIES FOR MITIGATION	Standard construction mitigation measures addressing the potential for the incidental discovery of any archaeological resources.	Standard construction mitigation measures addressing the potential for the incidental discovery of any archaeological resources.	Standard construction mitigation measures addressing the potential for the incidental discovery of any archaeological resources.	Standard construction mitigation measures addressing the potential for the incidental discovery of any archaeological resources.
	PERFORMANCE GRADE	Good	Good	Good	Good
	PREFERENCE	*1st*	*1st*	*1st*	*1st*
	RATIONALE	There is no discernable difference in effects between alternatives for this criterion as all alternatives are located entirely within an area identified as having low archaeological potential. However, the potential to discover deeply buried archaeological resources is a possibility for all construction projects and will be addressed through standard construction mitigation measures included in contract documentation.			
11 Contaminated Property	Avoids contaminated property. **Existing Conditions** A Phase 1 Environmental Site Assessment (ESA) was completed and did not recommend further investigations in this area.	A phase 1 Environmental Site Assessment (ESA) did not recommend further investigations in this area.	A phase 1 Environmental Site Assessment (ESA) did not recommend further investigations in this area.	A phase 1 Environmental Site Assessment (ESA) did not recommend further investigations in this area.	A phase 1 Environmental Site Assessment (ESA) did not recommend further investigations in this area.
	OPPORTUNITIES FOR MITIGATION	N/A	N/A	N/A	N/A
	PERFORMANCE GRADE	Good	Good	Good	Good
	PREFERENCE	*1st*	*1st*	*1st*	*1st*
	RATIONALE	There is no discernable difference in effects between alternatives for this criterion and therefore all are equally preferred.			

TABLE A-4: ASSESSMENT OF EFFECTS			EAST SEGMENT PRELIMINARY DESIGN ALTERNATIVES			
Criteria		**Performance Measures**	**Alignment A- Maintain Existing Highway Ramp Alignment**		**Alignment B- Relocated Highway Ramp**	
			Under (Alternative A1)	**Over (Alternative A2)**	**Under (Alternative B1)**	**Over (Alternative B2)**
12	Noise	Minimizes noise level increases at sensitive receivers NOTE: Sound level calculated from nearest noise sensitive receiver (receptor 25). **Existing Conditions** Existing noise levels range between 48dBA and 63dBA for daytime periods and between 41dBA and 57dBA for nighttime periods. The highest noise levels are closest to Highway 417. Noise levels decrease as the distance from the highway becomes greater.	The following outlines: noise levels predicted for a future do nothing scenario; the noise levels if Alternative A1 is implemented; and the difference in noise levels between the future do nothing scenario and the implementation of Alternative A1: Future Do Nothing: 64.7 dBA Future A1: 64.6 dBA Reduction of 0.1 dBA An increase in 3 dBA is considered just perceptible by most people. The Transitway's contribution to average daily noise levels will be indistinguishable from background traffic in the horizon year.	The following outlines: noise levels predicted for a future do nothing scenario; the noise levels if Alternative A2 is implemented; and the difference in noise levels between the future do nothing scenario and the implementation of Alternative A2: Future Do Nothing: 64.7 dBA Future A2: 64.9 dBA Increase of 0.2 dBA An increase in 3 dBA is considered just perceptible by most people. The Transitway's contribution to average daily noise levels will be indistinguishable from background traffic in the horizon year.	The following outlines: noise levels predicted for a future do nothing scenario; the noise levels if Alternative B1 is implemented; and the difference in noise levels between the future do nothing scenario and the implementation of Alternative B1: Future Do Nothing: 64.7 dBA Future B1: 64.6 dBA Reduction of 0.1 dBA An increase in 3 dBA is considered just perceptible by most people. The Transitway's contribution to average daily noise levels will be indistinguishable from background traffic in the horizon year.	The following outlines: noise levels predicted for a future do nothing scenario; the noise levels if Alternative B2 is implemented; and the difference in noise levels between the future do nothing scenario and the implementation of Alternative B2: Future Do Nothing: 64.7 dBA Future B2: 64.9 dBA Increase of 0.2 dBA An increase in 3 dBA is considered just perceptible by most people. The Transitway's contribution to average daily noise levels will be indistinguishable from background traffic in the horizon year.
		OPPORTUNITIES FOR MITIGATION	The primary source of existing and ambient noise levels in this area is Highway 417. The MTO has determined that sound barriers are warranted in certain locations within the study area. The Transitway will be designed so as not to preclude the future construction of these sound barriers by MTO.	The primary source of existing and ambient noise levels in this area is Highway 417. The MTO has determined that sound barriers are warranted in certain locations within the study area. The Transitway will be designed so as not to preclude the future construction of these sound barriers by MTO.	The primary source of existing and ambient noise levels in this area is Highway 417. The MTO has determined that sound barriers are warranted in certain locations within the study area. The Transitway will be designed so as not to preclude the future construction of these sound barriers by MTO.	The primary source of existing and ambient noise levels in this area is Highway 417. The MTO has determined that sound barriers are warranted in certain locations within the study area. The Transitway will be designed so as not to preclude the future construction of these sound barriers by MTO.
		PERFORMANCE GRADE	Good	Good	Good	Good
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	It has been determined that future noise levels for all four alternatives will not be perceptibly higher than the future do nothing scenario. An increase of 3 dBA is considered just perceptible for most people. The dominant noise source is currently, and will continue to be, Highway 417. There is no discernable difference amongst alternatives for this criterion; therefore all have been given equal preference.			
13	Ground Vibration	Minimizes ground vibration impacts on sensitive receivers. **Existing Conditions** Measured ground vibrations are considered to be low and of no consequence with respect to human perception and structural or cosmetic damage thresholds for buildings and other structures.	Due to the separation from sensitive receivers and proximity to the highway, Alternative A1 is not expected to result in a perceptible increase in ground vibrations over ambient levels.	The overpass required for the grade separation may require expansion joints which could marginally increase vibration levels. However, due to the separation from sensitive receivers and proximity to the highway, Alternative A2 is not expected to result in a perceptible increase in ground vibrations over ambient levels.	Due to the separation from sensitive receivers and proximity to the highway, Alternative A1 is not expected to result in a perceptible increase in ground vibrations over ambient levels.	The overpass required for the grade separation requires expansion joints which may marginally increase vibration levels. However, due to the separation from sensitive receivers and proximity to the highway, Alternative B2 is not expected to result in a perceptible increase in ground vibrations over ambient levels.
		OPPORTUNITIES FOR MITIGATION	N/A	Eliminate expansion joints on the structure through the use of semi-integral abutments. With semi-integral abutments, there will be no expansion joints on the structure resulting in decreased potential for ground vibrations and an improvement over existing conditions.	N/A	Eliminate expansion joints on the structure through the use of semi-integral abutments. With semi-integral abutments, there will be no expansion joints on the structure resulting in decreased potential for ground vibrations and an improvement over existing conditions.
		PERFORMANCE GRADE	Good	Good	Good	Good
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	In all cases, ground vibrations are at the low end of the human sensitivity range. Overpasses may require expansion joints which would marginally increase vibration levels; however, the use of semi-integral abutments would effectively mitigate this impact and result in an improvement over existing conditions. With mitigation, none of the alternatives are anticipated to result in vibration levels that are perceptible above ambient levels. There is therefore no discernible difference in effects between alternatives for this criterion and all are equally preferred.			

TABLE A-4: ASSESSMENT OF EFFECTS			EAST SEGMENT PRELIMINARY DESIGN ALTERNATIVES			
Criteria		Performance Measures	Alignment A- Maintain Existing Highway Ramp Alignment		Alignment B- Relocated Highway Ramp	
			Under (Alternative A1)	Over (Alternative A2)	Under (Alternative B1)	Over (Alternative B2)
14	Visual/Aesthetic Impacts	Maintains/Enhances buffer areas and scenic vistas. **Existing Conditions** A berm, characterized by reforestation planting, was built adjacent to the corridor during the Highway 416/417 interchange construction.	The potential location of the Transitway in a cut minimizes the visual impact of additional transportation infrastructure and maintains clear views of adjacent landforms and plantings.	The potential Transitway bridge structure visually separates Highway 417 westbound lanes from the northern portion of the Greenbelt in this area, slightly increasing the visual impact of the existing transportation corridor.	The potential location of the Transitway in a cut minimizes the visual impact of additional transportation infrastructure and maintains clear views of adjacent landforms and plantings.	The potential Transitway bridge structure and relocated highway ramp visually separates Highway 417 westbound lanes from the northern portion of the Greenbelt in this area, slightly increasing the visual impact of the existing transportation corridor.
		OPPORTUNITIES FOR MITIGATION	Good opportunity for context-sensitive structural and landscape design (e.g. buffer plantings, paint treatments etc.).	Some opportunity for context-sensitive structural and landscape design (e.g. buffer plantings, paint treatments etc.).	Some opportunity for context-sensitive structural and landscape design (e.g. buffer plantings, paint treatments etc.).	Some opportunity for context-sensitive structural and landscape design (e.g. buffer plantings, paint treatments etc.).
		PERFORMANCE GRADE	Good	Fair - Good	Good	Fair - Good
		PREFERENCE	*1st*	*2nd*	*1st*	*2nd*
		RATIONALE	The placement of the Transitway in a cut reduces the visual impact of additional transportation infrastructure in the transportation corridor. Alternatives A1 and B1 are slightly preferred from a visual/aesthetic perspective as they provide the greatest opportunities for context-sensitive structural and landscape design, further minimizing the appearance of additional transportation infrastructure. While Alternatives A2 and B2 slightly increase the visual impact of the transportation corridor, the magnitude of this effect is considered minor and can be further minimized through context sensitive structural and landscape design.			
15	Recreation Resources	Maintains/Enhances recreational resources (multi-use pathway, cycling, playing fields etc.) **Existing Conditions** A recreation pathway is located North of Highway 417 and is visually separated from the transit corridor by the existing berm and woodlot planting. A mixed use pathway is located on the east side of Holly Acres Road and connects Richmond Road south of Highway 47 to the NCC pathway system and Creeks End Lane.	This alternative has no impact to the NCC pathway system or to the City's mixed use pathway.	This alternative has no impact to the NCC pathway system or to the City's mixed use pathway.	This alternative has no impact to the NCC pathway system or to the City's mixed use pathway.	This alternative has no impact to the NCC pathway system or to the City's mixed use pathway.
		OPPORTUNITIES FOR MITIGATION	Potential to incorporate a new multi-use pathway connection from Aero Drive to Holly Acres Road.	Potential to incorporate a new multi-use pathway connection from Aero Drive to Holly Acres Road.	Potential to incorporate a new multi-use pathway connection from Aero Drive to Holly Acres Road.	Potential to incorporate a new multi-use pathway connection from Aero Drive to Holly Acres Road.
		PERFORMANCE GRADE	Good	Good	Good	Good
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	There is no discernable difference in effects between alternatives for this criterion and therefore all are equally preferred.			
16	Land Use	Compatibility with existing land use designations. **Existing Conditions** According to the *Greenbelt Master Plan* (NCC), lands to the north of Highway 417 are designated as Rural Landscape and the land within the Highway 417ROW is designated as an Infrastructure Corridor. According to the City of Ottawa *Official Plan*, the lands to the north of Highway 417, west of Holly Acres Road and the Highway 416 interchange, are designated as Greenbelt Rural. The lands north of Highway 417, east of Holly Acres Road and the Highway 416 interchange, are designated General Urban Area. The lands immediately east of Holly Acres Road are zoned for residential uses. A large commercial shopping centre (Bayshore	This alternative is located within the lands designated "Infrastructure Corridor" in the *Greenbelt Master Plan*, and within lands designated "Greenbelt Rural" west of Holly Acres Road and lands designated "General Urban Area" east of Holly Acres Road in the City of Ottawa *Official Plan*.	This alternative is located within the lands designated "Infrastructure Corridor" in the *Greenbelt Master Plan*, and within lands designated "Greenbelt Rural" west of Holly Acres Road and lands designated "General Urban Area" east of Holly Acres Road in the City of Ottawa *Official Plan*.	This alternative is located within the lands designated "Infrastructure Corridor" in the *Greenbelt Master Plan*, and within lands designated "Greenbelt Rural" west of Holly Acres Road and lands designated "General Urban Area" east of Holly Acres Road in the City of Ottawa *Official Plan*.	This alternative is located within the lands designated "Infrastructure Corridor" in the *Greenbelt Master Plan*, and within lands designated "Greenbelt Rural" west of Holly Acres Road and lands designated "General Urban Area" east of Holly Acres Road in the City of Ottawa *Official Plan*.

TABLE A-4: ASSESSMENT OF EFFECTS		EAST SEGMENT PRELIMINARY DESIGN ALTERNATIVES				
Criteria		**Performance Measures**	**Alignment A- Maintain Existing Highway Ramp Alignment**		**Alignment B- Relocated Highway Ramp**	
			Under (Alternative A1)	**Over (Alternative A2)**	**Under (Alternative B1)**	**Over (Alternative B2)**
		Mall) is located near the interchange.				
		OPPORTUNITIES FOR MITIGATION	None required.	None required.	None required.	None required.
		PERFORMANCE GRADE	Good	Good	Good	Good
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	All four alternatives are located within lands designated as "Infrastructure Corridor" in the *Greenbelt Master Plan* and "Greenbelt Rural" and "General Urban Area" in the City of Ottawa *Official Plan.* There is therefore no discernible difference between alternatives for this criterion.			
17	Safety/Security	Maximizes safety and security for transit users, cyclists, pedestrians and multi-use pathway users.	No safety / security issues have been identified for this alternative.	The additional structure in this alternative requires illumination in order to ensure a safe pedestrian environment at night.	The relocation of the S-W on-ramp creates a wide intersection at Holly Acres Road, the local bus access to Bayshore Station and the relocated S-W highway on-ramp. Standard intersection safety treatments (signalized pedestrian crossing, crosswalk markings on pavement, etc…) will be implemented. No safety / security issues have been identified for this alternative.	The relocation of the S-W on-ramp creates a wide intersection at Holly Acres Road, the local bus access to Bayshore Station and the relocated S-W highway on-ramp. Standard intersection safety treatments (signalized pedestrian crossing, crosswalk markings on pavement, etc…) will be implemented. No safety / security issues have been identified for this alternative. The additional structure in this alternative requires illumination in order to ensure a safe pedestrian environment at night.
		Existing Conditions Currently no safety/security issues.				
		OPPORTUNITIES FOR MITIGATION	Measures to enhance the safety of cyclists and pedestrians are discussed under criterion 18.	Lighting beneath bridge is required to provide adequate illumination for pedestrians. Measures to enhance the safety of cyclists and pedestrians are discussed under criterion 18.	Measures to enhance the safety of cyclists and pedestrians are discussed under criterion 18.	Lighting beneath bridge is required to provide adequate illumination for pedestrians. Measures to enhance the safety of cyclists and pedestrians are discussed under criterion 18.
		PERFORMANCE GRADE	Good	Good	Good	Good
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	With illumination, all alternatives maintain the safety and security of all transit users, cyclists, pedestrians and multi-use pathway users and are therefore given equal preference.			
18	Pedestrian/Cycling Connectivity	Maximizes pedestrian and cycling connections to and from transit.	This alternative maintains existing transit accessibility. Short-term, temporary closures of the existing sidewalk may be required during construction. There is an opportunity to upgrade the existing asphalt pathway on the West Side of Holly Acres Road and the existing sidewalk connection from Holly Acres Road to Bayshore Station to a 3.0 m multi-use pathway connection. A new, more direct connection from Aero Drive to Bayshore Station (crossing at the signalized intersection) can also be accommodated.	This alternative maintains existing transit accessibility. Short-term, temporary closures of the existing sidewalk may be required during construction. There is an opportunity to upgrade the existing asphalt pathway on the West Side of Holly Acres Road and the existing sidewalk connection from Holly Acres Road to Bayshore Station to a 3.0 m multi-use pathway connection. A new, more direct connection from Aero Drive to Bayshore Station (crossing at the signalized intersection) can also be accommodated.	This alternative maintains the existing transit accessibility. Short-term, temporary closures of the existing sidewalk may be required during construction. There is an opportunity to upgrade the existing asphalt pathway on the West Side of Holly Acres Road and the existing sidewalk connection from Holly Acres Road to Bayshore Station to a 3.0 m multi-use pathway connection. A new, more direct connection from Aero Drive to Bayshore Station (crossing at the signalized intersection) can also be accommodated.	This alternative maintains the existing transit accessibility. Short-term, temporary closures of the existing sidewalk may be required during construction. There is an opportunity to upgrade the existing asphalt pathway on the West Side of Holly Acres Road and the existing sidewalk connection from Holly Acres Road to Bayshore Station to a 3.0 m multi-use pathway connection. A new, more direct connection from Aero Drive to Bayshore Station (crossing at the signalized intersection) can also be accommodated.
		Existing Conditions: Transitway accessible from Bayshore Station. A sidewalk adjacent to the Transitway connects Holly Acres Rd. to Bayshore station.				
		OPPORTUNITIES FOR MITIGATION	N/A	N/A	N/A	N/A
		PERFORMANCE GRADE	Good	Good	Good	Good
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	There is no discernable difference in effects amongst alternatives for this criterion. There exist opportunities to improve pedestrian connections to adjacent residential communities, the existing NCC pathway and Bayshore Transit Station for all four alternatives.			
FACTOR AREA SUMMARY		**OVERALL PERFORMANCE GRADE**	**Good**	**Good**	**Good**	**Good**
		OVERALL PREFERENCE	***1st***	***1st***	***1st***	***1st***
		RATIONALE	All four alternatives perform well from a social /cultural perspective and are not anticipated to result in significant adverse effects that cannot be mitigated through design. While			

TABLE A-4: ASSESSMENT OF EFFECTS			EAST SEGMENT PRELIMINARY DESIGN ALTERNATIVES			
Criteria		**Performance Measures**	**Alignment A- Maintain Existing Highway Ramp Alignment**		**Alignment B- Relocated Highway Ramp**	
			Under (Alternative A1)	**Over (Alternative A2)**	**Under (Alternative B1)**	**Over (Alternative B2)**
			alternatives A2 and B2 are expected to be more visually obtrusive than alternatives that pass under Holly Acres Road (A1 and B1), aesthetic impacts can be minimized through context sensitive structural and landscape design. Anticipated noise and ground vibration levels for all of the alternatives are not predicted to be perceptible over ambient levels. All four alternatives provide opportunities to improve pedestrian and cycling connectivity to the transit station at Bayshore and the broader network. No preference is given as all alternatives are considered acceptable for this factor area.			
TECHNICAL CONSIDERATIONS						
19	Illumination	Avoids impacts to the “dark night sky”. Minimizes light trespass on residential receivers.	In accordance with Transitway design guidelines, only stations will be illuminated. Impacts are therefore not anticipated at Holly Acres Road.	In accordance with Transitway design guidelines, only stations will be illuminated. Impacts are therefore not anticipated at Holly Acres Road.	In accordance with Transitway design guidelines, only stations will be illuminated. Impacts are therefore not anticipated at Holly Acres Road.	In accordance with Transitway design guidelines, only stations will be illuminated. Impacts are therefore not anticipated at Holly Acres Road.
		Existing Conditions Existing illumination from highway.				
		OPPORTUNITIES FOR MITIGATION	None required.	None required.	None required.	None required.
		PERFORMANCE GRADE	Good	Good	Good	Good
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	There is no discernable difference in effects between alternatives for this criterion and are therefore given equal preference.			
20	Property	Bundles transportation corridors and requires least amount of new NCC Greenbelt lands and/or private property.	The following outlines the amount of lands required for this alignment: NCC = 0.0 ha MTO = 0.78 ha Private = .2 ha	The following outlines the amount of lands required for this alignment: NCC = 0.0 ha MTO = 0.78 ha Private = .2 ha	The following outlines the amount of lands required for this alignment: NCC = 0.0 ha MTO = 0.78 ha Private = .2 ha	The following outlines the amount of lands required for this alignment: NCC = 0.0 ha MTO = 0.78 ha Private = .2 ha
		Existing Conditions The study area includes MTO property within the Highway 417 right-of-way, NCC property to the north and private property to the northeast.				
		OPPORTUNITIES FOR MITIGATION	N/A	N/A	N/A	N/A
		PERFORMANCE GRADE	Good	Good	Good	Good
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	0.2 ha of private property is required for all alternatives to provide local access to Bayshore Station. The remainder of the Transitway in the area is located within land owned by the MTO. An agreement will be required to allow the City to use MTO lands. There is no difference in effects between alternatives for this criterion and all are therefore given equal preference.			
21	Local/ Highway Traffic	Avoids immediate and long-term permanent impacts to local and highway traffic (Delays, Queue Lengths, etc.). Provides maximum flexibility for future traffic operations.	This alternative will not impact existing traffic operations.	A bridge over Holly Acres Road may result in a slight visual impact for on road users, including limiting sight distance and the creation of a “tunnel” effect. Additional review will be required during design to ensure adequate site distances are provided. This alternative will not impact existing traffic operations.	This alternative will require more complex signaling at the intersection, however preliminary traffic analysis has demonstrated that the intersection operates well beyond the planning horizon.	A bridge over Holly Acres Road may result in a slight visual impact for on road users, including limiting sight distance and the creation of a “tunnel” effect. Additional review will be required during design to ensure adequate site distances are provided. This alternative will require more complex signaling at the intersection, however preliminary traffic analysis has demonstrated that the intersection operates well beyond the planning horizon.
		Existing Conditions Highway 416 northbound traffic exiting to Moodie Drive is currently restricted. Northbound Highway 416 vehicles are required to exit the highway at Holly Acres Road, turn left and use Holly Acres Road to cross under Highway 417, turn left on the westbound highway on-ramp, travel West on Highway 417 and exit at Moodie Drive. Counts show a total of 225 northbound vehicles per hour turning left from Holly Acres onto the highway on-ramp during the morning peak period.				
		OPPORTUNITIES FOR MITIGATION	N/A	The Holly Acres structure could be designed to eliminate median column and improve sight lines.	N/A	The Holly Acres structure could be designed to eliminate median column and improve sight lines.

TABLE A-4: ASSESSMENT OF EFFECTS		EAST SEGMENT PRELIMINARY DESIGN ALTERNATIVES				
Criteria		**Performance Measures**	**Alignment A- Maintain Existing Highway Ramp Alignment**		**Alignment B- Relocated Highway Ramp**	
			Under (Alternative A1)	**Over (Alternative A2)**	**Under (Alternative B1)**	**Over (Alternative B2)**
				Additional signal heads could be installed. The Holly Acres structure and ramps could be widened to reduce tunnel effect.		Additional signal heads could be installed. The Holly Acres structure and ramps could be widened to reduce tunnel effect.
		PERFORMANCE GRADE	Good	Fair	Good	Fair
		PREFERENCE	*1st*	*2nd*	*1st*	*2nd*
		RATIONALE	Alternative A1 and B1 are preferred as they avoid potential impacts to reduced sight distance and tunnel effects associated with the overpass alternatives (A2 and B2). However, the magnitude of these effects is considered minor and with mitigation and additional signal heads at the intersection, the potential effects associated with Alternatives A2 and B2 can be minimized.			
22	Transit Operations	Maximizes efficiency and flexibility for immediate and long-term transit operations.	This alternative removes buses from mixed traffic on Highway 417 which will improve transit service reliability. This alternative also maintains local northbound and southbound access from Holly Acres Road.	This alternative removes buses from mixed traffic on Highway 417 which will improve transit service reliability. This alternative also maintains local northbound and southbound access from Holly Acres Road.	This alternative removes buses from mixed traffic on Highway 417 which will improve transit service reliability. This alternative also maintains local northbound and southbound access from Holly Acres Road.	This alternative removes buses from mixed traffic on Highway 417 which will improve transit service reliability. This alternative also maintains local northbound and southbound access from Holly Acres Road.
		Existing Conditions Currently, in the peak period, all eastbound buses exit Highway 417 at Holly Acres Rd., turn left to travel north on Holly Acres Rd. and then turn right into Bayshore station. Westbound buses exit at Bayshore Station and cross Holly Acres Rd to the existing highway access ramp onto Highway 417.				
		OPPORTUNITIES FOR MITIGATION	N/A	N/A	N/A	N/A
		PERFORMANCE GRADE	Good	Good	Good	Good
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	All four alternatives remove buses from mixed traffic on Highway 417 and provide a grade separated crossing of Holly Acres Road. There are no discernable differences between alternatives for this criterion.			
23	Staging	Minimizes temporary disruptions to transit operations, local traffic, highway traffic and pedestrian and cyclist traffic during construction.	This alternative requires multi-phase, complex staging to maintain transit service during construction due to the required creek modifications. Significant disruptions to traffic on Holly Acres Road and the Highway 417 ramp are anticipated, including lane and ramp closures.	This alternative potentially requires the construction of a detour route to the north of the existing Highway 417 on-ramp, resulting in encroachment to Greenbelt lands and minor impacts to the vegetated berm. Detours on Holly Acres Road and the Highway 417 are expected to result in localized traffic disruptions.	This alternative requires multi-phase, complex staging to maintain transit service during construction due to the required creek modifications. Significant disruptions to traffic on Holly Acres Road and the Highway 417 ramp are anticipated, including lane and ramp closures.	This alternative requires relocation of the existing Highway 417 S-W on-ramp. Impacts to highway traffic during construction are minimized for this alternative as only one detour is required on Holly Acres Road if the Highway 417 ramp is relocated first.
		Existing Conditions N/A				
		OPPORTUNITIES FOR MITIGATION	Detour route for Holly Acres traffic and Hwy 417 ramp traffic.	Implement traffic management measures.	Detour route for Holly Acres traffic and Hwy 417 ramp traffic.	Implement traffic management measures.
		PERFORMANCE GRADE	Poor	Fair	Poor	Good
		PREFERENCE	*3rd*	*2nd*	*3rd*	*1st*
		RATIONALE	The overpass alternatives (A2 and B2) have fewer construction staging requirements than the tunnel alternatives (A1 and B1) and lengthy detour routes are avoided. Alternative B2 is preferred because by relocating the highway ramp first, Transitway operations can be largely maintained during construction.			
24	Constructability/ Capital Cost	Avoids complex constructability issues and can be constructed at the lowest capital cost.	The expected capital cost is $21.9 M This alternative requires significant excavation, a large number of retaining walls, measures to minimize groundwater impacts, major reconstruction of Graham Creek and/or its tributary and the relocation of existing force mains.	The expected capital cost is $16.9 M This alternative requires the construction of two structures with some retaining walls. This alternative also requires light-weight fills to prevent settlement which increases capital costs.	The expected capital cost is $20.9 M This alternative requires significant excavation, a large number of retaining walls, measures to minimize groundwater impacts, major reconstruction of Graham Creek and/or its tributary as well as the existing culverts, relocation of existing highway ramp and relocation of existing force main.	The expected capital cost is $15.9 M This alternative requires one structure, some retaining walls, and relocation of existing highway ramp. This alternative also requires light-weight fills to prevent settlement which increases capital costs.
		Existing Conditions N/A				
		OPPORTUNITIES FOR MITIGATION	Cost-saving measures will be explored for all alternatives during detail design.	Cost-saving measures will be explored for all alternatives during detail design.	Cost-saving measures will be explored for all alternatives during detail design.	Cost-saving measures will be explored for all alternatives during detail design.
		PERFORMANCE GRADE	Poor	Good	Poor	Good

TABLE A-4: ASSESSMENT OF EFFECTS		EAST SEGMENT PRELIMINARY DESIGN ALTERNATIVES			
Criteria	**Performance Measures**	**Alignment A- Maintain Existing Highway Ramp Alignment**		**Alignment B- Relocated Highway Ramp**	
		Under (Alternative A1)	**Over (Alternative A2)**	**Under (Alternative B1)**	**Over (Alternative B2)**
	PREFERENCE	*4th*	*2nd*	*3rd*	*1st*
	RATIONALE	Alternative B2 is preferred because it can be constructed at the lowest cost. Alternative A1 is the most expensive and therefore the least preferred alternative.			
25 Long Term Maintenance	Avoids the need for undesirable long-term maintenance operations.	This alternative requires the operation and maintenance of ancillary mechanisms associated with an underpass, including pumps, trench walls, underpass lighting, significant length of retaining walls and two roadway structures.	This alternative requires operation and maintenance of some retaining walls and two roadway structures.	This alternative requires the operation and maintenance of ancillary mechanisms associated with an underpass, including pumps, trench walls, underpass lighting, significant length of retaining walls and one roadway structure.	This alternative requires operation and maintenance of some retaining walls and one roadway structure.
	Existing Conditions				
	N/A				
	OPPORTUNITIES FOR MITIGATION	N/A	N/A	N/A	N/A
	PERFORMANCE GRADE	Fair	Fair	Fair	Good
	PREFERENCE	*2nd*	*2nd*	*2nd*	*1st*
	RATIONALE	The overpass alternatives (A2 and B2) minimize the need for long-term maintenance as they minimize amounts of retaining walls required, do not require pumping and do not require ancillary mechanisms that must be maintained. Alternative B2 is preferred over A2 as there is one less roadway structure to maintain.			
FACTOR AREA SUMMARY	**OVERALL PERFORMANCE GRADE**	**Fair**	**Good**	**Fair**	**Good**
	OVERALL PREFERENCE	***3rd***	***2nd***	***3rd***	***1st***
	RATIONALE	From a technical perspective, alternatives A1 and B1 are not recommended due to complex constructability issues and associated costs, impacts to local traffic and long term maintenance concerns associated with underpass structures. While Alternative B2 introduces a wider intersection at Holly Acres Road, the local bus access to Bayshore Station and the relocated S-W highway on-ramp, it is slightly preferred over A2 as it requires one fewer structure to construct and maintain. In order to maintain access to the S-W ramp during construction, Alternative A2 would potentially require constructing a detour to the north of the existing ramp, resulting in encroachment to Greenbelt lands and minor impacts to the vegetated berm. Preliminary traffic analysis has demonstrated that the intersection introduced by Alternative B2 operates well beyond the planning horizon. **Alternative B2 is therefore recommended for this factor area.**			

TABLE A-5: ASSESSMENT OF EFFECTS			CENTRAL SEGMENT PRELIMINARY DESIGN ALTERNATIVES	
Criteria		**Performance Measures**	**Alternative A- Adjacent to Highway 417 WB Lanes**	**Alternative B- 2 Highway 417 Lanes and Reconstruct Lanes in Median**
NATURAL ENVIRONMENT				
1	Fish and Fish Habitat	Minimizes permanent direct and indirect effects to fish and fish habitat considering sensitivity and relative magnitude of potential effect.	This alternative requires the extension of Highway 417 culverts at Tributaries A, B and C of Stillwater Creek (C3, C4 and C5). The culvert extension at C3 potentially requires a relatively minor realignment of Stillwater Creek and Tributary A in the vicinity of the confluence of these two features. The fish community at this location is considered common and tolerant. There is potential for disruptions to fish and fish habitat during in-water work as well as the marginal enclosure of fish and fish habitat due to the extension of culverts. There is potential for impacts to fish and fish habitat at Tributaries B and C, but these impacts will be minor as the tributaries have relatively low quality fish habitat and/or no fish use.	This alternative has no anticipated direct impacts to fish and fish habitat.
		Existing Conditions Stillwater Creek is classified as Type 2 fish habitat and is considered to have a relatively high sensitivity in terms of fish and fish habitat. Species including baitfish, Fathead Minnow, Brook Stickleback and Northern Redbelly Dace have been observed. Tributary A of Stillwater Creek has a warmwater baitfish community, permanent flows and is considered to be relatively good fish and fish habitat. Tributary B of Stillwater Creek is a swale feature with intermittent/ ephemeral flow and no direct fish use. Tributary C of Stillwater Creek has permanent flows, but a less diverse warmwater baitfish community.		
		OPPORTUNITIES FOR MITIGATION	Culvert extensions can be designed to maintain/enhance fish passage through incorporation of low-flow channels, substrate lining etc. Any realignment must be designed using natural channel design principals and must improve the quality of fish habitat. Opportunity to implement modifications required at Tributary A to address ongoing erosion concerns. The Conservation Authority will be required to review the proposed work under the DFO's Fish Habitat Referral protocol and determine the risk of harmful alteration, disruption, destruction (HADD) of fish habitat. If the proposed works result in a HADD determination, compensation will be required.	None required.
		PERFORMANCE GRADE	Fair	Good
		PREFERENCE	*2nd*	*1st*
		RATIONALE	Alternative B is preferred from a fish and fish habitat perspective as it avoids direct impacts to fish and fish habitat. While moderate effects are expected from the minor realignment of Stillwater Creek and Tributary A and from the in-water works required to construct the culvert extensions for Alternative A, the impacts can be mitigated through the incorporation of natural channel design elements and through the application of a protective covenant on fish and fish habitat.	
2	Designated Natural Environment Features/ Areas	Minimizes permanent direct and indirect effects to designated natural environmental features/areas including ESAs, ANSIs.	The Transitway footprint associated with Alternative A can be accommodated within the existing Highway 417 ROW. Some encroachment into the forested edge of the Stillwater Creek Valley Life Science Site, including potential minor removal of disturbed woody vegetation from the southern edge of this feature adjacent to the Highway 417 ROW, may be required depending on the final grading limits. Portions of this forested edge were previously disturbed and planted with native species during the expansion of Highway 417. Vegetation removals would not directly impact features for which the life science site was designated (i.e. incised valley with mature/regionally uncommon Black Maple).	There are no anticipated direct impacts to designated natural features as Alternative B avoids new encroachment into the southern edge of the Stillwater Creek Valley Life Science Site.
		Existing Conditions The Stillwater Creek Valley Life Science Site (SCVLSS) is located along the northern edge of the study area, north of Highway 417. This site is recognized for the narrow ravine in deep clay plain dominated by Sugar Maple-Black Maple. Some of the individual trees of the regionally uncommon Black Maple are very large (>100 cm DBH). It should be noted that the young Black Maples located in close proximity to Highway 417 do not appear to be part of the Black/Sugar Maple ecotype located in the main wooded portion of the valley.		
		OPPORTUNITIES FOR MITIGATION	Disturbance to forest edge vegetation may be avoided by installing a retaining wall to minimize the Transitway footprint and the extent of grading between chainage 11+500 and 12+200.	None required.

TABLE A-5: ASSESSMENT OF EFFECTS			CENTRAL SEGMENT PRELIMINARY DESIGN ALTERNATIVES	
Criteria		**Performance Measures**	**Alternative A- Adjacent to Highway 417 WB Lanes**	**Alternative B- 2 Highway 417 Lanes and Reconstruct Lanes in Median**
		PERFORMANCE GRADE	Fair - Good	Good
		PREFERENCE	*2nd*	*1st*
		RATIONALE	Alternative B avoids direct impacts to the Stillwater Creek valley Life Science Site and adjacent vegetation and is therefore preferred; however, with effective mitigation to avoid unnecessary encroachment, the magnitude of effects associated with Alternative A is expected to be minimal.	
3	Wetlands	Minimizes permanent direct and indirect effects to wetland vegetation considering sensitivity, quality and significance of wetland vegetation (including regionally rare/uncommon plant species); and the relative magnitude of potential effects.	This alternative may require direct removal of wetland vegetation from a seepage area abutting the Highway 417 ROW (approximately 50 meters west of culvert C4). This seepage area is dominated by common and tolerant species and has been moderately disturbed by its close proximity to Highway 417. The culvert extension works at culvert C3 will require the removal of vegetation along the drainage channels, which includes occasional common and tolerant wetland plant species. There may be incremental increases in indirect effects such as contaminant drift (salt spray) beyond that attributable to the existing Highway 417 are expected in remaining portions of the seepage area and adjacent floodplain meadow marsh community.	This alternative Avoids direct impacts to wetlands. There may be a need for some removal of tolerant wetland vegetation including cattail and Common Reed may be required within the existing Highway 417 median. There may be indirect effects such as contaminant drift (salt spray) are expected due to additional transportation infrastructure.
		Existing Conditions The area is characterized by narrow riparian vegetation along watercourses and swales, as well as meadow marsh inclusions surrounding these features. Vegetation is mostly characterized by common and tolerant wetland plant species.		
		OPPORTUNITIES FOR MITIGATION	Minimize the removal of wetland vegetation and avoid direct impacts to the seepage area by using design measures that: - minimize the footprint and the extent of grading at the wetland located approximately at chainage 11+800 (steepened sideslopes, retaining walls, etc.); and - sustain the existing moisture regime. Consider the transplant/salvage of potentially affected native vegetation.	Re-vegetate any disturbed or newly created roadside ditches with tolerant native wetland species.
		PERFORMANCE GRADE	Fair-Good	Good
		PREFERENCE	*2nd*	*1st*
		RATIONALE	Alternative B is preferred for this criterion as it avoids direct impacts to wetlands and minimizes impacts to wetland vegetation; however the magnitude of effects associated with the removal of vegetation from the seepage area is expected to be minimal.	
4	Upland Vegetation	Minimizes permanent direct and indirect effects to upland vegetation (including wooded tablelands and valleys and culturally influenced communities such as cultural thicket, meadow and hedgerows); Considers sensitivity, quality and significance of vegetation (including regionally rare/uncommon plant species); and the relative magnitude of potential effect.	This alternative requires removal of common and tolerant cultural meadow vegetation types and landscape plantings along Highway 417 in areas that have been previously distrurbed. These vegetation removals will mainly avoid the main treed portion of the Stillwater Creek valley and are largely limited to culturally influenced and early successional vegetation communities. In some areas, the required vegetation removals may potentially result in some minor edge removal/tree trimming along the Stillwater Creek valley edge, including regionally uncommon Black Maple. It should be noted that the young Black Maples observed closer to the highway do not appear to be part of the regionally uncommon ecotype/association which is located in the main treed portion of the valley. Given that potential effects to the regionally uncommon Black Maple ecotype/association are avoided, the magnitude of potential impacts related to minor edge removal/tree trimming along the Stillwater Creek valley edge is relatively low. Furthermore, these direct effects can likely be avoided through the implementation of design measures that minimize footprint impacts (described below). There may be indirect effects such as contaminant drift (salt spray) in areas where the transit facility is brought closer to the remaining portion of the valley.	This alternative may require the removal and/or disturbance of small areas of cultural meadow vegetation abutting the north side of the highway near the east and west limits of the mainline alternative and within the existing Highway 417 median in areas that have been previously distrurbed. There may be indirect effects such as contaminant drift (salt spray) due to additional transportation infrastructure.
		Existing Conditions The area along the edge of the Stillwater Creek valley within and adjacent to the existing Highway 417 ROW is dominated by culturally influenced vegetation including meadow, early successional growth (forest edge naturalization program and plantings) and scattered shrubs. Regionally uncommon Black Maple and Slippery Elm are present in this study area.		
		OPPORTUNITIES FOR MITIGATION	Minimize disturbance to forest edge vegetation by installing a retaining wall to minimize the Transitway footprint and the extent of grading between chainage 11+500 and 12+200. Possible mitigation for regionally rare plants includes transplant/seedbank salvage.	None required.
		PERFORMANCE GRADE	Fair-Good	Good
		PREFERENCE	*2nd*	*1st*
		RATIONALE	Alternative B is preferred for this criterion as it minimizes the direct removal of upland vegetation and avoids potential removal of regionally uncommon flora. Although	

TABLE A-5: ASSESSMENT OF EFFECTS			CENTRAL SEGMENT PRELIMINARY DESIGN ALTERNATIVES	
Criteria		**Performance Measures**	**Alternative A- Adjacent to Highway 417 WB Lanes**	**Alternative B- 2 Highway 417 Lanes and Reconstruct Lanes in Median**
			Alternative A may result in some potential impacts to the valley edge, the magnitude of potential impacts is relatively low as the required edge removal/tree trimming avoids the regionally uncommon ecotype/association located in the main treed portion of the valley.	
5	Wildlife	Minimizes permanent direct and indirect effects on habitat (including migratory birds and known habitat for wildlife species of conservation concern); Considers sensitivity and quality of habitat and the relative magnitude of potential effects.	This alternative results in the removal of cultural meadow habitat within the Highway 417 ROW and some removal of woody vegetation along the edge of the Stillwater Creek valley edge. Some localized clearing of riparian vegetation associated with the required culvert extensions is also expected. One meadow area sensitive species (Savannah Sparrow) is potentially affected by the removal of cultural meadow vegetation and habitat. This species is common and often observed in similar habitats. There may be some reduction in habitat quality associated with an incremental increase in indirect effects including contaminant drift, light and noise may be expected. An abandoned heronry of about 8 nests located in large deciduous trees along the south edge of the valley would be directly impacted by this route. The heronry was not active in 2009 or 2010 and Kemptville District MNR has no previous records or information about the heronry and when it might have last been active. Consultation with the Canadian Wildlife Service, MNR and knowledgeable stakeholder groups has confirmed that the heronry is abandoned. The impacts to potential wildlife linkages are mainly limited to extensions of existing Highway 417 culverts. Culvert extensions may have some effect on use by wildlife by increasing the 'tunnel effect' (i.e. decreasing the relative openness of the culvert measured as the ratio of culvert height and width to length).	This alternative results in the removal of cultural meadow habitat and roadside ditch vegetation within the existing Highway 417 ROW/median. One meadow area sensitive species (Savannah Sparrow) is potentially affected by the removal of cultural meadow vegetation and habitat. This species is common and often observed in similar habitats. There may be some reduction in habitat quality associated with an incremental increase in indirect effects including contaminant drift, light and noise may be expected. There are no impacts to potential wildlife linkages.
		Existing Conditions The area along the edge of the Stillwater Creek valley directly adjacent to the Highway 417 ROW is dominated by previously cleared and culturally influenced vegetation communities.		
		OPPORTUNITIES FOR MITIGATION	Mitigation measures that protect vegetation and limit encroachment into the valley will also protect wildlife and wildlife habitat.	Mitigation measures that protect vegetation will also protect wildlife and wildlife habitat.
		PERFORMANCE GRADE	Fair-Good	Good
		PREFERENCE	*2nd*	*1st*
		RATIONALE	Alternative B is slightly more preferred for this criterion as it minimizes direct removal of vegetation and does not require culvert extensions. Significant effects to wildlife are not anticipated for either alternative.	
6	Fluvial Geomorphology	Minimizes permanent direct and indirect impacts on Stillwater Creek and its tributaries with respect to: - Flow regime (timing and volumes); - Energy regime; - Sediment transport; - Erosion and/or sedimentation; and - Quality and functioning of existing fluvial features	The culvert extension at C3 may require a minor realignment of a tributary of Stillwater Creek at the confluence with the main branch. This alternative may also encroach on the floodplain in this area, altering process relationships between the creek and the floodplain creating responses to flow events in the downstream direction which may impact sensitive fluvial processes. To ensure this project does not negatively contribute to the flooding of Stillwater Creek, the Study Team is actively working with the RVCA to determine the overall floodplain, assess impacts and determine appropriate mitigation.	There are no direct impacts to existing fluvial processes.
		Existing Conditions The Stillwater Watershed is a Clay Plain characterized by silts and clays that result in poor drainage and become highly unstable after heavy rains. The current junction between Stillwater Creek and the Tributary A is perpendicular. The existing conditions assessment shows that this junction is continuing to erode rapidly and will continue to do so if the perpendicular connection is maintained.		
		OPPORTUNITIES FOR MITIGATION	Realignment of Tributary A at C3 should be explored to arrest continuing erosion prior to installing the culvert extension at C3. The culvert should be designed to transfer flow energy downstream under normal conditions. This could be achieved through the provision of a low flow channel in the culvert. Additional fluvial geomorphology investigation will be undertaken during detail design to determine the impact of altered process relationships resulting from any culvert extension. Potential measures to mitigate encroachment into the floodplain include the replacement of floodplain storage elsewhere in the system.	Realignment of Tributary A at C3 should be explored to arrest continuing erosion.

TABLE A-5: ASSESSMENT OF EFFECTS			CENTRAL SEGMENT PRELIMINARY DESIGN ALTERNATIVES	
Criteria		**Performance Measures**	**Alternative A- Adjacent to Highway 417 WB Lanes**	**Alternative B- 2 Highway 417 Lanes and Reconstruct Lanes in Median**
		PERFORMANCE GRADE	Fair	Good
		PREFERENCE	*2nd*	*1st*
		RATIONALE	Alternative B is preferred as it does not encroach on the Stillwater Creek floodplain. Due to the unstable conditions of the existing confluence of Stillwater Creek and its tributary, realignment of Tributary A is recommended to arrest further erosion independent of Transitway construction.	
7	Groundwater Impacts	Avoids permanent draw-down and associated environmental impacts. **Existing Conditions** Investigations currently underway.	As no significant excavation is required, no impacts are anticipated.	As no significant excavation is required, no impacts are anticipated.
		OPPORTUNITIES FOR MITIGATION	None required.	None required.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	There are no discernable differences among alternatives for this criterion.	
8	Drainage/ Hydrology	Minimizes runoff to watercourses; Minimizes increases to flood flows; and Minimizes SWM facility maintenance. **Existing Conditions** Storm sewers and grassed swales and ditches convey stormwater runoff from Highway 417.	An increase in surface area impermeability will increase runoff which will eventually outlet to area watercourses. Increased runoff does not increase peak flow in the creek system. Some portions of Alternative A may encroach on areas of the Stillwater Creek floodplain. To ensure this project does not negatively contribute to the flooding of Stillwater Creek, the Study Team is actively working with the RVCA to determine the overall floodplain, assess impacts and determine appropriate mitigation.	An increase in surface area impermeability will increase runoff which will eventually outlet to area watercourses. Increased runoff does not increase peak flow in the creek system.
		OPPORTUNITIES FOR MITIGATION	Use oil-grit separators and other SWM best practices to mitigate increased imperviousness. Larger storm sewers will be required to drain Transitway and Highway 417 runoff.	Use oil-grit separators and other SWM best practices to mitigate increased imperviousness. Larger storm sewers will be required to drain Transitway and Highway 417 runoff.
		PERFORMANCE GRADE	Fair - Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	Alternative B is slightly preferred as it avoids encroachment on areas of the Stillwater Creek floodplain and does not require additional culvert extensions.	
9	Construction Impacts	Minimizes temporary construction related impacts. **Existing Conditions** See existing conditions from criteria 1-8.	There is the potential for erosion and migration of sediment off-site. There is the potential for temporary disturbance of wildlife and migratory birds, and temporary disturbance of wetland and upland vegetation. There is the potential for increased noise and dust during construction. There is the potential for accidental spills during construction.	There is the potential for erosion and migration of sediment off-site. There is the potential for temporary disturbance of wildlife and migratory birds, and temporary disturbance of wetland and upland vegetation. There is the potential for increased noise and dust during construction. There is the potential for accidental spills during construction.
		OPPORTUNITIES FOR MITIGATION	Standard construction mitigation measures include: - Implement erosion and sediment control plan. - Stabilize/ re-vegetate exposed surfaces. - Ensure proper management of excess material. - Identify “Environmentally Sensitive Areas,” including watercourses and vegetation, on contract drawings and in the field to protect from incidental disturbance. - Limit vegetation clearing to that required for construction. - Re-vegetate any disturbed wetland and/or upland vegetation features with tolerant native species. - Use appropriate timing windows to protect local fish and bird species during spawning and nesting seasons. - Use flow management measures, as required. - Abide by City of Ottawa Noise Control Bylaw. - Standard controls on Contractor operations. Construction access can be provided by Holly Acres and Corkstown Rd.	Standard construction mitigation measures include: - Implement erosion and sediment control plan. - Stabilize/ re-vegetate exposed surfaces. - Ensure proper management of excess material. - Identify “Environmentally Sensitive Areas,” including watercourses and vegetation, on contract drawings and in the field to protect from incidental disturbance. - Limit vegetation clearing to that required for construction. - Re-vegetate any disturbed wetland and/or upland vegetation features with tolerant native species. - Use appropriate timing windows to protect local fish and bird species during spawning and nesting seasons. - Use flow management measures, as required. - Abide by City of Ottawa Noise Control Bylaw. - Standard controls on Contractor operations. Construction access can be provided by Highway 417, Holly Acres and Corkstown Rd.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*

TABLE A-5: ASSESSMENT OF EFFECTS			CENTRAL SEGMENT PRELIMINARY DESIGN ALTERNATIVES	
Criteria		**Performance Measures**	**Alternative A- Adjacent to Highway 417 WB Lanes**	**Alternative B- 2 Highway 417 Lanes and Reconstruct Lanes in Median**
		RATIONALE	As the potential for minor impacts resulting from construction have been identified for both alternatives, there are no discernable differences among alternatives for this criterion. The magnitude of these effects, after mitigation, is expected to be low.	
Factor Area Summary		**OVERALL PERFORMANCE GRADE**	**Fair**	**Good**
		OVERALL PREFERENCE	***2nd***	***1st***
		RATIONALE	Both Alternative A and Alternative B avoid direct impacts to the main treed portion of the Stillwater Creek valley and other associated natural features. For both alternatives, fluvial geomorphological improvements are recommended at C3 to address existing and ongoing erosion at the confluence of Stillwater Creek and its Tributary. While the magnitude of potential natural environmental effects associated with either alternative is not expected to be significant, Alternative B is given preference for this factor area as it will not require extending Highway 417 culverts (with the potential exception of C3) and has less potential for indirect effects to the valley (salt spray, contaminant drift, minor tree trimming/edge removals etc.).	
SOCIAL/CULTURAL ENVIRONMENT				
10	Heritage/ Archaeology	Avoids areas with heritage/archaeological potential.	Although Alternative A is contained within the existing Highway 417 ROW footprint, an area that has been previously disturbed, there is the potential for slight encroachment beyond the ROW. A Stage 2 archaeological assessment is underway to determine the extent of archaeological potential in these areas.	Alternative B is contained entirely within the Highway 417 footprint, an area that has been previously disturbed.
		Existing Conditions		
		Stage 1 archaeological assessment identified relatively high potential for pre-contact sites in the area between Holly Acres and Moodie along the ROW corridor where Stillwater Creek has not been disturbed.		
		OPPORTUNITIES FOR MITIGATION	Mitigation measures will be recommended based on the findings of stage 2 investigations. Standard construction mitigation measures addressing the potential for the incidental discovery of archaeological resources.	Standard construction mitigation measures addressing the potential for the incidental discovery of archaeological resources.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	With mitigation, there are no discernable differences among alternatives for this criterion.	
11	Contaminated Property	Avoids contaminated property.	There is a potential to encounter contaminated materials (salt) while excavating the existing highway ROW for this alternative.	There is a potential to encounter contaminated materials (salt) while excavating the existing highway ROW for this alternative.
		Existing Conditions		
		Phase 1 Environmental Site Assessment (ESA) identified potential for environmental impacts associated with transportation corridors (i.e. road salts).		
		OPPORTUNITIES FOR MITIGATION	Ensure proper handling and disposal of excess materials during construction.	Ensure proper handling and disposal of excess materials during construction.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	With mitigation, potential impacts resulting from the disturbance of contaminated property can be minimized. There is no discernible difference between alternatives for this factor area.	
12	Noise	Minimizes noise level increases at sensitive receivers NOTE: Sound level calculated from nearest noise sensitive receiver.	The following outlines the noise levels predicted for: a future do nothing scenario; the noise levels if Alternative A is implemented; and the difference in noise levels between the future do nothing scenario and the implementation of Alternative A: Future Do Nothing: 64.2 dBA Future A: 64.8 dBA Increase of 0.6 dBA An increase in 3 dBA is considered just perceptible by most people. While this alternative does bring the transportation facility marginally closer to the community (approximately 15m), due to the separation from noise sensitive receivers, the contribution of Transitway noise to average daily noise levels will be indistinguishable from background traffic noise (highway) in the horizon year.	The following outlines the noise levels predicted for: a future do nothing scenario; the noise levels if Alternative B is implemented; and the difference in noise levels between the future do nothing scenario and the implementation of Alternative B: Future Do Nothing: 64.2 dBA Future B: 64.5 dBA Increase in 0.3 dBA An increase in 3 dBA is considered just perceptible by most people. The Transitway's contribution to average daily noise levels will be indistinguishable from background traffic in the horizon year.
		Existing Conditions		
		At receiver 14: 56.7 dBA		
		OPPORTUNITIES FOR MITIGATION	The primary source of existing and ambient noise levels in this area is Highway 417. The MTO has determined that sound barriers were warranted in certain locations within the study area. The Transitway will be designed so as not to preclude the future construction of these sound barriers by MTO.	The primary source of existing and ambient noise levels in this area is Highway 417. The MTO has determined that sound barriers were warranted in certain locations within the study area. The Transitway will be designed so as not to preclude the future construction of these sound barriers by MTO.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	It has been determined that future noise levels for both alternatives will not be perceptibly higher than the future do nothing scenario. An increase of 3 dBA is considered just perceptible for most people.	

TABLE A-5: ASSESSMENT OF EFFECTS			CENTRAL SEGMENT PRELIMINARY DESIGN ALTERNATIVES	
Criteria		**Performance Measures**	**Alternative A- Adjacent to Highway 417 WB Lanes**	**Alternative B- 2 Highway 417 Lanes and Reconstruct Lanes in Median**
			The dominant noise source is, and will continue to be, Highway 417. There is no discernable difference amongst alternatives for this criterion; therefore all have been given equal preference.	
13	Ground Vibration	Minimizes ground vibration impacts on sensitive receivers.	Due to the separation from sensitive receivers and proximity to the highway, Alternative A is not expected to result in a measureable increase in ground vibrations.	Due to the separation from sensitive receivers and proximity to the highway, Alternative A is not expected to result in a measureable increase in ground vibrations.
		Existing Conditions		
		Measured ground vibrations are considered to be low and of no consequence with respect to human perception and structural or cosmetic damage thresholds for buildings and other structures.		
		OPPORTUNITIES FOR MITIGATION	None required.	None required.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	There are no discernable differences between alternatives for this criterion; therefore all have been given equal preference.	
14	Visual/Aesthetic Impacts	Maintains/Enhances buffer areas and scenic vistas.	Installation of a barrier wall between Highway 417 and the Transitway may impact views northerly into the NCC Greenbelt lands. The proximity of the Transitway to Highway 417 increases the visual expanse of traffic lanes. There will be no impact to the significant vista identified in the Greenbelt Master Plan.	Installation of a barrier wall between Highway 417 and the Transitway may impact views northerly into the NCC Greenbelt lands. The construction of additional lanes in the Highway 417 median increases the visual expanse of traffic lanes. There will be no impact to the significant vista identified in the Greenbelt Master Plan.
		Existing Conditions		
		The National Capital Commission's Greenbelt Master Plan identifies a significant vista that includes a view of downtown Ottawa that is presented to Highway 417 travelers as they come from the valley heading east. A wooded area composed of well established deciduous and coniferous trees on NCC Greenbelt land is located north of Highway 417. The forest is set back from the edge of the existing ROW and contributes to the rural cross-section that characterizes the study area. A berm, characterized by reforestation planting, was built adjacent to the corridor during the Highway 416/417 interchange construction.		
		OPPORTUNITIES FOR MITIGATION	The Transitway profile could be lowered slightly to reduce required height for barrier and glare screens, minimizing impacts to views northerly into the NCC Greenbelt lands.	Not feasible.
		PERFORMANCE GRADE	Good	Fair-Good
		PREFERENCE	*1st*	*2nd*
		RATIONALE	With mitigation, Alternative A minimizes the impact of the barrier wall on views northerly into the NCC Greenbelt lands. As Alternative B proposes the construction of the Transitway on existing highway lanes, similar mitigation is not feasible in this location. Alternative A is slightly preferred as it results in fewer visual/aesthetic impacts.	
15	Recreation Resources	Maintains/Enhances recreational resources (multi-use pathway, playing fields etc.).	This alternative retains all existing recreational features. In some locations, there may be a relative narrowing of the offset between the NCC recreational pathway and the Transitway alignment resulting in potential impacts to user experience.	This alternative retains all existing recreational features.
		Existing Conditions		
		A recreational pathway meanders along the length of the Stillwater Creek Valley. In some locations, the existing offset between the pathway and Highway 417 is relatively narrow.		
		OPPORTUNITIES FOR MITIGATION	Landscape plantings may be used to buffer the recreational pathway. Minor pathway relocation is also possible in some locations.	None required.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	With mitigation, permanent impacts to recreational resources are not anticipated for either alternative as there is the potential for a reduction in the existing buffer between the recreational pathway and the transportation corridor, There are therefore no discernable differences between alternatives for this criterion.	
16	Land Use	Compatibility with existing land use designations.	Through the installation of a 750m long retaining wall, Alternative A is contained entirely within the MTO right of way and does not directly impact Greenbelt lands or the Watts Creek Recreational Pathway. The Transitway is therefore located entirely within lands designated as I*nfrastructure Corridor* in Greenbelt Master Plan.	The Transitway is located entirely within lands designated as I*nfrastructure Corridor* in Greenbelt Master Plan.

TABLE A-5: ASSESSMENT OF EFFECTS			CENTRAL SEGMENT PRELIMINARY DESIGN ALTERNATIVES	
Criteria		**Performance Measures**	**Alternative A- Adjacent to Highway 417 WB Lanes**	**Alternative B- 2 Highway 417 Lanes and Reconstruct Lanes in Median**
		Existing Conditions		
		According to the Greenbelt Master Plan (NCC), lands to the south of Highway 417 are designated as Cultivated Landscape and lands to the north of Highway 417 are designated as Rural Landscape. Highway 417 is designated as an Infrastructure Corridor. According to the City of Ottawa Official Plan, the lands to the south of Highway 417 are designated as Agricultural Resource Area and the lands to the north of Highway 417 are designated as Greenbelt Rural.		
		OPPORTUNITIES FOR MITIGATION	None required.	None required.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	There are no discernable differences between alternatives for this criterion.	
17	Safety/Security	Maximizes safety and security for transit and multi-use pathway users.	The installation of a barrier wall between the highway and the Transitway may increase a sense of isolation in some locations due to reduced visibility.	The installation of a barrier wall between the highway and the Transitway may increase a sense of isolation in some locations due to reduced visibility.
		Existing Conditions		
		Currently no safety/security issues.		
		OPPORTUNITIES FOR MITIGATION	Additional planting should be designed to maintain existing views between the Transitway and the pathway. There may exist an opportunity to lower the profile of the Transitway in order to reduce the height of the barrier wall/glare screen required. This would maintain existing visibility and reduce the sense of isolation for pathway users. In accordance with Transitway design guidelines, the Transitway will be fenced to prevent pedestrian conflicts.	Additional planting should be designed to maintain existing views between the Transitway and the pathway. In accordance with Transitway design guidelines, the Transitway will be fenced to prevent pedestrian conflicts.
		PERFORMANCE GRADE	Good	Fair-Good
		PREFERENCE	*1st*	*2nd*
		RATIONALE	As there is the possibility of reducing the height of the barrier wall required for Alternative A, this alternative is slightly preferred from a safety/security perspective. The magnitude of effects from either alternative is considered minor.	
18	Pedestrian/Cycling Connectivity	Maximizes pedestrian and cycling connections to and from transit.	This alternative does not impact accessibility to transit.	This alternative does not impact accessibility to transit.
		Existing Conditions		
		N/A		
		OPPORTUNITIES FOR MITIGATION	None required.	None required.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	There are no discernable differences between alternatives for this factor area.	
Factor Area Summary		**OVERALL PERFORMANCE GRADE**	**Good**	**Good**
		OVERALL PREFERENCE	***1st***	***1st***
		RATIONALE	Neither alternative is predicted to result in a perceptible noise level increase over the Future Do Nothing Scenario. The dominant noise source is and will continue to be Highway 417. As these alternatives are bundled within the existing transportation corridor, both are compatible with existing land uses and avoid conflicts with pedestrians, cyclists and recreational pathway users. While Alternative A does bring the transportation facility closer to the recreational pathway in some areas, potential impacts to user experience can be mitigated through the implementation of a 750 m long retaining wall and the use of context sensitive design principles and landscape treatments. Based on magnitude and significance of potential effects to the social/cultural environment, both Alternative A and Alternative B are given equal preference.	
TECHNICAL CONSIDERATIONS				
19	Illumination	Avoids Impacts to the “dark night sky”. Minimizes light trespass on residential receivers.	In accordance with Transitway design guidelines, only stations will be illuminated, therefore impacts to illumination are not anticipated.	In accordance with Transitway design guidelines, only stations will be illuminated, therefore impacts to illumination are not anticipated.

TABLE A-5: ASSESSMENT OF EFFECTS			CENTRAL SEGMENT PRELIMINARY DESIGN ALTERNATIVES	
Criteria		Performance Measures	Alternative A- Adjacent to Highway 417 WB Lanes	Alternative B- 2 Highway 417 Lanes and Reconstruct Lanes in Median
		Existing Conditions		
		Existing illumination from highway.		
		OPPORTUNITIES FOR MITIGATION	None required.	None required.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	There are no discernable differences between alternatives for this criterion.	
20	Property	Bundles transportation corridors and requires least amount of new NCC Greenbelt lands and/or private property.	The following outlines the amount of lands required for this alternative: NCC: less than 1.0 ha (potential for some minor encroachment due to grading) MTO: 1.8 ha Private Property = 0.0 ha	The following outlines the amount of lands required for this alternative: NCC: 0.0 ha MTO: 1.8 ha Private Property = 0.0 ha
		Existing Conditions		
		The mainline portion of the study area is located within MTO property. There is NCC Greenbelt land north of the study area		
		OPPORTUNITIES FOR MITIGATION	Alternative A is contained within the MTO ROW. There is the potential for minor footprint encroachment into NCC Greenbelt land for this alternative. The use of design measures including a 750 m long retaining wall will avoid encroachment outside of the ROW and eliminate the need for NCC land.	Alternative B is contained within the MTO ROW.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	With mitigation (retaining wall), there are no discernable differences between alternatives for this criterion.	
21	Local/ Highway Traffic	Avoids immediate and long-term permanent impacts to local and highway traffic.	This alternative has no anticipated impacts to local and highway traffic.	While MTO has no plans for future expansion, this alternative would effectively preclude any future widening of Highway 417 into the median.
		Existing Conditions		
		The 2006 Average Annual Daily Traffic volume on Highway 417 between Bayshore and Moodie is 404,400 vehicles.		
		OPPORTUNITIES FOR MITIGATION	None required.	None required.
		PERFORMANCE GRADE	Good	Fair-Good
		PREFERENCE	*1st*	*2nd*
		RATIONALE	Alternative A is preferred as it minimizes potential long-term impacts to Highway 417. As MTO has no plans for expansions, the magnitude of this effect is considered minor.	
22	Transit Operations	Maximizes efficiency and flexibility for immediate and long-term transit operations.	This alternative removes buses from mixed traffic on Highway 417, improving transit service reliability.	This alternative removes buses from mixed traffic on Highway 417, improving transit service reliability.
		Existing Conditions		
		Transitway Routes 96 and 101 operate frequently between Bayshore Station and Moodie Drive. Express and rural services such as route 60, 61, 62, 63, 64, 65, 66, 68, 167, 182, 261, 262 and 263 also operate between Bayshore Station and Moodie Drive and circulate through communities west of the study area.		
		OPPORTUNITIES FOR MITIGATION	None required.	None required.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	Both alternatives remove buses from mixed traffic on Highway 417 and therefore There are no discernable differences between alternatives for this criterion.	
23	Staging	Minimizes temporary disruptions to transit operations, local traffic and highway traffic during construction.	Some short term lane closures will be required on Highway 417 to install a barrier between Highway 417 and the Transitway. It is anticipated that most of this construction can be completed without significant impacts to the travelling public. Transit service can be maintained for the duration of construction.	This alternative requires a complex, 4-staged construction operation over a 2-3 year period and requires significant reconstruction of Highway 417. Significant traffic delays are anticipated, similar to those experienced during the recent Highway 417 expansion (i.e. recurring lane and ramp closures and associated delays over 2-3 construction seasons). These delays will significantly impact the 40,000 – 50,000 users who travel this corridor everyday and will significantly impact the movement of goods along this important provincial transportation link. Furthermore, as the construction of the Transitway lanes would likely be carried-out in the final stage, this configuration would delay the opening of the Transitway facility by approximately 1 year.
		Existing Conditions		
		N/A		

TABLE A-5: ASSESSMENT OF EFFECTS			CENTRAL SEGMENT PRELIMINARY DESIGN ALTERNATIVES	
Criteria		**Performance Measures**	**Alternative A- Adjacent to Highway 417 WB Lanes**	**Alternative B- 2 Highway 417 Lanes and Reconstruct Lanes in Median**
				To maintain transit service for the duration of construction, westbound Transitway buses would be detoured via Holly Acres – Carling – Moodie or be required to operate within the work zone in mixed traffic. Both options result in significant delays to Transitway users.
		OPPORTUNITIES FOR MITIGATION	Implement standard traffic management measures.	Would require the development and implementation of a comprehensive traffic management plan, including advanced warning, signage etc. Even with mitigation, disruption to the travelling public is expected to be severe.
		PERFORMANCE GRADE	Good	Poor
		PREFERENCE	*1st*	*2nd*
		RATIONALE	Alternative A is preferred as it will largely avoid significant impacts to the travelling public on Highway 417. Alternative B is expected to result in significant disruptions to the travelling public over at least 2 construction seasons. The magnitude of this potential effect is considered high.	
24	Constructability/ Capital Cost	Avoids complex constructability issues and can be constructed at the lowest capital cost.	The expected capital cost of construction of this alternative is $8.8 M This alternative requires standard roadway construction operations and compatibility with existing infrastructure.	The expected capital cost of construction of this alternative is $13.9 M. This alternative requires significant construction operations, including: - Reconstruction/regrading of existing lanes, - 2-lane widening into the median; - Complex realignment/reconstruction of Highway 416 and Moodie Drive ramps; - Pavement crown shift of Highway 417 westbound lanes necessitating the removal and reconstruction of the entire pavement structure of the recently constructed highway; and - Relocation and reconstruction of: high-mast lighting (minimum of 11 poles); existing roadway protection systems such as concrete barrier and steel beam guide rail; storm sewers; and advanced traffic management system (ATMS) plant.
		Existing Conditions		
		N/A		
		OPPORTUNITIES FOR MITIGATION	Cost-saving measures will be explored for all alternatives during detail design.	Cost-saving measures will be explored for all alternatives during detail design.
		PERFORMANCE GRADE	Good	Fair
		PREFERENCE	*1st*	*2nd*
		RATIONALE	Alternative A is preferred as it can be constructed at the lowest capital cost and does not require the reconstruction of recently completed provincial transportation infrastructure.	
25	Long Term Maintenance	Avoids the need for undesirable long-term maintenance operations.	Requires the maintenance of retaining walls and the driving surface.	Requires the maintenance of retaining walls and the driving surface.
		Existing Conditions		
		N/A		
		OPPORTUNITIES FOR MITIGATION	None required.	None required.
		PERFORMANCE GRADE	Good	Good
		PREFERENCE	*1st*	*1st*
		RATIONALE	There are no discernable differences between alternatives for this factor area.	
Factor Area Summary		**OVERALL PERFORMANCE GRADE**	**Good**	**Poor**
		OVERALL PREFERENCE	***1st***	***2nd***
		RATIONALE	Alternative A minimizes impacts to highway operations and can be constructed for approximately $5M less than Alternative B. Alternative B requires the reconstruction of the recently expanded westbound Highway 417 lanes, including the removal and reconstruction of the entire pavement structure and the relocation of high-mast lighting, existing roadway protection systems, storm sewers and advanced traffic management system (ATMS) plant.. This reconstruction would likely be carried out in 4 stages over a period of 2 to 3 years and would require recurring lane and ramp closures on Highway 417 throughout construction. These closures will result in significant delays for the approximately 40,000-50,000 users travelling this corridor every day for the duration of construction. Based on the magnitude of anticipated disruptions to Highway 417 operations and associated user delays, Alternative A is recommended for this factor area.	

TABLE A-6: ASSESSMENT OF EFFECTS			WEST SEGMENT PRELIMINARY DESIGN ALTERNATIVES			
			Alignment A – North of Interchange		Alignment B – Through Interchange	
Criteria		Performance Measures	Under Moodie w/ Station at Corkstown (Alternative A1)	Over Moodie w/ Station at Corkstown (Alternative A2)	Under Moodie w/ Station at Moodie (Alternative B1)	Under Moodie w/ Station at Corkstown (Alternative B2)
NATURAL ENVIRONMENT						
1	Fish and Fish Habitat	Minimizes permanent direct and indirect effects to fish and fish habitat considering sensitivity and relative magnitude of potential effect.	The proximity of the proposed Corkstown station to Stillwater Creek increases the potential for indirect effects such as impacts to slope stability and potential erosion along the bank. This alternative requires an extension of the existing Highway 417 culvert west of Moodie Drive (C1). With appropriate mitigation, the effects to fish and fish habitat are not considered significant.	The proximity of the proposed Corkstown station to Stillwater Creek increases the potential for indirect effects such as slope stability and potential erosion along the bank. This alternative requires an extension of the existing Highway 417 culvert west of Moodie Drive (C1). With appropriate mitigation, the effects to fish and fish habitat are not considered significant.	The location of the proposed Moodie station avoids encroachment effects to the Stillwater Creek valley south of Corkstown Road, minimizing the potential for indirect effects. This alterantive requires an extension of the existing Highway 417 culvert west of Moodie Drive (C1). With appropriate mitigation, the effects to fish and fish habitat are not considered significant.	The proximity of the proposed Corkstown station to Stillwater Creek increases the potential for indirect effects such as slope stability and potential erosion along the bank. This alternative requires an extension of the existing Highway 417 culvert west of Moodie Drive (C1). With appropriate mitigation, the effects to fish and fish habitat are not considered significant.
		Existing Conditions Stillwater Creek is classified as Type 2 fish habitat and is considered to have a relatively high sensitivity. Species including baitfish, Fathead Minnow, Brook Stickleback and Northern Redbelly Dace have been observed. In this area, Stillwater Creek flows downstream along Moodie Drive, crosses Corkstown Road and meanders along the highway before entering the Stillwater Creek Valley area.				
		PERFORMANCE GRADE	Fair-Good	Fair-Good	Good	Fair-Good
		OPPORTUNITIES FOR MITIGATION	Design measures are recommended to minimize the potential for bank erosion such as retaining walls or similar features. Design measures are recommended to ensure that fish passage is maintained at culvert C1 such as embedded culverts, low flow passages and substrate lining.	Design measures are recommended to minimize the potential for bank erosion such as retaining walls or similar features. Design measures are recommended to ensure that fish passage is maintained at culvert C1 such as embedded culverts, low flow passages and substrate lining.	Design measures to ensure that fish passage is maintained at culvert C1 such as embedded culverts, low flow passages and substrate lining.	Design measures are recommended to minimize the potential for bank erosion such as retaining walls or similar features. Design measures are recommended to ensure that fish passage is maintained at culvert C1 such as embedded culverts, low flow passages and substrate lining.
		PREFERENCE	*2nd*	*2nd*	*1st*	*2nd*
		RATIONALE	Alternative B1 is preferred for this criterion as the proposed Moodie Drive station location avoids encroachment on the Stillwater Creek Valley south of Corkstown Road and minimizes the potential for indirect impacts to fish and fish habitat. The potential for minor indirect impacts to fish and fish habitat are the same for alternatives A1, A2 and B2 and are therefore given equal preference. The magnitude of potential effects is expected to be low.			
2	Designated Natural Environment Features/ Areas	Minimizes permanent direct and indirect effects to designated natural environmental features/areas including ESAs, ANSIs.	The proposed Corkstown station location requires some vegetation removals from cultural meadow vegetation contiguous with the Stillwater Creek valley Life Science Site. The overall ecological significance of this meadow area is considered relatively low as it is characterized by low botanical diversity, is isolated by Highway 417 to the south and Corsktown Road to the north and therefore provides limited opportunity for wildlife movement and contains habitat that is common and well represented in the study area.	The proposed Corkstown station location requires some additional vegetation removals from cultural meadow vegetation contiguous with the Stillwater Creek valley Life Science Site. The overall ecological significance of this meadow area is considered relatively low as it is characterized by low botanical diversity, is isolated by Highway 417 to the south and Corsktown Road to the north and therefore provides limited opportunity for wildlife movement and contains habitat that is common and well represented in the study area.	This alternative has no direct impact to designated natural environment features/areas. The proposed Moodie Drive station location requires minimal removal of cultural meadow vegetation contiguous with the Stillwater Creek valley Life Science Site.	The proposed Corkstown station location requires some additional vegetation removals from cultural meadow vegetation contiguous with the Stillwater Creek valley Life Science Site. The overall ecological significance of this meadow area is considered relatively low as it is characterized by low botanical diversity, is isolated by Highway 417 to the south and Corsktown Road to the north and therefore provides limited opportunity for wildlife movement and contains habitat that is common and well represented in the study area.
		Existing Conditions The Stillwater Creek Valley Life Science Site (SCVLSS) is located along the northern edge of the study area, north of Highway 417. The SCVLSS is characterized by a wooded valley bordered by cultural meadow vegetation.				
		PERFORMANCE GRADE	Fair-Good	Fair-Good	Good	Fair-Good
		OPPORTUNITIES FOR MITIGATION	Reinstate vegetation, seedbank/ salvage and transplant.	Reinstate vegetation, seedbank/ salvage and transplant.	None required.	Reinstate vegetation, seedbank/ salvage and transplant.
		PREFERENCE	2nd	2nd	1st	2nd
		RATIONALE	The Stillwater Creek Valley Life Science Site (SCVLSS) is the only designated natural environmental feature in the study area. Alternative B1 is preferred as the proposed Moodie Drive station location has the least impact to cultural vegetation communities within the Life Science Site.			

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			Alignment A – North of Interchange		Alignment B – Through Interchange	
Criteria		Performance Measures	Under Moodie w/ Station at Corkstown (Alternative A1)	Over Moodie w/ Station at Corkstown (Alternative A2)	Under Moodie w/ Station at Moodie (Alternative B1)	Under Moodie w/ Station at Corkstown (Alternative B2)
			The potential for indirect impacts to the SCVLSS are the same for alternatives A1, A2 and B2 and are therefore given equal preference. The magnitude of potential effects is expected to be low.			
3	Wetlands	Minimizes permanent direct and indirect effects to wetland vegetation/communities considering sensitivity, quality and significance of wetland vegetation (including regionally rare/uncommon plant species) and relative magnitude of potential effect.	The proposed Corkstown station location may require partial removal of a roadside ditch and riparian vegetation. This alternative may result in an incremental increase in indirect effects such as contaminant drift (salt spray) beyond that attributable to the existing Highway 417 is expected in riparian vegetation areas.	The proposed Corkstown station may require permanent removal of a roadside ditch and riparian vegetation. This alternative may result in an incremental increase in indirect effects such as contaminant drift (salt spray) beyond that attributable to the existing Highway 417 is expected in riparian vegetation areas.	This alignment may result in an incremental increase in indirect effects such as contaminant drift (salt spray) beyond that attributable to the existing Highway 417 in riparian vegetation areas.	The proposed Corkstown station may require partial removal of a roadside ditch and riparian vegetation. This alternative may result in an incremental increase in indirect effects such as contaminant drift (salt spray) beyond that attributable to the existing Highway 417 is expected in riparian vegetation areas.
		Existing Conditions There are no Provincially Significant Wetlands in the study area. Vegetation is mostly characterized by common and tolerant wetland plant species. Regionally significant Foxtail Sedge (*Carex alopecoidea*) and an unconfirmed sample of regionally uncommon Jointed Rush (*Juncus articulatus*) have been relocated as part of the ongoing 3W watermain construction project.				
		PERFORMANCE GRADE	Fair-Good	Fair-Good	Good	Fair-Good
		OPPORTUNITIES FOR MITIGATION	Design measures to minimize the removal of riparian vegetation such as the construction of retaining walls in order to minimize the footprint of the Transitway adjacent to Stillwater Creek.	Design measures to minimize the removal of riparian vegetation such as the construction of retaining walls in order to minimize the footprint of the Transitway adjacent to Stillwater Creek.	Landscape plantings are recommended including native, tolerant species.	Design measures to minimize the removal of riparian vegetation such as the construction of retaining walls in order to minimize the footprint of the Transitway adjacent to Stillwater Creek.
		PREFERENCE	*2nd*	*2nd*	*1st*	*2nd*
		RATIONALE	Alternative B1 is preferred for this criterion as the proposed Moodie Drive station location does not require removal/relocation of wetland vegetation species. There are no discernable differences among Alternative A1, A2 and B2 for this criterion and are therefore given equal preference. The magnitude of residual effects for these alternatives is expected to be minimal.			
4	Upland Vegetation	Minimizes permanent direct and indirect effects to upland vegetation (including wooded tablelands and valleys and culturally influenced communities such as cultural thicket, meadow and hedgerows) considering sensitivity, quality and significance of vegetation (including regionally rare/uncommon plant species) and relative magnitude of potential effect	The proposed Corkstown station location requires vegetation removals from cultural meadow adjacent to the Stillwater Creek Valley. The meadow is generally characterized by open field with occasional shrubs and small trees. The overall ecological significance of this meadow area is considered relatively low as it is characterized by low botanical diversity, is isolated by Highway 417 to the south and Corsktown Road to the north and therefore provides limited opportunity for wildlife movement and contains habitat that is common and well represented in the study area. Three species of conservation concern were observed in the vicinity of the proposed station (Slippery Elm, Foxtail Sedge and Jointed Rush). All three species were observed along the bank of Stillwater Creek, outside of the footprint of the proposed station at Corkstown Road. The foxtail sedge and jointed rush have been transplanted as part of the 3W watermain	The proposed Corkstown station location requires vegetation removals from cultural meadow adjacent to the Stillwater Creek Valley. The meadow is generally characterized by open field with occasional shrubs and small trees. The overall ecological significance of this meadow area is considered relatively low as it is characterized by low botanical diversity, is isolated by Highway 417 to the south and Corsktown Road to the north and therefore provides limited opportunity for wildlife movement and contains habitat that is common and well represented in the study area. Three species of conservation concern were observed in the vicinity of the proposed station (Slippery Elm, Foxtail Sedge and Jointed Rush). All three species were observed along the bank of Stillwater Creek, outside of the footprint of the proposed station at Corkstown Road. The foxtail sedge and jointed rush have been transplanted as part of the 3W watermain	The proposed Moodie Drive station location requires minor removal of cultural meadow vegetation within the interchange loop ramps. A minor re-alignment of the existing NCC recreational pathway to accommodate the Transitway and station may result in minor removal of vegetation from the edge of a young to mid-aged ash/maple forest.	The proposed Corkstown station location requires vegetation removals from cultural meadow adjacent to the Stillwater Creek Valley. The meadow is generally characterized by open field with occasional shrubs and small trees. The overall ecological significance of this meadow area is considered relatively low as it is characterized by low botanical diversity, is isolated by Highway 417 to the south and Corsktown Road to the north and therefore provides limited opportunity for wildlife movement and contains habitat that is common and well represented in the study area. Three species of conservation concern were observed in the vicinity of the proposed station (Slippery Elm, Foxtail Sedge and Jointed Rush). All three species were observed along the bank of Stillwater Creek, outside of the footprint of the proposed station at Corkstown Road. The foxtail sedge and jointed rush have been transplanted as part of the 3W watermain
		Existing Conditions The area adjacent to the interchange loop ramps is characterized by cultural meadow and the area west of Moodie Drive includes horse pasture. Regionally significant Slippery Elm is present within the study area. The area east of Moodie Drive, between Corkstown Road and Highway 417 is located adjacent to the Stillwater Creek Valley.				

TABLE A-6: ASSESSMENT OF EFFECTS		WEST SEGMENT PRELIMINARY DESIGN ALTERNATIVES			
		Alignment A – North of Interchange		Alignment B – Through Interchange	
Criteria	Performance Measures	Under Moodie w/ Station at Corkstown (Alternative A1)	Over Moodie w/ Station at Corkstown (Alternative A2)	Under Moodie w/ Station at Moodie (Alternative B1)	Under Moodie w/ Station at Corkstown (Alternative B2)
		construction project. The preliminary design for the proposed Corkstown Station allows for the retention of the meadow vegetation adjacent to the creek and its associated function. A minor re-alignment of the existing NCC recreational pathway to accommodate the Transitway and station may result in minor removal of vegetation from the edge of a young to mid-aged ash/maple forest. The re-alignment of Corkstown Road west of Moodie Drive would require the removal of horse pasture vegetation and an isolated hedgerow within the pasture.	construction project. The preliminary design for the proposed Corkstown Station allows for the retention of the meadow vegetation adjacent to the creek and its associated function. A minor re-alignment of the existing NCC recreational pathway to accommodate the Transitway and station may result in minor removal of vegetation from the edge of a young to mid-aged ash/maple forest. The re-alignment of Corkstown Road west of Moodie Drive would require the removal of horse pasture vegetation and an isolated hedgerow within the pasture.		construction project. The preliminary design for the proposed Corkstown Station allows for the retention of the meadow vegetation adjacent to the creek and its associated function. A minor re-alignment of the existing NCC recreational pathway to accommodate the Transitway and station may result in minor removal of vegetation from the edge of a young to mid-aged ash/maple forest.
	PERFORMANCE GRADE	Fair	Fair	Good	Fair-Good
	OPPORTUNITIES FOR MITIGATION	Edge-mitigation measures, including buffer plantings, may reduce impacts associated with the creation of a new edge within the young to mid-aged deciduous forest.	Edge mitigation measures, including buffer plantings, may reduce impacts associated with the creation of a new edge within the young to mid-aged deciduous forest.	None required.	Edge mitigation measures, including buffer plantings, may reduce impacts associated with the creation of a new edge within the young to mid-aged deciduous forest.
	PREFERENCE	*3rd*	*3rd*	*1st*	*2nd*
	RATIONALE	Alternative B1 is preferred for this criterion as the proposed Moodie Drive station location minimizes the removal of upland vegetation adjacent to the Stillwater Creek Valley and avoids impacts to regionally significant species. Alternative A1, A2 and B2 are slightly less preferred for this criterion, as the location of the Corkstown station would require some additional removal of cultural meadow vegetation adjacent to the Stillwater Creek Valley. As alternative B2 does not require the relocation of Corkstown Road west of Moodie Drive and therefore does not result in the additional removal of horse pasture vegetation, it is slightly preferred over alternatives A1 and A2.			
5	Wildlife	Minimizes permanent direct and indirect effects on habitat considering sensitivity, quality and significance (including migratory birds and known habitat for regional wildlife species of conservation concern) and relative magnitude of potential effect. **Existing Conditions** Wildlife habitat in proximity to Highway 417 is of relatively low quality (young cultural meadow and restoration plantings adjacent to major highway), is common and widespread throughout the study corridor, and is likely utilized by common wildlife species tolerant of disturbance.	The proposed Corkstown station requires the minor removal of common and tolerant cultural vegetation types and associated habitat function from the cultural meadow adjacent to the Stillwater Creek Valley. The re-alignment of Corkstown Road west of Moodie Drive also requires the removal of horse pasture vegetation and an isolated hedgerow within the pasture that may provide perch opportunities for raptors. One meadow area sensitive species (Savannah Sparrow) has the potential to be affected by the removal of cultural meadow vegetation and habitat. This species is common and often observed in similar habitats. Some reduction in habitat quality associated with an incremental increase in indirect effects including contaminant drift, light and noise may be expected. The potential wildlife corridor function of	The proposed Corkstown station requires the minor removal of common and tolerant cultural vegetation types and associated habitat function from the cultural meadow adjacent to the Stillwater Creek Valley. The re-alignment of Corkstown Road west of Moodie Drive also requires the removal of horse pasture vegetation and an isolated hedgerow within the pasture that may provide perch opportunities for raptors. One meadow area sensitive species (Savannah Sparrow) has the potential to be affected by the removal of cultural meadow vegetation and habitat. This species is common and often observed in similar habitats. Some reduction in habitat quality associated with an incremental increase in indirect effects including contaminant drift, light and noise may be expected. The potential wildlife corridor function of	The proposed Moodie station requires the limited removal of common and tolerant cultural vegetation types and associated habitat function within the interchange loop ramps. This alternative avoids vegetation removals from the cultural meadow adjacent to the Stillwater Creek Valley. One meadow area sensitive species (Savannah Sparrow) has the potential to be affected by the removal of cultural meadow vegetation and habitat. This species is common and often observed in similar habitats. Remaining habitat area will receive an incremental increase in indirect effects including light and noise from the south. As all affected habitat is common and well represented on the landscape with large cultivated field, cultural meadow and intervening hedgerows located along the south side of Hwy 417, the magnitude of the potential impacts is low.	The proposed Corkstown station requires the minor removal of common and tolerant cultural vegetation types and associated habitat function from the cultural meadow adjacent to the Stillwater Creek Valley. One meadow area sensitive species (Savannah Sparrow) has the potential to be affected by the removal of cultural meadow vegetation and habitat. This species is common and often observed in similar habitats. Some reduction in habitat quality associated with an incremental increase in indirect effects including contaminant drift, light and noise may be expected. The potential wildlife corridor function of the meadow area is very limited due to its isolation by Highway 417 to the south and Corkstown Road to the north. As all affected habitat is common and well represented on the landscape with large cultivated field, cultural meadow and

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			the meadow area is very limited due to its isolation by Highway 417 to the south and Corkstown Road to the north. As all affected habitat is common and well represented on the landscape with large cultivated field, cultural meadow and intervening hedgerows located along the south side of Hwy 417, the magnitude of the potential impacts is low.	the meadow area is very limited due to its isolation by Highway 417 to the south and Corkstown Road to the north. As all affected habitat is common and well represented on the landscape with large cultivated field, cultural meadow and intervening hedgerows located along the south side of Hwy 417, the magnitude of the potential impacts is low.		intervening hedgerows located along the south side of Hwy 417, the magnitude of the potential impacts is low.
		PERFORMANCE GRADE	Fair	Fair	Good	Fair-Good
		OPPORTUNITIES FOR MITIGATION	Mitigation measures that protect vegetation (design measures to limit encroachment such as transplant, seedbank, salvage etc.) will in turn protect associated habitat function.	Mitigation measures that protect vegetation (design measures to limit encroachment such as transplant, seedbank, salvage etc.) will in turn protect associated habitat function.	Mitigation measures that protect vegetation (design measures to limit encroachment such as transplant, seedbank, salvage etc.) will in turn protect associated habitat function.	Mitigation measures that protect vegetation (design measures to limit encroachment such as transplant, seedbank, salvage etc.) will in turn protect associated habitat function.
		PREFERENCE	*3rd*	*3rd*	*1st*	*2nd*
		RATIONALE	Alternative B1 is preferred as the proposed Moodie Drive station location avoids habitat removal adjacent to the Stillwater Creek valley. Alternative B2 is slightly less preferred as the proposed Corkstown Station location would require minor habitat removals adjacent to the Stillwater Creek Valley. However, as all affected habitat is common and well represented on the landscape, the magnitude of the potential impact is low. Alternatives A1 and A2 are least preferred as they require additional removal of horse pasture vegetation and an isolated hedgerow west of Moodie Drive.			
6	Fluvial Geomorphology	Minimizes permanent direct and indirect impacts on Stillwater Creek and its tributaries with respect to: Flow regime (timing and volumes) Energy regime Sediment transport Erosion and/or sedimentation Quality and functioning of existing fluvial features	The proposed Corkstown station location may encroach on the floodplain in this area, potentially altering process relationships between the creek and the floodplain creating responses to flow events in the downstream direction which may impact sensitive fluvial processes. To ensure this project does not negatively contribute to the flooding of Stillwater Creek, the Study Team is actively working with the RVCA to determine the overall floodplain, assess impacts and determine appropriate mitigation.	The proposed Corkstown station location may encroach on the floodplain in this area, altering process relationships between the creek and the floodplain creating responses to flow events in the downstream direction which may impact sensitive fluvial processes. To ensure this project does not negatively contribute to the flooding of Stillwater Creek, the Study Team is actively working with the RVCA to determine the overall floodplain, assess impacts and determine appropriate mitigation.	This alternative avoids encroachment on the floodplain downstream of Corkstown Road. To ensure this project does not negatively contribute to the flooding of Stillwater Creek, the Study Team is actively working with the RVCA to determine the overall floodplain, assess impacts and determine appropriate mitigation.	The proposed Corkstown station location may encroach on the floodplain in this area, altering process relationships between the creek and the floodplain creating responses to flow events in the downstream direction which may impact sensitive fluvial processes. To ensure this project does not negatively contribute to the flooding of Stillwater Creek, the Study Team is actively working with the RVCA to determine the overall floodplain, assess impacts and determine appropriate mitigation.
		Existing Conditions The area east of Moodie Drive is characterized by a floodplain that extends roughly the length of the playing field.				
		PERFORMANCE GRADE	Fair	Fair	Good	Fair
		OPPORTUNITIES FOR MITIGATION	Measures to mitigate floodplain encroachment will vary depending on the scale of impact, but may include the replacement of floodplain storage or the balanced cut/fills etc.	Measures to mitigate floodplain encroachment will vary depending on the scale of impact, but may include the replacement of floodplain storage or the balanced cut/fills etc.	None required.	Measures to mitigate floodplain encroachment will vary depending on the scale of impact, but may include the replacement of floodplain storage or the balanced cut/fills etc.
		PREFERENCE	*2nd*	*2nd*	*1st*	*2nd*
		RATIONALE	Alternative B1 is preferred for this criterion as the proposed Moodie Drive station location avoids potential encroachment on the floodplain and thereby avoids the potential to alter responses to flow events which may impact fluvial processes. The potential for impacts to the floodplain and Stillwater Creek are the same for alternatives A1, A2 and B2 and therefore all are given equal preference.			
7	Groundwater Impacts	Avoids permanent draw-down and associated environmental impacts.	Preliminary groundwater modeling of the proposed Transitway cut shows that a minor lowering of the spring groundwater level (0.5 m drawdown with 15-30 m of excavation) will not impact Stillwater Creek.	There are no effects to groundwater anticipated with this alignment.	Preliminary groundwater modeling of the proposed Transitway cut shows that a minor lowering of the spring groundwater level (0.5 m drawdown with 15-30 m of excavation) will not impact Stillwater Creek.	Preliminary groundwater modeling of the proposed Transitway cut shows that a minor lowering of the spring groundwater level (0.5 m drawdown with 15-30 m of excavation) will not impact Stillwater Creek.
		Existing Conditions Investigations currently underway.				
		PERFORMANCE GRADE	Good	Good	Good	Good

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			Alignment A – North of Interchange		Alignment B – Through Interchange	
Criteria		**Performance Measures**	**Under Moodie w/ Station at Corkstown (Alternative A1)**	**Over Moodie w/ Station at Corkstown (Alternative A2)**	**Under Moodie w/ Station at Moodie (Alternative B1)**	**Under Moodie w/ Station at Corkstown (Alternative B2)**
		OPPORTUNITIES FOR MITIGATION	Use watertight structures, raise the profile, implement perimeter growth curtains, etc. Trenches for storm and sanitary sewers must incorporate clay seals to prevent a "French drain" effect whereby groundwater is conveyed through these trenches.	None required.	Use watertight structures, raise the profile, implement perimeter growth curtains, etc. Trenches for storm and sanitary sewers must incorporate clay seals to prevent a "French drain" effect whereby groundwater is conveyed through these trenches.	Use watertight structures, raise the profile, implement perimeter growth curtains, etc. Trenches for storm and sanitary sewers must incorporate clay seals to prevent a "French drain" effect whereby groundwater is conveyed through these trenches.
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	With mitigation, there are no discernable differences among alternatives for this criterion as the cut is not anticipated to impact groundwater levels or Stillwater Creek.			
8	Drainage / Hydrology	Minimize deleterious runoff. Minimize increases to flood flows. Minimize stormwater management facility maintenance. **Existing Conditions** Localized stormwater management is currently provided by an MTO stormwater management pond located in the Moodie Drive Interchange. Storm sewers and grassed swales and ditches also convey stormwater runoff from Highway 417 before outletting to Stillwater Creek.	The proposed Transitway will result in more runoff due to increased impermeable surface. The proposed location of the Transitway will impact the existing MTO stormwater management pond outlet located under the E-NS ramp and will require the removal of a wet swale at the outlet of the drainage pond. The existing drainage pattern can generally be maintained, although the proposed re-alignment of Corkstown Road west of Moodie will modify existing drainage paths in that area. The profile required to pass under the Moodie Drive interchange may require a pumping station to meet drainage requirements. The use of the existing MTO pond for stormwater storage and treatment may be possible.	The proposed Transitway will result in more runoff due to increased impermeable surface. The proposed location of the Transitway will impact the existing MTO stormwater management pond outlet located under the E-NS ramp and will require the removal of a wet swale at the outlet of the drainage pond. The existing drainage pattern can generally be maintained, although the proposed re-alignment of Corkstown Road west of Moodie will modify existing drainage paths in that area. The proposed alignment and profile suggests that gravity drainage is possible for this alternative. The use of the existing MTO pond for stormwater storage and treatment may be possible.	The proposed Transitway will result in a slight increase in runoff due to a minor increase in impermeable surface. The proposed location of the Transitway will impact the existing MTO stormwater management pond outlet located under the E-NS ramp and will require the removal of a wet swale at the outlet of the drainage pond. The existing drainage pattern can generally be maintained, although more of the area that currently drains to the MTO stormwater management pond will be diverted to the Transitway drainage system. Local changes to the drainage system within the interchange will be required. The profile required to pass under the Moodie Drive interchange may require a pumping station to meet drainage requirements. The use of the existing MTO pond for stormwater storage and treatment may be possible.	The proposed Transitway will result in more runoff due to increased impermeable surface. The proposed location of the Transitway will impact the existing MTO stormwater management pond outlet located under the E-NS ramp and will require the removal of a wet swale at the outlet of the drainage pond. The existing drainage pattern can generally be maintained, although more of the area that currently drains to the MTO stormwater management pond will be diverted to the Transitway drainage system. Local changes to the drainage system within the interchange will be required. The profile required to pass under the Moodie Drive interchange may require a pumping station to meet drainage requirements. The use of the existing MTO pond for stormwater storage and treatment may be possible.
		PERFORMANCE GRADE	Fair	Fair-Good	Fair	Fair
		OPPORTUNITIES FOR MITIGATION	Measures to mitigate effects on drainage and hydrology include: - the use oil-grit separators to provide quality control: - providing storage to ensure no impact to peak flows from added runoff: - installing new culverts to maintain existing drainage paths at Corkstown Road: - integrating existing outlet with proposed Transitway storm sewer to mitigate impacts to MTO pond outlet; and - the use of trenches for storm and sanitary sewer to incorporate clay seals to prevent 'French Drain' effect.	Measures to mitigate effects on drainage and hydrology include: - the use oil-grit separators to provide quality control: - providing storage to ensure no impact to peak flows from added runoff: - installing new culverts to maintain existing drainage paths at Corkstown Road: - integrating existing outlet with proposed Transitway storm sewer to mitigate impacts to MTO pond outlet; and - the use of trenches for storm and sanitary sewer to incorporate clay seals to prevent 'French Drain' effect.	Measures to mitigate effects on drainage and hydrology include: - the use oil-grit separators to provide quality control: - providing storage to ensure no impact to peak flows from added runoff: - the use of trenches for storm and sanitary sewer to incorporate clay seals to prevent 'French Drain' effect.	Measures to mitigate effects on drainage and hydrology include: - the use oil-grit separators to provide quality control: - providing storage to ensure no impact to peak flows from added runoff: - installing new culverts to maintain existing drainage paths at Corkstown Road: - integrating existing outlet with proposed Transitway storm sewer to mitigate impacts to MTO pond outlet; and - the use of trenches for storm and sanitary sewer to incorporate clay seals to prevent 'French Drain' effect.
		PREFERENCE	*2nd*	*1st*	*2nd*	*2nd*

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			Alignment A – North of Interchange		**Alignment B – Through Interchange**	
Criteria		**Performance Measures**	**Under Moodie w/ Station at Corkstown (Alternative A1)**	**Over Moodie w/ Station at Corkstown (Alternative A2)**	**Under Moodie w/ Station at Moodie (Alternative B1)**	**Under Moodie w/ Station at Corkstown (Alternative B2)**
		RATIONALE	With mitigation, the overall magnitude of potential impacts from a drainage/hydrology perspective is low for all alternatives. Alternative A2 is slightly preferred as it avoids the need for a pumping station to meet drainage requirements.			
9	Construction Impacts	Minimizes temporary effects during construction such as: vegetation impacts; erosion and sedimentation of watercourses; groundwater impacts; and noise/vibration etc. **Existing Conditions** See existing conditions from criteria 1-8.	This alternative results in potential impacts to Stillwater Creek (e.g. potential for erosion and migration of sediment off-site). There is potential for incidental disturbance to watercourse and upland vegetation, disturbance of wildlife and migratory birds, temporary impacts to groundwater during excavations and temporary increases in construction noise and dust. The proposed Transitway alignment requires significant relocation of Corkstown Road west of Moodie Drive and minor relocation of Corkstown Road east of Moodie Drive. There is also the potential for accidental spills.	This alternative results in potential impacts to Stillwater Creek (e.g. potential for erosion and migration of sediment off-site). There is potential for incidental disturbance to watercourse and upland vegetation, disturbance of wildlife and migratory birds, temporary impacts to groundwater during excavations and temporary increases in construction noise and dust. The proposed Transitway alignment requires significant relocation of Corkstown Road west of Moodie Drive and minor relocation of Corkstown Road east of Moodie Drive. There is also the potential for accidental spills.	There is potential for incidental disturbance to watercourse and upland vegetation, disturbance of wildlife and migratory birds, temporary impacts to groundwater during excavations and temporary increases in construction noise and dust. The proposed Transitway alignment requires minor relocation of Corkstown Road east of Moodie Drive. There is also the potential for accidental spills.	This alternative results in potential impacts to Stillwater Creek (e.g. potential for erosion and migration of sediment off-site). There is potential for incidental disturbance to watercourse and upland vegetation, disturbance of wildlife and migratory birds, temporary impacts to groundwater during excavations and temporary increases in construction noise and dust. The proposed Transitway alignment requires minor relocation of Corkstown Road east of Moodie Drive. There is also the potential for accidental spills.
		PERFORMANCE GRADE	Good	Good	Good	Good
		OPPORTUNITIES FOR MITIGATION	Standard construction mitigation measures include: - Implement erosion and sediment control plan. - Stabilize/ re-vegetate exposed surfaces. - Ensure proper management of excess material. - Identify "Environmentally Sensitive Areas," including watercourses and vegetation, on contract drawings and in the field to protect from incidental disturbance. - Limit vegetation clearing to that required for construction. - Re-vegetate any disturbed wetland and/or upland vegetation features with tolerant native species. - Use appropriate timing windows to protect local fish and bird species during spawning and nesting seasons. - Abide by City of Ottawa Noise Control Bylaw.	Standard construction mitigation measures include: - Implement erosion and sediment control plan. - Stabilize/ re-vegetate exposed surfaces. - Ensure proper management of excess material. - Identify "Environmentally Sensitive Areas," including watercourses and vegetation, on contract drawings and in the field to protect from incidental disturbance. - Limit vegetation clearing to that required for construction. - Re-vegetate any disturbed wetland and/or upland vegetation features with tolerant native species. - Use appropriate timing windows to protect local fish and bird species during spawning and nesting seasons. - Abide by City of Ottawa Noise Control Bylaw.	Standard construction mitigation measures include: - Implement erosion and sediment control plan. - Stabilize/ re-vegetate exposed surfaces. - Ensure proper management of excess material. - Identify "Environmentally Sensitive Areas," including watercourses and vegetation, on contract drawings and in the field to protect from incidental disturbance. - Limit vegetation clearing to that required for construction. - Re-vegetate any disturbed wetland and/or upland vegetation features with tolerant native species. - Use appropriate timing windows to protect local fish and bird species during spawning and nesting seasons. - Abide by City of Ottawa Noise Control Bylaw.	Standard construction mitigation measures include: - Implement erosion and sediment control plan. - Stabilize/ re-vegetate exposed surfaces. - Ensure proper management of excess material. - Identify "Environmentally Sensitive Areas," including watercourses and vegetation, on contract drawings and in the field to protect from incidental disturbance. - Limit vegetation clearing to that required for construction. - Re-vegetate any disturbed wetland and/or upland vegetation features with tolerant native species. - Use appropriate timing windows to protect local fish and bird species during spawning and nesting seasons. - Abide by City of Ottawa Noise Control Bylaw.
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	There are no discernable differences among alternatives for this criterion. With standard construction mitigation, the magnitude of residual effects is expected to be minor.			
FACTOR AREA SUMMARY		**OVERALL PERFORMANCE GRADE**	Fair-Good	Fair-Good	Good	Fair-Good
		OVERALL PREFERENCE	*2nd*	*2nd*	*1st*	*2nd*
		RATIONALE	Alternatives incorporating a station at Corkstown Road (A1, A2 and B2) are generally less preferred from a natural environment perspective over Alternative B1 (Moodie Station), as Corkstown Station will require removing some cultural meadow and riparian vegetation adjacent to the highway within the footprint of the proposed station and may require special design measures to minimize potential bank erosion at the east end of the station where it is close to Stillwater Creek. The overall ecological significance of this meadow area is considered relatively low as it is characterized by low botanical diversity and a high proportion of non-native species, is isolated and therefore provides limited opportunity for wildlife movement and contains habitat that is common and well represented in the study area. When comparing these three alternatives (A1, A2 and B2), B2 is preferred from a natural environmental perspective as it does not require the realignment of Corkstown Road west of Moodie Drive and therefore minimizes footprint impacts.			

TABLE A-6: ASSESSMENT OF EFFECTS		WEST SEGMENT PRELIMINARY DESIGN ALTERNATIVES			
		Alignment A – North of Interchange		Alignment B – Through Interchange	
Criteria	Performance Measures	Under Moodie w/ Station at Corkstown (Alternative A1)	Over Moodie w/ Station at Corkstown (Alternative A2)	Under Moodie w/ Station at Moodie (Alternative B1)	Under Moodie w/ Station at Corkstown (Alternative B2)
		As alternative B1 incorporates a station under Moodie Drive and does not require the relocation of Corkstown Road west of Moodie Drive, it results in the smallest footprint and is therefore given preference from a natural environmental perspective. Due to the relatively low sensitivity of potentially affected areas, none of the alternatives are expected to result in significant effects.			
SOCIAL/CULTURAL ENVRIONMENT					
10 Heritage/ Archaeology	Avoids areas with heritage/archaeological potential	The proposed Transitway alignment is located in an area with relatively high potential for historic sites. A Stage 2 archaeological assessment is underway to determine extent of archaeological potential.	The proposed Transitway alignment is located in an area with relatively high potential for historic sites. A Stage 2 archaeological assessment is underway to determine extent of archaeological potential.	The proposed Transitway alignment is located in an area with low archaeological potential.	The proposed Transitway alignment is located in an area with relatively high potential for historic sites. A Stage 2 archaeological assessment is underway to determine extent of archaeological potential.
	Existing Conditions Stage 1 archaeological assessment determined that the area west of Moodie between Corkstown Road and Highway 417 and along the Stillwater Creek corridor had relatively high potential for historic sites.				
	PERFORMANCE GRADE	Good	Good	Good	Good
	OPPORTUNITIES FOR MITIGATION	Standard construction mitigation measures addressing the potential for incidental discovery of archaeological resources.	Standard construction mitigation measures addressing the potential for incidental discovery of archaeological resources.	Standard construction mitigation measures addressing the potential for incidental discovery of archaeological resources.	Standard construction mitigation measures addressing the potential for incidental discovery of archaeological resources.
	PREFERENCE	*1st*	*1st*	*1st*	*1st*
	RATIONALE	With mitigation, there are no discernable difference among alternatives for this criterion.			
11 Contaminated Property	Avoids contaminated property	A Phase 2 ESA is underway to determine location and extent of potential contamination.	A Phase 2 ESA is underway to determine location and extent of potential contamination.	A Phase 2 ESA is underway to determine location and extent of potential contamination.	A Phase 2 ESA is underway to determine location and extent of potential contamination.
	Existing Conditions A Phase 1 Environmental Site Assessment (ESA) identified potential contamination near Moodie Drive.				
	PERFORMANCE GRADE	Good	Good	Good	Good
	OPPORTUNITIES FOR MITIGATION	Standard construction mitigation measures for handling and disposal of excess material. Any additional mitigation measures required following the completion of the Phase 2 ESA will be identified and recommended during detail design.	Standard construction mitigation measures for handling and disposal of excess material. Any additional mitigation measures required following the completion of the Phase 2 ESA will be identified and recommended during detail design.	Standard construction mitigation measures for handling and disposal of excess material. Any additional mitigation measures required following the completion of the Phase 2 ESA will be identified and recommended during detail design.	Standard construction mitigation measures for handling and disposal of excess material. Any additional mitigation measures required following the completion of the Phase 2 ESA will be identified and recommended during detail design.
	PREFERENCE	*1st*	*1st*	*1st*	*1st*
	RATIONALE	With mitigation, there is no discernable difference among alternatives for this criterion.			
12 Noise	Minimizes noise level increases at sensitive receivers NOTE: Sound level calculated from nearest receptor location (receptor 23)	The following outlines the noise levels predicted for: a future do nothing scenario; the noise levels if alternative A1 is implemented; and the difference in noise levels between the future do nothing scenario and the implementation of alternative A1: Future Do Nothing: 59.6 dBA Future A1: 59.6 dBA Increase of 0.0 dBA An increase in 3 dBA is considered just perceptible by most people. The Transitway's contribution to average daily noise levels will be indistinguishable from background traffic in the horizon year.	The following outlines the noise levels predicted for: a future do nothing scenario; the noise levels if alternative A2 is implemented; and the difference in noise levels between the future do nothing scenario and the implementation of alternative A2: Future Do Nothing: 59.6 dBA Future A2: 59.7 dBA Increase of 0.1 dBA An increase in 3 dBA is considered just perceptible by most people. The Transitway's contribution to average daily noise levels will be indistinguishable from background traffic in the horizon year.	The following outlines the noise levels predicted for: a future do nothing scenario; the noise levels if alternative B1 is implemented; and the difference in noise levels between the future do nothing scenario and the implementation of alternative B1: Future Do Nothing: 59.6 dBA Future B1: 59.6 dBA Increase of 0.0 dBA An increase in 3 dBA is considered just perceptible by most people. The Transitway's contribution to average daily noise levels will be indistinguishable from background traffic in the horizon year.	The following outlines the noise levels predicted for: a future do nothing scenario; the noise levels if alternative B2 is implemented; and the difference in noise levels between the future do nothing scenario and the implementation of alternative B2: Future Do Nothing: 59.6 dBA Future B2: 59.6 dBA Increase of 0.0 dBA An increase in 3 dBA is considered just perceptible by most people. The Transitway's contribution to average daily noise levels will be indistinguishable from background traffic in the horizon year.
	PERFORMANCE GRADE	Good	Good	Good	Good

TABLE A-6: ASSESSMENT OF EFFECTS			WEST SEGMENT PRELIMINARY DESIGN ALTERNATIVES			
			Alignment A – North of Interchange		Alignment B – Through Interchange	
Criteria		Performance Measures	Under Moodie w/ Station at Corkstown (Alternative A1)	Over Moodie w/ Station at Corkstown (Alternative A2)	Under Moodie w/ Station at Moodie (Alternative B1)	Under Moodie w/ Station at Corkstown (Alternative B2)
		OPPORTUNITIES FOR MITIGATION	The primary source of existing and ambient noise levels in this area is Provincial Highway 417. The MTO has determined that sound barriers are warranted in certain locations within the study area. The Transitway will be designed so as not to preclude the future construction of these sound barriers by MTO.	The primary source of existing and ambient noise levels in this area is Provincial Highway 417. The MTO has determined that sound barriers are warranted in certain locations within the study area. The Transitway will be designed so as not to preclude the future construction of these sound barriers by MTO.	The primary source of existing and ambient noise levels in this area is Provincial Highway 417. The MTO has determined that sound barriers are warranted in certain locations within the study area. The Transitway will be designed so as not to preclude the future construction of these sound barriers by MTO.	The primary source of existing and ambient noise levels in this area is Provincial Highway 417. The MTO has determined that sound barriers are warranted in certain locations within the study area. The Transitway will be designed so as not to preclude the future construction of these sound barriers by MTO.
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	It has been determined that future noise levels for all four alternatives will not be perceptibly higher than the future do nothing scenario. An increase of 3.0 dBA is considered just perceptible for most people. The dominant noise source will continue to be Highway 417 under all four scenarios. There is no discernable difference amongst alternatives for this criterion; therefore all have been given equal preference.			
13	Ground Vibration	Minimizes ground vibration impacts on sensitive receivers. **Existing Conditions** Measured ground vibrations are considered to be low and of no consequence with respect to human perception and structural or cosmetic damage thresholds for buildings and other structures.	Due to the separation from sensitive receivers and proximity to Highway 417, alternative A1 is not expected to result in a measureable increase in ground vibrations.	Due to the separation from sensitive receivers and proximity to Highway 417, alternative A2 is not expected to result in a measureable increase in ground vibrations.	Due to the separation from sensitive receivers and proximity to Highway 417, alternative B1 is not expected to result in a measureable increase in ground vibrations.	Due to the separation from sensitive receivers and proximity to Highway 417, alternative B2 is not expected to result in a measureable increase in ground vibrations.
		PERFORMANCE GRADE	Good	Good	Good	Good
		OPPORTUNITIES FOR MITIGATION	N/A	N/A	N/A	N/A
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	There are no discernible differences between alignments for this criterion; therefore all have been given equal preference.			
14	Visual/Aesthetic Impacts	Maintains/Enhances buffer areas and scenic vistas **Existing Conditions** The National Capital Commission's Greenbelt Master Plan identifies a significant vista that includes a view of downtown Ottawa that is presented to Highway 417 travelers as they come from the valley heading east. The area is characterized by a rural cross-section.	The proposed location of Corskstown station within the rural landscape increases the visual impact of the station from Highway 417.	The proposed location of Corskstown station within the rural landscape increases the visual impact of the station from Highway 417. The proposed Transitway structure over Moodie Drive introduces another urban visual element into the rural landscape.	The elevator towers required to service the proposed Moodie station introduces an urban design element into the rural landscape.	The proposed location of the Corkstown station within the rural landscape increases the visual impact of the station from Highway 417.
		PERFORMANCE GRADE	Good	Fair	Fair	Good
		OPPORTUNITIES FOR MITIGATION	Implement an architectural concept that reflects the rural and agricultural landscape to provide context for the station. Architectural treatments could include: - Vegetated roofs to soften the visual impact of the buildings and to reduce the amount of heat experienced during the summer; - Natural building materials for structural support and in other locations not exposed to the weather such as glulam timbers for their durability and aesthetic qualities; - Additional planting between Transitway and off-ramp to provide	Additional planting may integrate the overpass within the context of the interchange Implement an architectural concept that reflects the rural and agricultural landscape to provide context for the station. Architectural treatments could include: - Vegetated roofs to soften the visual impact of the buildings and to reduce the amount of heat experienced during the summer; - Natural building materials for structural support and in other locations not exposed to the weather such as	Implement landscape treatment and planting.	Implement an architectural concept that reflects the rural and agricultural landscape to provide context for the station. Architectural treatments could include: - Vegetated roofs to soften the visual impact of the buildings and to reduce the amount of heat experienced during the summer; - Natural building materials for structural support and in other locations not exposed to the weather such as glulam timbers for their durability and aesthetic qualities; - Additional planting between Transitway and off-ramp to provide some screening

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Criteria	Performance Measures	Under Moodie w/ Station at Corkstown (Alternative A1)	Over Moodie w/ Station at Corkstown (Alternative A2)	Under Moodie w/ Station at Moodie (Alternative B1)	Under Moodie w/ Station at Corkstown (Alternative B2)
		some screening of Transitway; - Glass shelters; - Natural stone walls around the planting beds; and - Use of natural stone in the retaining walls.	glulam timbers for their durability and aesthetic qualities; - Additional planting between Transitway and off-ramp to provide some screening of Transitway; - Glass shelters; - Natural stone walls around the planting beds; and - Use of natural stone in the retaining walls.		of Transitway; - Glass shelters; - Natural stone walls around the planting beds; and - Use of natural stone in the retaining walls.
	PREFERENCE	*1st*	*2nd*	*2nd*	*1st*
	RATIONALE	Alternatives A1 and B2 are given equal preference as the proposed underpasses will minimize visual/aesthetic impacts. These alternatives also provide an opportunity to introduce landscape elements and context sensitive design in order to buffer the proposed station, including vegetated roof treatments and building materials such as wood, glass and stone to soften the visual impact of the station buildings in this rural and agricultural setting. Alternative A2 is slightly less preferred as it introduces an additional structure into the rural landscape. Alternative B1 is the most visually intrusive alternative as the introduction of 4 elevator towers represents the addition of urban design elements in a rural context. This alternative is therefore the least preferred from a visual/aesthetic perspective.			
15 Recreation Resources	Maintains/Enhances recreational resources (multi-use pathway, playing fields etc.) **Existing Conditions** The NCC's recreational pathway runs along Corkstown Road before meandering into the Stillwater Creek Valley. Playing fields are located north of Corkstown Road and east of Moodie Dr. The National Equestrian Park is located west of Moodie Dr, north of Corkstown Road.	The proposed Transitway alignment requires the realignment of Corkstown Road east and west of Moodie Drive. While the realignment east of Moodie Drive will not impact the playing fields, the realignment west of Moodie Drive will require property from the National Equestrian Park. The proposed Corkstown station requires the minor realignment of the NCC pathway in the vicinity of Corkstown Road and the Highway 417 off-ramp. The proposed Corkstown station location provides opportunity to enhance access to the recreational pathway by connecting the transit facility to the existing pathway infrastructure.	The proposed Transitway alignment requires the realignment of Corkstown Road east and west of Moodie Drive. While the realignment east of Moodie Drive will not impact the playing fields, the realignment west of Moodie Drive will require property from the National Equestrian Park. The proposed Corkstown station requires the minor realignment of the NCC pathway in the vicinity of Corkstown Road and the Highway 417 off-ramp. The proposed Corkstown station location provides opportunity to enhance access to recreational pathway by connecting the transit facility to the existing pathway infrastructure.	The proposed Transitway alignment requires the realignment of Corkstown Road east of Moodie Drive. The realignment will not impact the playing fields. This alignment requires realignment of the NCC recreational pathway in the vicinity of the Moodie Drive interchange. The proposed Moodie station location does not connect well to existing recreational pathway infrastructure. A pathway connection could be provided along the Transitway, however, this pathway would be located in a trench under the interchange, resulting in reduced visibility and increasing the sense of isolation for the pathway users.	The proposed Transitway alignment requires the realignment of Corkstown Road east of Moodie Drive The realignment will not impact the playing fields. The proposed Corkstown station requires the minor realignment of the NCC pathway in the vicinity of Corkstown Road and the Highway 417 off-ramp. The proposed Corkstown station location provides opportunity to enhance access to recreational pathway by connecting the transit facility to the existing pathway infrastructure.
	PERFORMANCE GRADE	Good-Fair	Good-Fair	Fair	Good
	OPPORTUNITIES FOR MITIGATION	Minor reconfiguration of existing pathway to provide access to the station.	Minor reconfiguration of existing pathway to provide access to the station.	N/A	Minor reconfiguration of existing pathway to provide access to the station.
	PREFERENCE	*2nd*	*2nd*	*2nd*	*1st*
	RATIONALE	Alternative B2 is preferred as it avoids permanent impacts to recreational resources and provides an opportunity to connect the transit facility to the existing recreational pathway. Alternatives A1 and A2 are less preferred as they result in some minor impacts to the National Equestrian Park, however the magnitude of impacts to the Equestrian Park is expected to be low. Although Alternative B1 avoids impacts to the Equestrian Park, the lack of potential for good connections to existing recreational pathway make this alternative undesirable.			
16 Land Use	Compatibility with existing land use designations. **Existing Conditions** According to the Greenbelt Master Plan (NCC), lands to the north of Highway 417 and east and west of Moodie Drive are designated as Rural Landscape and lands to the south of Highway 417 are designated as Cultivated	The NCC is currently in the process of reviewing the Greenbelt Master Plan. The proposed Corkstown station is located within lands currently designated as *Rural Landscape* in the Greenbelt Master Plan, directly adjacent to lands designated as *Buildable Site Area*. This proposed Transitway alignment is located within	The NCC is currently in the process of reviewing the Greenbelt Master Plan. The proposed Corkstown station is located within lands currently designated as *Rural Landscape* in the Greenbelt Master Plan, directly adjacent to lands designated as *Buildable Site Area*. This proposed Transitway alignment is located within	The NCC is currently in the process of reviewing the Greenbelt Master Plan. The entire proposed alignment, including the station at Moodie, is contained within lands currently designated as *Infrastructure Corridor* in the Greenbelt Master Plan. This alignment would not result in any	The NCC is currently in the process of reviewing the Greenbelt Master Plan. The proposed Corkstown station is located within lands currently designated as *Rural Landscape* in the Greenbelt Master Plan, directly adjacent to lands designated as *Buildable Site Area*. This proposed Transitway alignment is located within

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	Landscape. Highway 417 is designated as an Infrastructure Corridor. A Buildable Site Area is located along the east side of Moodie Drive, north of Corkstown Road. According to the City of Ottawa Official Plan, the lands to the north of Highway 417 and east and west of Moodie Drive are designated as Greenbelt Rural and lands to the south of Highway 417 are designated as Agricultural Resource Area.	lands currently designated as *Rural Landscape*. The station and corridor alignments effectively widen the infrastructure corridor and encroach on Greenbelt land. The station location will enhance access to adjacent Greenbelt lands and is easily accessible from nearby employment and residential lands.	lands currently designated as *Rural Landscape*. The station and corridor alignments effectively widen the infrastructure corridor and encroach on Greenbelt land. The station location will enhance access to adjacent Greenbelt lands and is easily accessible from nearby employment and residential lands.	changes to existing land use is required.	lands currently designated as *Rural Landscape*. The proposed station alignment causes a minor widening the infrastructure corridor and encroaches slightly on Greenbelt land. The station location will enhance access to adjacent Greenbelt lands and is easily accessible from nearby employment and residential lands.
	PERFORMANCE GRADE	Fair	Fair	Good	Fair-Good
	OPPORTUNITIES FOR MITIGATION	The realignment of Corkstown Road (west of Moodie) may require an amendment to the Greenbelt Master Plan, subject to the completion of the NCC Greenbelt Master Plan Review process. The proposed station location may require review in accordance with the NCC Greenbelt Master Plan Review process.	The realignment of Corkstown Road (west of Moodie) may require an amendment to the Greenbelt Master Plan, subject to the completion of the NCC Greenbelt Master Plan Review process. The proposed station location may require review in accordance with the NCC Greenbelt Master Plan Review process..	None required.	The proposed station location may require review in accordance with the NCC Greenbelt Master Plan Review process..
	PREFERENCE	*3rd*	*3rd*	*1st*	*2nd*
	RATIONALE	Alternative B1 is preferred as the station and corridor alignment is located entirely within lands currently designated as *Infrastructure Corridor* in the Greenbelt Master Plan. This alignment minimizes encroachment of transit infrastructure into Greenbelt lands currently designated as *Rural Landscape*. Alternative B2 is slightly less preferred due to encroachment on Greenbelt lands. Alternatives A1 and A2 are least preferred due to the requirement for Greenbelt land east and west of Moodie Drive. An amendment to the Greenbelt Master Plan may be required for these three alternatives (A1, A2 and B2) as the proposed station at Corkstown Road may not be consistent with the existing designation.			
17 Safety/Security	Maximizes safety and security for transit and multi-use pathway users **Existing Conditions** Currently no safety/security issues.	The proposed Corkstown station configuration increases station activity and maximizes visual sightlines from station platforms, reducing the sense of isolation for waiting passengers. The at-grade pedestrian connection will require a signalized pedestrian intersection to safely control bus and pedestrian movements within the station. Provides the opportunity for a direct connection to Corkstown Road and the recreational pathway, ensuring safe pedestrian access to/from the community north of the Transitway without crossing on/off ramps. The proposed at-grade combination of local/Transitway services at Corkstown Station provides an enhanced sense of security due to increased activity (with the number of routes passing through the station) and visibility.	The proposed Corkstown station configuration increases station activity and maximizes visual sightlines from station platforms, reducing the sense of isolation for waiting passengers. The at-grade pedestrian connection will require a signalized pedestrian intersection to safely control bus and pedestrian movements within the station. Provides the opportunity for a direct connection to Corkstown Road and the recreational pathway, ensuring safe pedestrian access to/from the community north of the Transitway without crossing on/off ramps. The proposed at-grade combination of local/Transitway services at Corkstown Station provides an enhanced sense of security due to increased activity (with the number of routes passing through the station) and visibility.	The grade separation of local and Transitway platforms results in decreased visibility on the Transitway and increases the perception of isolation for local and Transitway passengers boarding and alighting, especially during off-peak periods. Local buses making stops at the local station on the Moodie Drive structure are not segregated from traffic lanes on Moodie Drive. The potential for conflict between vehicles and cyclists due to the presence of existing cycling lanes on the Moodie Drive structure is introduced. As there are currently no sidewalks on the Moodie Drive structure, there is no immediate opportunity to safely provide pedestrian access to the station from Moodie Drive itself.	The proposed Corkstown station configuration increases station activity and maximizes visual sightlines from station platforms, reducing the sense of isolation for waiting passengers. The at-grade pedestrian connection will require a signalized pedestrian intersection to safely control bus and pedestrian movements within the station. Provides the opportunity for a direct connection to Corkstown Road and the recreational pathway, ensuring safe pedestrian access to/from the community north of the Transitway without crossing on/off ramps. The proposed at-grade combination of local/Transitway services at Corkstown Station provides an enhanced sense of security due to increased activity (with the number of routes passing through the station) and visibility.
	PERFORMANCE GRADE	Good	Good	Poor	Good
	OPPORTUNITIES FOR MITIGATION	Mitigation measures include standard	Mitigation measures include standard	Mitigation measures include standard	Mitigation measures include standard

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			Transitway station safety measures such as lighting, CCTV, emergency phones, etc. Mitigation should also include the principles of CPTED (Crime Prevention Through Environmental Design) such as lighting pathway connections, the provision of a signalized crossing from the recreational pathway at Corkstown Road, and the provision of sidewalks on Corkstown Road.	Transitway station safety measures such as lighting, CCTV, emergency phones, etc. Mitigation should also include the principles of CPTED (Crime Prevention Through Environmental Design) such as lighting pathway connections, the provision of a signalized crossing from the recreational pathway at Corkstown Road, and the provision of sidewalks on Corkstown Road.	Transitway station safety measures such as lighting, CCTV, emergency phones, etc. Mitigation should also include lighting pathway connections with the provision sidewalks on Corkstown Road.	Transitway station safety measures such as lighting, CCTV, emergency phones, etc. Mitigation should also include the principles of CPTED (Crime Prevention Through Environmental Design) such as lighting pathway connections with the provision of a signalized crossing from the recreational pathway at Corkstown Road, and the provision of sidewalks on Corkstown Road.
		PREFERENCE	*1st*	*1st*	*2nd*	*1st*
		RATIONALE	The Corkstown station location (Alternatives A1, A2 and B2) is preferred as the proposed station configuration is more conducive to safe pedestrian movements to and from the station. The requirement for safe pedestrian and cycling connections to and from the station will be further examined for the recommended plan. The Moodie station location (Alternative B1) is least preferred as the separation of local and rapid transit services increases the perception of isolation for passengers boarding and alighting. Further, local buses are not separated from traffic lanes, introducing a potential safety concern on the Moodie Drive structure.			
18	Pedestrian/Cycling Connectivity	Maximizes pedestrian and cycling connections to and from transit. **Existing Conditions** A multi-use recreational pathway runs along Corkstown Road before meandering into the Stillwater Creek Valley,. There are currently no sidewalks on Corkstown Road, limiting existing pedestrian/cyclist linkages.	The station is fully integrated with the existing multi-use pathway network and is easily accessible for pedestrians and cyclists from nearby residential and employment lands. This station location creates the opportunity for a “Kiss and Ride” drop-off at Corkstown and covered cycling storage facilities at the local station to encourage “bike and ride” uses.	The station is fully integrated with the existing multi-use pathway network and is easily accessible for pedestrians and cyclists from nearby residential and employment lands. This station location creates the opportunity for a “Kiss and Ride” drop-off at Corkstown and covered cycling storage facilities at the local station to encourage “bike and ride” uses.	Currently there are no sidewalks on the Moodie Drive bridge, therefore, there is no opportunity to provide pedestrian access to the station from Moodie Drive itself. Access to the Transitway platforms could be provided via a multi-use pathway under Moodie Drive; however, as this pathway is located in a trench through the interchange, visibility is poor introducing personal safety concerns. Furthermore, as the Transitway platforms are not visible from adjacent streets or Highway 417, Moodie Station increases the sense of isolation for waiting passengers which could be expected to discourage ridership, particularly during off peak hours. There is no potential for “Kiss and Ride” at Moodie as this configuration cannot be accommodated on existing roadway. The station is located a considerable distance from existing residences and employment areas, limiting the ability to attract walk-in ridership to the station.	The station is fully integrated with the existing multi-use pathway network and is easily accessible for pedestrians and cyclists from nearby residential and employment lands. This station location creates the opportunity for a “Kiss and Ride” drop-off at Corkstown and covered cycling storage facilities at the local station to encourage “bike and ride” uses.
		PERFORMANCE GRADE	Good	Good	Poor	Good
		OPPORTUNITIES FOR MITIGATION	There is the potential to remove one traffic lane in the southbound direction on the Moodie Drive Bridge over Highway 417. This provides an opportunity to widen existing cycling lanes, provide a 3.0 multi-use pathway connection across the bridge, relocate cycling lanes to the shoulders and introduce bike boxes to give cyclists priority at ramp intersections north of the highway. The provision of this pathway connection should be further explored as the recommended plan is refined.	There is the potential to remove one traffic lane in the southbound direction on the Moodie Drive Bridge over Highway 417. This provides an opportunity to widen existing cycling lanes, provide a 3.0 multi-use pathway connection across the bridge, relocate cycling lanes to the shoulders and introduce bike boxes to give cyclists priority at ramp intersections north of the highway. The provision of this pathway connection should be further explored as the recommended plan is refined.	None required.	There is the potential to remove one traffic lane in the southbound direction on the Moodie Drive Bridge over Highway 417. This provides an opportunity to widen existing cycling lanes, provide a 3.0 multi-use pathway connection across the bridge, relocate cycling lanes to the shoulders and introduce bike boxes to give cyclists priority at ramp intersections north of the highway. The provision of this pathway connection should be further explored as the recommended plan is refined.

TABLE A-6: ASSESSMENT OF EFFECTS			WEST SEGMENT PRELIMINARY DESIGN ALTERNATIVES			
			Alignment A – North of Interchange		Alignment B – Through Interchange	
Criteria		Performance Measures	Under Moodie w/ Station at Corkstown (Alternative A1)	Over Moodie w/ Station at Corkstown (Alternative A2)	Under Moodie w/ Station at Moodie (Alternative B1)	Under Moodie w/ Station at Corkstown (Alternative B2)
			The provision of a kiss and ride on Corkstown Road will also be further examined as the recommended plan is refined. Introduce pedestrian-friendly design elements to the station, including shelter over each of the platforms and a canopy to provide weather protection while crossing the Transitway.	The provision of a kiss and ride on Corkstown Road will also be further examined as the recommended plan is refined. Introduce pedestrian-friendly design elements to the station, including shelter over each of the platforms and a canopy to provide weather protection while crossing the Transitway.		The provision of a kiss and ride on Corkstown Road will also be further examined as the recommended plan is refined. Introduce pedestrian-friendly design elements to the station, including shelter over each of the platforms and a canopy to provide weather protection while crossing the Transitway.
		PREFERENCE	*1st*	*1st*	*2nd*	*1st*
		RATIONALE	The Corkstown Station location (Alternatives A1, A2 and B2 is preferred for this criterion as it maximizes pedestrian and cycling connections to/from the proposed station by providing opportunities of pathway connections, cycling facilities and a kiss and ride on Corkstown Road. Alternative B1 is less preferred as it has limited opportunities for the provision of pedestrian and cycling connections.			
FACTOR AREA SUMMARY		**OVERALL PERFORMANCE GRADE**	Fair-Good	Fair-Good	Fair	Good
		OVERALL PREFERENCE	*2nd*	*2nd*	*3d*	*1st*
		RATIONALE	No significant impacts to Heritage/Archaeology resources, Contaminated Property, Noise or Ground Vibration are anticipated for any alternative. Alternatives A1, A2 and B2 are preferred over Alternative B1 from a safety, recreation and pedestrian/cycling perspective as the proposed station located at Corkstown Road is fully integrated with the existing recreational infrastructure, provides the greatest opportunity for enhanced active transportation connections and is easily accessible from nearby employment lands. The Corkstown Station location also provides the opportunity to introduce "green" design elements including a vegetated roof and green building materials. Although Alternative B1 is contained within lands currently designated as Infrastructure Corridor in the Greenbelt Master Plan and may not require an amendment to that plan, it does introduce potential personal safety/ security issues due to the grade separation of local and rapid transit platforms which reduces visibility and increases the sense of isolation for passengers boarding and alighting at the station. It also increases potential conflicts with pedestrians and cyclists travelling across Highway 417 on Moodie Drive. When comparing Alternatives A1, A2, and B2 from a social/cultural perspective, Alternative B2 is given preference as it does not require the relocation of Corkstown Road west of Moodie Drive and therefore avoids additional footprint impacts to Greenbelt lands (National Equestrian Park).			
TECHNICAL CONSIDERATIONS						
19	Illumination	Avoids Impacts to the "dark night sky". Minimizes light trespass on residential receivers and spillover onto adjacent highway. Avoids spill over effects onto highway users.	The proposed Corkstown station is offset from the interchange and extends light requirements easterly into Greenbelt lands, increasing the impact of light trespass. The closest residential neighborhood is well shielded from light pollution by existing trees.	The proposed Corkstown station is offset from the interchange and extends light requirements easterly into Greenbelt lands, increasing the impact of light trespass. The closest residential neighborhood is well shielded from light pollution by existing trees.	The proposed Moodie station is integrated within the existing interchange. Lights will therefore also be integrated within the existing interchange and will minimize the impact of light trespass. The location of the illuminated station may result in light spillover onto highway.	The proposed Corkstown station is offset from the interchange and extends light requirements easterly into Greenbelt lands, increasing the impact of light trespass. The closest residential neighborhood is well shielded from light pollution by existing trees.
		Existing Conditions Existing illumination from Highway 417 and the Moodie Drive interchange.				
		PERFORMANCE GRADE	Fair - Good	Fair - Good	Fair-Good	Fair – Good
		OPPORTUNITIES FOR MITIGATION	Planting additional trees along south side of Corkstown Road would mitigate light trespass onto adjacent properties.	Planting additional trees along south side of Corkstown Road would mitigate light trespass onto adjacent properties.	The provision of glare shields is recommended to minimize light spillover onto the highway.	Planting additional trees along south side of Corkstown Road would mitigate light trespass onto adjacent properties.
		PREFERENCE	*1st*	*1st*	*1st*	*1st*
		RATIONALE	There are no discernible differences between alignments for this criterion and no significant effects are anticipated.			
20	Property	Bundles transportation corridors and requires least amount of new NCC Greenbelt lands and/or private property.	The following outlines the amount of lands required for this alternative: NCC = 2.9 ha MTO = 2.2 ha Private Property = 0.0 ha	The following outlines the amount of lands required for this alternative: NCC = 2.9 ha MTO = 2.2 ha Private Property = 0.0 ha	The following outlines the amount of lands required for this alternative: NCC = 0.1 ha MTO = 3.6 ha Private Property = 0.0 ha	The following outlines the amount of lands required for this alternative: NCC = 1.2 ha MTO = 3.0 ha Private Property = 0.0 ha
		Existing Conditions The MTO right-of way extends along Highway 417 and within the Moodie Drive interchange. The property north of the MTO ROW is owned by the NCC.				
		PERFORMANCE GRADE	Poor	Poor	Good	Fair-Good
		OPPORTUNITIES FOR MITIGATION	Steepening slopes or adding retaining walls	Steepening slopes or adding retaining walls	N/A	Steepening slopes or adding retaining walls

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			Alignment A – North of Interchange		Alignment B – Through Interchange	
Criteria		Performance Measures	Under Moodie w/ Station at Corkstown (Alternative A1)	Over Moodie w/ Station at Corkstown (Alternative A2)	Under Moodie w/ Station at Moodie (Alternative B1)	Under Moodie w/ Station at Corkstown (Alternative B2)
			to reduce impact to Greenbelt lands.	to reduce impact to Greenbelt lands.		will reduce impact to Greenbelt lands.
		PREFERENCE	*3d*	*3d*	*1st*	*2nd*
		RATIONALE	Alternative B1 is preferred as it is bundled within the transportation corridor and requires the least amount of Greenbelt lands. Alternative B2 is slightly less preferred as it requires some additional Greenbelt land to accommodate the proposed Corkstown station. Alternatives A1 and A2 are least preferred as the requirement to relocate Corkstown Road west of Moodie Drive results in additional impacts to Greenbelt lands that are not associated with other alternatives.			
21	Local/ Highway Traffic	Avoids immediate and long-term permanent impacts to local and highway traffic.	The proposed Corkstown station introduces slight visual distractions (i.e. potential for glare issues) to westbound Highway 417 ramp users due to the proximity of the station to the ramp. The proposed Corkstown station introduces slight visual distractions (i.e. potential for glare issues) to westbound Highway 417 ramp users due to the proximity of the station to the ramp.	The proposed Corkstown station introduces slight visual distractions (i.e. potential for glare issues) to westbound Highway 417 ramp users due to the proximity of the station to the ramp. The proposed overpass introduces potential visual distractions (i.e. potential for glare issues) to drivers due to the Transitway overpass embankments and structures/retaining walls.	This alternative mixes local bus and ramp traffic at the station on the Moodie Drive structure.	The proposed Corkstown station introduces slight visual distractions (i.e. potential for glare issues) to westbound Highway 417 ramp users due to the proximity of the station to the ramp.
		Existing Conditions A relatively high level of service is provided to traffic operations at Moodie Drive and Highway 417 northbound and southbound during the morning and afternoon peak hours.				
		PERFORMANCE GRADE	Fair	Fair	Fair	Fair
		OPPORTUNITIES FOR MITIGATION	Glare shield between Corkstown Road on Transitway east of Moodie Drive.	Glare shield between Corkstown Road on Transitway east of Moodie Drive.	Use transit priority measures on Moodie Drive to mitigate transit/traffic conflicts at local station.	Glare shield between Corkstown Road on Transitway east of Moodie Drive.
		PREFERENCE	*1st*	*1st*	*2nd*	*1st*
		RATIONALE	With mitigation, Alternatives A1, A2 and B2 are given equal preference. The magnitude of impacts associated with these alternatives is expected to be low. Alternative B1 is slightly less preferred as it mixes local bus and ramp traffic at the local station on the Moodie Drive Structure.			
22	Transit Operations	Maximizes efficiency and flexibility for immediate and long-term transit operations (e.g. turn around, lay-up).	The proposed Corkstown station provides increased operational flexibility: - Accommodates direct passenger transfers between local north and southbound services on Moodie Drive (projected to be 600 person trips in the am peak hour in 2031); - Potential for shuttle service to/from employment to the north and south. - Potential for lay-up opportunity - Permits turn-around of local routes/ splitting of service to/from Bells Corners and to/from Nortel (avoids unnecessary travel without passengers to complete a round trip - no deadheading) - Permits local service to connect directly to Transitway. - Easily accommodates walk-in/cycle-in ridership. The local services on Moodie must use Corkstown to access station, which will increase travel distance. The curvilinear alignment around the Moodie Drive interchange introduces steep grades and curves which result in reduced	The proposed Corkstown station provides increased operational flexibility: - Accommodates direct passenger transfers between local north and southbound services on Moodie Drive (projected to be 600 person trips in the am peak hour in 2031); - Potential for shuttle service to/from employment to the north and south. - Potential for lay-up opportunity - Permits turn-around of local routes/ splitting of service to/from Bells Corners and to/from Nortel (avoids unnecessary travel without passengers to complete a round trip - no deadheading) - Permits local service to connect directly to Transitway. - Easily accommodates walk-in/cycle-in ridership. The local services on Moodie must use Corkstown to access station, which will increase travel distance. The curvilinear alignment around the Moodie Drive interchange introduces steep grades and curves which result in reduced	The proposed Moodie station configuration limits operational flexibility as a local station cannot be accommodated (e.g. no lay-up or Kiss-and-Ride opportunities, no flexibility to terminate/turn around local/shuttle buses, does not easily accommodate walk-in/cycle-in ridership). Without the flexibility to turn buses around at the station, buses would be required to travel twice as far without passengers (deadheading) in order to complete the round trip. The requirement for deadheading increases operational costs, emissions and the potential for service delays. The simple geometry associated with travelling through the interchange (fewer and larger curves, and shallower grades) provides good ride comfort and minimal associated service degradation. This alignment introduces potential conflict between S-E Highway 417 ramp traffic and local buses on Moodie Drive.	The proposed Corkstown station provides increased operational flexibility: - Accommodates direct passenger transfers between local north and southbound services on Moodie Drive (projected to be 600 person trips in the am peak hour in 2031); - Potential for shuttle service to/from employment to the north and south. - Potential for lay-up opportunity - Permits turn-around of local routes/ splitting of service to/from Bells Corners and to/from Nortel (avoids unnecessary travel without passengers to complete a round trip - no deadheading) - Permits local service to connect directly to Transitway. - Easily accommodates walk-in/cycle-in ridership. The simple geometry associated with travelling through the interchange (fewer and larger curves, and shallower grades) provides good ride comfort and minimal associated service degradation. The local services on Moodie must use
		Existing Conditions There is an eastbound bus stop at the Highway 417/Moodie Drive interchange that utilizes a Demand for Service Indicator Signal (DSIS) to allow the eastbound buses on Highway 417 to exit the highway when the illuminated DSIS indicates passengers are waiting at the bus stop. Currently the eastbound routes 96, 101 and the a.m. peak route 167 exit the highway to service this stop. Route 166 is an all-day local route that travels north-south along Moodie Drive and ultimately connects to the Bayshore transit station.					

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			Alignment A – North of Interchange		Alignment B – Through Interchange	
Criteria		Performance Measures	Under Moodie w/ Station at Corkstown (Alternative A1)	Over Moodie w/ Station at Corkstown (Alternative A2)	Under Moodie w/ Station at Moodie (Alternative B1)	Under Moodie w/ Station at Corkstown (Alternative B2)
			ride comfort.	ride comfort.		Corkstown to access station, which will increase travel distance.
		PERFORMANCE GRADE	Fair - Good	Fair - Good	Poor	Good
		OPPORTUNITIES FOR MITIGATION	N/A	N/A	N/A	N/A
		PREFERENCE	*2nd*	*2nd*	*3d*	*1st*
		RATIONALE	Alternatives A1, A2 and B2 are generally preferred as the station at Corkstown offers the greatest amount of transit service flexibility. Alternative B2 is preferred over A1 and A2 as the geometric design associated with Alternative B2 minimizes ride discomfort. Alternative B1 is least preferred as it does not offer the same level of transit service flexibility as the other alternatives.			
23	Staging	Minimizes temporary disruptions to transit operations, local traffic, highway traffic and pedestrian and cyclist traffic during construction.	This alternative requires complex staging and detours. Staging results in significant disruption to transit operations.	This alternative requires some complex staging and detour elements. Staging results in disruption to transit operations.	This alternative requires intermittent and recurring closures / detours on Moodie and Hwy 417 access ramps. Transit service remains unaffected.	This alternative requires intermittent and recurring closures / detours on Moodie and Hwy 417 access ramps. Transit service remains unaffected.
		PERFORMANCE GRADE	Poor	Poor-Fair	Fair	Fair
		OPPORTUNITIES FOR MITIGATION	Station could be constructed first allowing Corkstown to be used as detour during construction.	Station could be constructed first allowing Corkstown to be used as detour during construction.	Advanced notification of lane and ramp closures. Implement traffic management plan.	Advanced notification of lane and ramp closures. Implement traffic management plan. Station could be constructed first allowing Corkstown to be used as detour during construction.
		PREFERENCE	*3d*	*2nd*	*1st*	*1st*
		RATIONALE	Alignments B1 and B2 are preferred as they do not affect transit service and require only intermittent road closures.			
24	Constructability/ Capital Cost (not including property costs)	Avoids complex construction staging. Can be constructed at the lowest capital cost.	The expected capital cost of construction of this alternative is $30.7 M This alternative requires underpass excavation, large number of retaining walls and the potential for special design measures to limit groundwater impacts.	The expected capital cost of construction of this alternative is $24.8 M This alternative requires one structure and some retaining walls. Potential need for light-weight fills and pre-loading to consolidate soils.	The expected capital cost of construction of this alternative is $34.6 M This alternative requires excavation, a large number of retaining walls, three structures and adjustments to Highway 417 ramps. Access to Moodie Station requires the construction of four elevator towers.	The expected capital cost of construction of this alternative is $32.4 M This alternative requires excavation, three structures, some retaining walls, potential need for light-weight fills, the potential need for pre-loading to consolidate soil and relocation of Highway 417 on-ramp.
		PERFORMANCE GRADE	Fair	Good	Fair	Fair
		OPPORTUNITIES FOR MITIGATION	Cost-saving measures will be explored for all alternatives during detail design	Cost-saving measures will be explored for all alternatives during detail design	Cost-saving measures will be explored for all alternatives during detail design	Cost-saving measures will be explored for all alternatives during detail design
		PREFERENCE	*2nd*	*1st*	*3d*	*3rd*
		RATIONALE	Alternative A2 is preferred as it can be constructed for the lowest capital cost. Alternative A1 is slightly less preferred as it requires the construction of underpass structures. Alternatives B1 and B2 are least preferred as they result in increased structural costs due to the grade separation through the Moodie Drive interchange ramps.			
25	Long Term Maintenance	Avoids the need for undesirable long-term maintenance operations.	There is potential for snow clearing issues due to proximity of Transitway and the Highway 417 ramp. This alternative requires the operation and maintenance of pumps, some retaining walls, one roadway structure, trench walls and underpass lighting.	There is potential for snow clearing issues due to proximity of Transitway and the Highway 417 ramp. This alternative requires the operation and maintenance of some retaining walls and 1 roadway structure. Pumping will not be required.	This alignment requires operation and maintenance of pumps, some retaining walls, three roadway structures, trench walls and underpass lighting. This alternative also requires the operation and maintenance of elevators and stairway structures.	There is potential for snow clearing issues due to proximity of Transitway and the Highway 417 ramp. This alternative requires the operation and maintenance of pumps, some retaining walls, three roadway structures, trench walls and underpass lighting.
		PERFORMANCE GRADE	Fair	Good	Fair	Fair
		OPPORTUNITIES FOR MITIGATION	N/A	N/A	N/A	N/A
		PREFERENCE	*2nd*	*1st*	*3rd*	*2nd*

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		Alignment A – North of Interchange		Alignment B – Through Interchange	
Criteria	Performance Measures	Under Moodie w/ Station at Corkstown (Alternative A1)	Over Moodie w/ Station at Corkstown (Alternative A2)	Under Moodie w/ Station at Moodie (Alternative B1)	Under Moodie w/ Station at Corkstown (Alternative B2)
	RATIONALE	From a long term maintenance perspective, alternative A2 is preferred as pumping is not required for drainage. Alternatives A1 and B2 are slightly less preferred as some additional maintenance operations and costs are anticipated due to the requirement for pumping. Alternative B1 is least preferred due to the requirement to maintain elevators and stairway structures.			
FACTOR AREA SUMMARY	**OVERALL PERFORMANCE GRADE**	Fair	Fair-Good	Fair	Good
	OVERALL PREFERENCE	4th	*2nd*	*3d*	*1st*
	RATIONALE	While Alternative B1 requires the least amount of NCC property (0.1 ha compared to 1.2 - 2.9 ha), from a technical perspective it is least preferred as the proposed station under Moodie Drive does not provide maximum transit service flexibility. Moodie station would operate solely as a transfer facility between local buses on Moodie Drive and rapid transit buses on the Transitway below. This station does not encourage walk-in/ cycle-in ridership, does not provide OC Transpo with the flexibility to terminate or turn around local/shuttle buses at the station, and does not provide the ability for buses to access the Transitway at the station. Alternative B1 also carries the highest capital and operating costs due to the requirement for elevators to service the grade-separated local and Transitway platforms. When comparing Alternatives A1, A2 and B2, Alternative A1 and A2 are less preferred as the curvilinear alignment around the Moodie Drive interchange results in reduced ride comfort. Alternative B2 is preferred from a technical perspective as the footprint minimizes impacts to Greenbelt lands, the geometric design minimizes ride discomfort, and the proposed station at Corkstown Road maximizes operational flexibility and accessibility and design opportunities.			