Brian Coburn / Cumberland Transitway Alternate Corridor Environmental Assessment Study

SHORT LISTED OPTIONS - ROADWAY / BUS RAPID TRANSIT (NETWORK) – ASSESSMENT OF ALTERNATIVES

Evaluation Criteria					Assessment of Alternatives			
Factors	**Criteria**	**Rationale**	**Indicator**	**Comparison**	**Option 1 - New Road and BRT off Navan**	**Option 4 - Widen Navan/BRT off Navan**	**Option 5 - Renaud Extension and BRT off Navan**	**Option 7 - Renaud Extension and BRT on Renaud**
1. Transportation and Transit								
Active Transportation (AT)	1.1 Support for Active Transportation (AT)	Maximize Active Transportation (Pedestrian, Cycling) opportunities	- Maximize connections to existing and build new AT facilities - Maximize access to communities and trails / pathways	Very Good / Good / Fair / Poor	All options will include AT facilities and provide linkages to trails and communities.			
					●	●	●	●
Transit Ridership and Service	1.2 Maximizing Transit Ridership	Maximize transit ridership as part of the Ultimate Network Transit Plan (Post 2031)	- # of BRT stations - EMME Traffic Model Ridership Projections for 2031 AM Peak Hour East of Blair - Transit travel time from Chapel Hill Park & Ride to Blair/Innes	Very Good / Good / Fair / Poor	- 4 BRT stations - Estimated 1217 WB Riders - Travel time: 6.2 min	- 4 BRT stations - Estimated 1234 WB Riders - Travel time: 6.2 min	- 4 BRT stations - Estimated 1244 WB Riders - Transit travel time: 6.2 min	- 2 BRT stations - Estimated 1213 WB Riders - Transit travel time: 5.3 min.
					●	●	●	●
Park and Ride Access	1.3 Access to and Use of Chapel Hill Park and Ride Lot	Maximize access to P&R for all modes	Maximize access to P&R for all modes	Very Good / Good / Fair / Poor	All options provide good access.			
					●	●	●	●
Traffic Operations	1.4 Neighbourhood Traffic	Minimize neighbourhood cut-through traffic	Minimize neighbourhood cut-through traffic	Qualitative	- Potential reduction in cut-through traffic on Orléans Blvd	- Potential increase in cut-through traffic on Orléans Blvd - Increased traffic to Navan Road residents	- Will reduce traffic demand in Bradley Estates area - Potential reduction in cut-through traffic on Orléans Blvd	- Will reduce traffic demand in Bradley Estates area - Potential reduction in cut-through traffic on Orléans Blvd
					◑	◔	●	●
	1.5 Traffic Operations	Accommodates east-west roadway level of service	AM Volume/ Capacity ratio accommodates future traffic demands	Quantitative	All Options provide one additional lane in each direction of east/west roadway capacity (approx. 1000 vph capacity increase) and accommodates demand			
					●	●	●	●
Emergency Vehicle Access	1.6 Maintain / Enhance Emergency Vehicle and Service Access	Maintain / enhance emergency vehicle and service access	Maintains / enhances emergency access and connections to communities	Very Good / Good / Fair / Poor	Enhances access to communities east/west of Blackburn Hamlet.	Enhances access to Chapel Hill South and communities east/west of Blackburn Hamlet.	Enhances alternative access to Bradley Estates / Chapel Hill South.	Enhances alternative access to Bradley Estates / Chapel Hill South.
					●	●	●	●

Construction Staging and Phasing	1.7 Construction Staging	Minimize traffic disruption / delays during construction	- Minimize/avoid construction detours and lane closures	Very Good / Good / Fair / Poor	- Construction detour required at Brian Coburn / Navan bridge construction - Expect lane closures along Innes/BHBP	- Construction detour required at Brian Coburn / Navan bridge and for BHBP / BRT bridge - Expect lane closures along Innes/ BHBP	- Construction detour required at Brian Coburn / Navan bridge and for BHBP / BRT bridge	- Construction detour required at Brian Coburn / Navan bridge
								
	1.8 Phasing Flexibility	Maximize flexibility for incremental implementation.	Maximize ability to phase construction.	Very Good / Good / Fair / Poor	- Limits phasing options for BRT after road construction. - Good phasing options for future Innes-Walkley-Hunt Club.	- Limits phasing options for BRT after road construction. - Good phasing options for for Innes-Walkley-Hunt Club.	- Better phasing options for BRT after Road construction. - BRT can go on existing WBL or to the north. - Less preferred phasing for Innes-Walkley-Hunt Club due to increased early traffic pressures on Anderson.	- Good flexibility for BRT north of Renaud. - Less preferred phasing for Innes-Walkley-Hunt Club due to increased early traffic pressures on Anderson.
								
1. Transportation and Transit Overall Relative Performance = Total score / Maximum score of 32 8 Indicators x 4 (highest score) = 32					29/32 91% 	28/32 88% 	31/32 97% 	32/32 100% 

Notes:

1. For each Factor / Criteria / Indicator the 1st ranked Option receives 4 Points, 2nd receives 3 Points, 3rd receives 2 Points and 4th receives 1 Point.
2. Ties (within 10%) receive the same Score and Aggregate Rank.

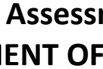
Evaluation Criteria					Assessment of Alternatives			
Factors	**Criteria**	**Rationale**	**Indicator**	**Comparison**	**Option 1 - New Road and BRT off Navan**	**Option 4 - Widen Navan/BRT off Navan**	**Option 5 - Renaud Extension and BRT off Navan**	**Option 7 - Renaud Extension and BRT on Renaud**
2. Natural Environment								
Fisheries & Aquatic Habitat	2.1 Effects on Aquatic Habitat Type, Quality and Function	Minimize number of water course crossings	- Minimize # of new bridge watercourse crossings - Minimize # of new culverts - Minimize km of road alignment running alongside water courses	Quantitative	- 9 water crossings TOTAL - 4 Major Crossings	- 9 water crossings TOTAL - 4 Major Crossing	- 12 water crossings TOTAL - 5 Major Crossings - Potential Creek/Tributary realignment	- 8 water crossings TOTAL - 4 Major Crossings: 4 - Potential Creek/Tributary realignment
					5 Minor Crossings	5 Minor Crossings	7 Minor Crossings	4 Minor Crossings
					~1.3km of roadway runs alongside watercourses	~2.3km of roadway runs alongside watercourses	~2.3km of roadway runs alongside watercourses	~1.3km of roadway runs alongside watercourses
				2.1 Overall				
Terrestrial habitat	2.2 Habitat Quality – Invasive Species	Avoid disruption of habitats by minimizing encroachment of invasive species	Minimize new edge conditions created within the Greenbelt	Quantitative	14 km new edge condition	16 km new edge condition	19.9 km new edge condition	13.7 km new edge condition
Wetlands	2.3 Effects on Wetlands	Minimize impact on wetland functions	- Least amount of area (Ha.) within a wetland - Least amount of area (Ha) within 120m of a wetland.	Quantitative	- Adjacent Wetlands: 7 - Severed Wetland: 1	- Adjacent Wetland: 7 - Severed Wetland: 1	- Adjacent Wetlands: 4 - Severed Wetland: 1 - Close to Mer Bleue - Area Within PSW: 0.2 Ha.	- Adjacent Wetland: 4 - Severed Wetland: 1 - Close to Mer Bleue - Area Within PSW: 0.2 Ha.
					Within Unevaluated Wetland: 1.6 Ha.	Within Unevaluated Wetland: 1.7 Ha.	Within Unevaluated Wetland: 1.5 Ha.	Within Unevaluated Wetland: 0.3 Ha.

					Area within 120 m of Wetland: 8 Ha 	Area within 120 m of Wetland: 9.5 Ha 	Area within 120 m of Wetland: 11.3 Ha 	Area within 120 m of Wetland: 10.2 Ha 
		Impact on Auto Traffic on Anderson (after Innes-Walkley Connection)	Minimize 2-way AM Peak Hour Traffic versus Base Case (No Project)	Quantitative	Similar Benefit 	Similar Benefit 	Similar Benefit 	Similar Benefit 
				2.3 Overall				
Terrestrial At-Risk and Sensitive Species	2.4 Provincially or Federally listed potential Species at Risk (SAR) habitat	Minimize impact on SAR habitats	- Area (Ha.) within SAR habitat. - Proximity to SAR habitat (km).	Quantitative	Area = 24.3 Ha 	Area = 18 Ha 	Area = 24.4 Ha 	Area = 30.7 Ha 
					Length ~5 km 	Length ~5 km 	Length ~11 km 	Length ~6 km 
				2.4 Overall				
Greenbelt Core Natural Area	2.5 Encroachment on Core Natural Area	Minimize encroachment on Greenbelt Core Natural Areas	Encroachment area (Ha)	Quantitative	Area = 5 Ha 	Area = 5 Ha 	Area =3.6 Ha 	Area =1.3 Ha 
Greenbelt Natural Link	2.6 Encroachment on Natural Link	Minimize encroachment on NCC Greenbelt Natural Link Areas	Encroachment area (Ha)	Quantitative	Area = 4.6 Ha 	Area = 5.3 Ha 	Area = 9.2 Ha 	Area = 9.6 Ha 
Habitat Fragmenting	2.7 Infrastructure in Shared Corridor	Minimize new infrastructure corridor in Greenbelt	New corridor length (km)	Quantitative	Length = 3.8 km 	Length = 3.9 km 	Length = 4.1 km 	Length = 2.5 km 
Natural Heritage Features (Municipal)	2.8 Encroachment on municipal natural heritage features	Minimize encroachment on municipal natural heritage features	Encroachment area (Ha)	Quantitative	Area = 0.78 Ha 	Area = 0.76 Ha 	Area = 0.78 Ha 	None 
Slope Stability	2.9 Areas with Slope Stability Concerns	Minimize encroachment on areas with slope stability concerns	Minimize area (Ha) within unstable slopes	Quantitative	Area = 1.3 Ha 	Area = 1.6 Ha 	Area = 1.9 Ha 	Area = 1.8 Ha 
				Quantitative	Area = 9.6 Ha	Area = 11 Ha	Area = 8.6 Ha	Area = 6.1 Ha.

Climate Change Mitigation	2.10 Carbon Footprint	Avoid / minimize impact to carbon sinks (wetland, plants)	Least amount of area (Ha) within wetland and vegetation					
Climate Change Adaptation	2.11 Potential Climate Change Risk on Infrastructure and Adjacent Land Use	Minimize area within creek meander zone	Area within creek meander zone	Qualitative	- 4 major crossings - New crossing of Mud Creek west of Anderson	- 4 major crossings - New crossing of Mud Creek west of Anderson	- Potential impact with BCE parallel to Mud Creek - 5 major crossings - Channel realignment at Renaud	- Potential impact with BCE and CTE parallel to Mud Creek - 5 major crossings - New crossing of Mud Creek west of Anderson
								
		Minimize area with potential flood risk	Area with potential flood risk	Qualitative	- RVCA Flood Risk Area of Concern - 4 major crossings - 5 tributary crossings	- RVCA flood Risk Area of concern but only at CTE - 4 major crossings - 5 tributary crossings	- RVCA Flood Risk Area of concern - BCE parallel to Mud Creek - 5 major crossings - 7 tributary crossings	- RVCA Flood Risk Area of concern - BCE and CTE parallel to Mud Creek - 5 major crossings - 8 tributary crossings
								
				2.11 Overall				
2. Natural Environment Overall **Relative Performance (%) = Total score / Maximum Score of 44** **11 indicators x 4 (highest score) = 44**					36/44 82% 	31/44 70% 	23/44 52% 	32/44 73% 

Notes:

1. For each Factor / Criteria / Indicator the 1st ranked Option receives 4 Points, 2nd receives 3 Points, 3rd receives 2 Points and 4th receives 1 Point.
2. Ties (within 10%) receive the same Score and Aggregate Rank.

Evaluation Criteria					Assessment of Alternatives			
Factors	**Criteria**	**Rationale**	**Indicator**	**Comparison**	**Option 1 - New Road and BRT off Navan**	**Option 4 - Widen Navan/BRT off Navan**	**Option 5 - Renaud Extension and BRT off Navan**	**Option 7 - Renaud Extension and BRT on Renaud**
3. Social / Cultural Environment								
Property Ownership	3.1 # of Properties Required	Minimize impact to property owners (private and federal)	- # of property owners affected/ isolated - # of buildings to be acquired	Quantitative	Private Parcels: 10 - 15 	Private Parcels: 30-40 	Private Parcels: 15-20 	Private Parcels: 10-15 
					Federal Parcels: 9 	Federal Parcels: 12 	Federal Parcels: 11 	Federal Parcels: 8 
					Buildings Acquired = 0 	Buildings Acquired = 3 	Buildings Acquired = 3 	Buildings Acquired =3 
				3.1 Overall				
Agriculture	3.2 Loss of Farmland	Minimize impact to agricultural lands / operations	- Farm area (ha) lost - # of farms affected - Area (Ha.) identified within Class 1-3 soils	Quantitative	- 9 long parcels with edge effects (2 have edge effects at both ends) - 3 long parcels severed - All agricultural lands are CLI Class 3 	- 9 long parcels with edge effects (2 have edge effects at both ends) - 3 long parcels severed - All agricultural lands are CLI Class 3	- 9 long parcels with edge effects - 10 parcels severed - All agricultural lands are CLI Class 3	- 9 long parcels with edge effects - 8 parcels severed - All agricultural lands are CLI Class 3
					25.4 ha of farm lost 	19.1 ha of farm lost 	20.0 ha of farm lost 	20.8 ha of farm land lost 
					9 farms affected 	10 farms affected 	10 farms affected 	6 farms affected 
					Area within Agriculture lands (Class 3) = 36.6 Ha 	Area within Agriculture lands (Class 3) = 29.5 Ha 	Area within Agriculture lands (Class 3) = 31 Ha 	Area within Agriculture lands (Class 3) = 33.9 Ha 
				3.2 Overall				
Business	3.3 Impacts to Business	Minimize impact to businesses	- # of businesses affected - # of farms affected	Quantitative	Total 17 - 8 businesses on route - 9 farms on route	Total 18 - 8 businesses on route - 10 farms on route	Total 19 - 9 businesses on route - 10 farms on route	Total 15 - 9 businesses on route - 6 farms on route

		including Agricultural						
Views and Vistas	3.4 Impact of Vistas / Visual Aesthetics	Minimize impact on vistas / visual aesthetics	Minimize impact on established views	Comparative (Very Good / Good / Fair / Poor)	Fair impact on views	Fair impact on views	Poor – Highest impact on views	Very good - Least impact on views and vistas
								
				3.4 Overall				
Air Quality, Noise, Vibration	3.5 Proximity to Sensitive Land Uses	Minimize impact to sensitive land uses	# of sensitive receptors	Quantitative	131 within study area	150 within study area	114 within study area	90 within study area
								
Recreation	3.6 Access to / Enjoyment of Recreation	Encourage recreation activity within the Greenbelt	- Lowest # of Greenbelt pathway crossings - Greater improved access to recreational features	Quantitative	Crosses Bicycle Network: 1 Crosses Trails: 5 Crosses Planned NCC Pathway: 1 Total: 7 Existing Connections: 7	Crosses Bicycle Network: 1 Crosses Trail: 5 Crosses Planned NCC Pathway: 1 Total: 7 Existing Connections: 8	Crosses Bicycle Network: 0 Crosses Trail: 4 Crosses Planned NCC Pathway: 1 Total: 5 Existing Connections: 7	Crosses Bicycle Network: 0 Crosses Trail: 1 Crosses Planned NCC Pathway: 1 Total: 2 Existing Connections: 3
								
Greenbelt Experience	3.7 Greenbelt Experience	Minimize impact to Greenbelt experience	- Impacts to established views - # of grade separations	Quantitative	Potential impacts to 5 Greenbelt views.  4 above grade features - 3 grade separations - 1 high 8m embankment proposed 	Potential impacts to 5 Greenbelt views.  3 above grade features - 3 grade separations - Filling at mud creek required 	Potential impacts to ALL 7 Greenbelt views.  3 above grade features - 3 grade separations - 1 high 8 m embankment proposed 	Potential impacts to 4 Greenbelt views.  3 above grade features - 2 grade separations - 1 high 8m embankment proposed 
				3.7 Overall				
Drinking Water Quality	3.8 Preserve Water Quality	Minimize / avoid potential water quality impacts	Potential # of private wells within 50m	Quantitative	Close to 8 domestic wells 	Close to 11 domestic wells. 	Close to 15 domestic wells and 3 agricultural wells. 	Close to 16 domestic wells and 3 agricultural wells. 
Heritage Properties	3.9 Listed (Ottawa) Heritage Properties	Minimize potential encroachment on listed (Ottawa) heritage properties	Potential # of heritage properties impacted	Quantitative	- Adjacent to 3 properties - Encroaching on 1 property	- Adjacent to 5 properties - Encroaching on 1 property	- Adjacent to 3 properties - Encroaching on 1 property	- Adjacent to 2 properties - Encroaching on 1 property
								

Archaeological Potential	3.10 Water Resources / Topography / Historic Settlement	Minimize impact to areas of archaeological potential	Area (Ha.) within area of archaeological potential	Quantitative	Area = 21.0 Ha 	Area = 15.7 Ha 	Area = 24.7 Ha 	Area = 32.9 Ha 
	3.11 Registered Archaeological Sites / Traditional Use Sites	Minimize potential impact on archaeological sites	# of archaeological sites impacted	Quantitative	Not within registered Archaeological Site 			
3. Social/Cultural Environment Overall Relative Performance (%) = Total score / Maximum score of 44 11 indicators x 4 (highest score) = 44					30/44 68% 	29/44 66% 	28/44 64% 	38/44 86% 

Notes:
1. For each Factor / Criteria / Indicator the 1st ranked Option receives 4 Points, 2nd receives 3 Points, 3rd receives 2 Points and 4th receives 1 Point.
2. Ties (within 10%) receive the same Score and Aggregate Rank (1 to 4).

Evaluation Criteria					Assessment of Alternatives			
Factors	**Criteria**	**Rationale**	**Indicator**	**Comparison**	**Option 1 - New Road and BRT off Navan**	**Option 4 - Widen Navan/BRT off Navan**	**Option 5 - Renaud Extension and BRT off Navan**	**Option 7 - Renaud Extension and BRT on Renaud**
4. Cost								
Construction	4.1 Relative Construction Cost	Minimize construction cost	Relative order of magnitude construction cost	Quantitative/ Ratio (Option Cost / Lowest Cost)	1.6 	1.4 	1.5 	1.0 
4. Cost **Relative Performance (%) = Total score / Maximum Score of 4** **1 indicator x 4 (highest score = 4)**					3/4 75% 	3/4 75% 	3/4 75% 	4/4 100% 

Notes:
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2. Ties (within 10%) receive the same Score and Aggregate Rank (1 to 4).

Brian Coburn / Cumberland Transitway Alternate Corridor Environmental Assessment Study
SHORT LISTED OPTIONS - ROADWAY / BUS RAPID TRANSIT (NETWORK) – ASSESSMENT OF ALTERNATIVES

EVALUATION SUMMARY - Relative Performance vs. 'Perfect Score' (All 1st Place Rankings)

Evaluation Criteria Groups	Short Listed Options - Assessment of Alternatives				
	Option 1 - New Road and BRT off Navan	Option 4 - Widen Navan / BRT off Navan	Option 5 - Renaud Extension and BRT off Navan	Option 7 - Renaud Extension and BRT on Renaud	Preferred Option(s)
1. Transportation and Transit (8 Factors)	29/32 91%	28/32 88%	31/32 97%	32/32 100%	Option 7 (All Options Close)
2. Natural Environment (11 Factors)	36/44 82%	31/44 70%	23/44 52%	32/44 73%	Option 1 (Options 4 & 7 Close)
3. Social/Cultural Environment (11 Factors)	30/44 68%	29/44 66%	28/44 64%	38/44 86%	Option 7
4. Cost (1 Factor)	3/4 75%	3/4 75%	3/4 75%	4/4 100%	Option 7
Overall Ratings (All Criteria)	79%	75%	72%	90%	Option 7
	Relative Ranking: 1st = ; 2nd = ; 3rd = ; 4th =				

EVALUATION – SENSITIVITY TESTS - Relative Performance vs. 'Perfect Score' (All 1st Place Rankings)

	Short Listed Options - Assessment of Alternatives				
SENSITIVITY TESTS DESCRIPTION	**Option 1 - New Road and BRT off Navan**	**Option 4 - Widen Navan / BRT off Navan**	**Option 5 - Renaud Extension and BRT off Navan**	**Option 7 - Renaud Extension and BRT on Renaud**	**Preferred Option(s)**
Sensitivity Test #1 Excluding Natural Environment	78% 	76% 	79% 	95% 	**Option 7**
Sensitivity Test #2 Excluding Social/Cultural Environment	82% 	78% 	75% 	91% 	**Option 7**
Sensitivity Test #3 Excluding Cost	80% 	75% 	71% 	86% 	**Option 7 (Option 1 within 10%)**
Sensitivity Test #4 Natural Environment Weighted 66%	81% 	72% 	61% 	81% 	**Options 1, 7**
Sensitivity Test #5 All Individual Criteria Weighted Equally	79% 	73% 	69% 	85% 	**Option 7 (Option 1 within 10%)**
	Relative Ranking: 1st =  ; 2nd =  ; 3rd =  ; 4th =