

Document 1 – Evaluation of Road and Transit Corridor Options

Long List of Road and Transit Corridor Options

An environmental assessment (EA) is a planning process that requires a review of technically feasible alternative solutions in order to assess and minimize the potential for environmental effects using best available information. Accordingly, the study developed a long list of road and transit corridor options covering the study area and beyond to the north and south. These options were assessed at a high level considering the natural, social and cultural environments, as well as transportation and cost. Shown in Figure 1 is the long list of six road corridor options, while Table 1 summarizes the assessment and screening resulting in 3 options being carried forward. The six road corridor options and those carried forward included:

1. Extend a new 4 lane Brian Coburn Boulevard (BCB) directly west from Navan Road and follow the Hydro corridor to Walkley Road.
2. Extend a new 4 lane BCB directly west from Navan Road along the Hydro Corridor and continue along the Prescott Russell Trail to the future Innes/Walkley/Hunt Club (IWHC) link.
3. Extend a new 4 lane BCB directly west from Navan Road to a widened 4 lane Renaud Road and along a widened 4 lane Anderson Road to connect to the future IWHC link. **This Option was carried forward.**
4. Option 4 combines with either Option 5 or 6 and involves a widening of the Blackburn Hamlet Bypass (BHBP) from 4 to 6 lanes, with a new 2 lane road extending southwest from the Innes Road intersection across Mud Creek and connecting to the future IWHC link. **This Option was carried forward.**
5. As per the 1999 EA for the BHBP Extension, Option 5 extends BCB with 4 lanes down the escarpment, before turning north following Navan Road in the Greenbelt to connect to Option 4 on the BHBP. **This Option was carried forward.**
6. Option 6 is a widening of Navan Road to 4 lanes, which would connect to Option 4 on the BHBP. **This Option was carried forward.**

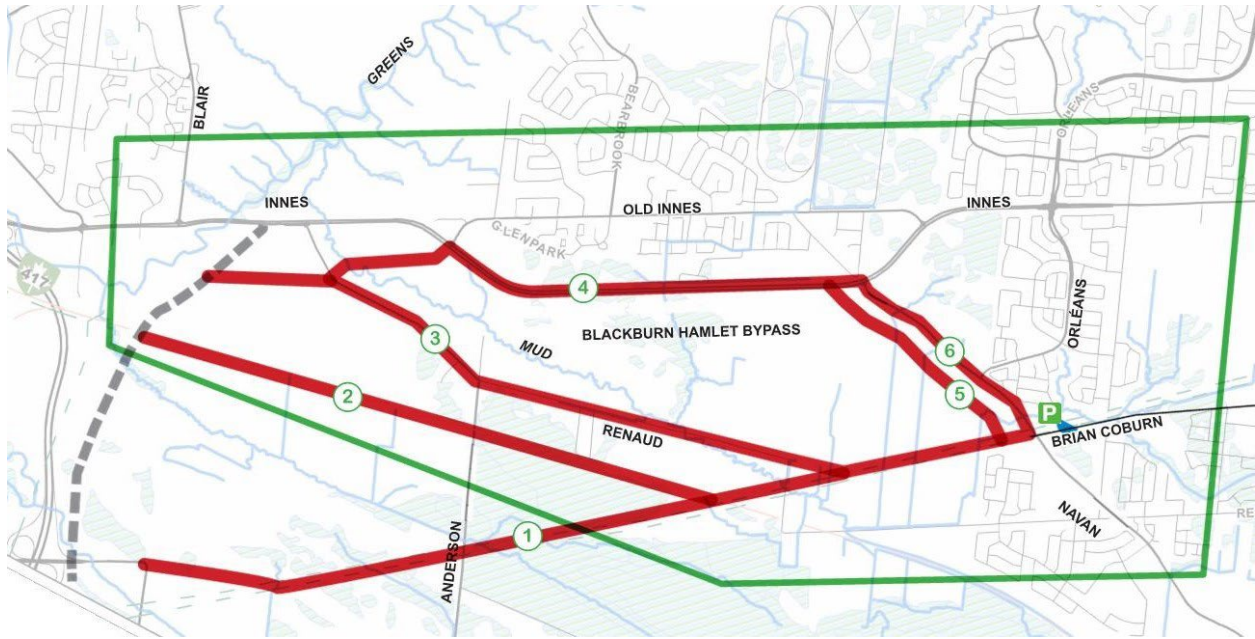


Figure 1: Long List of Road Corridor Options

#	Evaluation Factor					Recommendation
	Natural Environment	Social Environment	Cultural Environment	Transportation	Cost	
1	X	~	~	√	~	Do Not Carry Forward
2	X	~	~	√	~	Do Not Carry Forward
3	--	~	~	√	~	Carry Forward
4+5	--	~	~	√	~	Carry Forward
4+6	--	~	~	√	~	Carry Forward

Table 1: Long List of Road Corridor Options Screening

Shown in Figure 2 is the long list of 15 transit corridor options, while Table 2 summarizes the assessment and screening resulting in two options being carried forward. The transit corridor concept options are as follows:

1. Figure 1 was considered but applies to the road corridor options only.
2. Extends the transitway west from BCB down the escarpment following the Prescott Russell Trail, where it connects to the future IWHC link.

3. Extends the transitway west from BCB down the escarpment towards Renaud Road, following Renaud Road, and continuing along Anderson Road, before connecting to the future IWHC link.
4. As per the 2011 EA for the Hospital Link and Cumberland Transitway Westerly, Option 4 combines with either Option 5 or 6. The transitway takes over the existing westbound lanes of the BHBP, drops down to pass under Innes Road on a structure before rising back up to grade to the planned transit station at Blair Road and Innes Road. **This Option was carried forward.**
5. As per the 1999 Cumberland Transitway EA Study, Option 5 extends the transitway from BCB down the escarpment and extends west of Navan Road in the Greenbelt heading north to connect to the transitway in Option 4 via a grade separated structure. **This Option was carried forward.**
6. Option 6 extends the transitway along the north side of Navan Road to connect to the transitway in Option 4 via a grade separated structure. **This Option was carried forward.**
7. Option 7 combines with either Option 5 or 6 and runs parallel to and in the area between Innes Road and the BHBP before connecting to Option 9.
8. Option 8 combines with Option 5 and follows Innes Road before connecting to Option 9.
9. Option 9 combines with either Option 4, 7 or 8 and is as per the 2011 EA for the Hospital Link and Cumberland Transitway Westerly. From the grade separated structure at Innes Road and the BHBP, the transitway continues along the north side of Innes Road at grade to the planned transit station at Blair Road and Innes Road. **This Option was carried forward.**
10. Option 10 is located to the west of the Blackburn Hamlet community, destined to the Montreal Road LRT Station.
11. Option 11 runs adjacent to Bearbrook Road before connecting to Option 12.
12. Option 12 is located to the east of the Blackburn Hamlet community, destined to Montreal Road LRT Station.
13. Option 13 swings north from Option 12.
14. Option 14 swings north from Option 8 and through the RCMP property.
15. Option 15 swings north from Option 8 and through the RCMP property further east of Option 14.

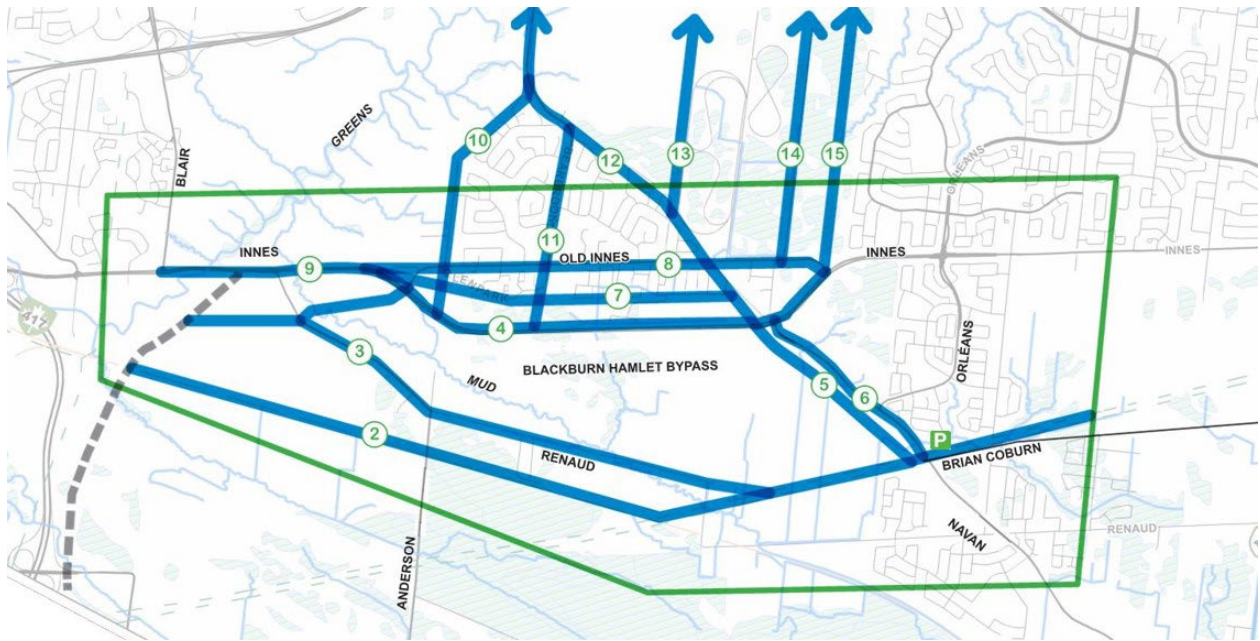


Figure 2: Long List of Transit Corridor Options

#	Evaluation Factor					Recommendation
	Natural Environment	Social Environment	Cultural Environment	Transportation / Transit System	Cost	
1	Not applicable – Road only corridor					
2	x	~	--	x	~	Do Not Carry Forward
3	~	~	--	x	~	Do Not Carry Forward
4+5+9	~	~	√	√	~	Carry Forward
4+6+9	~	~	√	√	~	Carry Forward
7	~	x	√	√	~	Do Not Carry Forward
8	√	x	√	√	x	Do Not Carry Forward
10	x	x	~	~	~	Do Not Carry Forward
11	~	x	√	√	x	Do Not Carry Forward
12	~	x	~	√	~	Do Not Carry Forward
13	~	~	~	√	~	Do Not Carry Forward
14	x	~	~	√	~	Do Not Carry Forward
15	x	x	~	√	~	Do Not Carry Forward

Table 2: Long List of Transit Corridor Options Screening

The above assessment of the long list of road and transit corridor options resulted in a high-level screening to a short list of six combined road and transit corridor options that were carried forward for further consideration.

Short List of Road and Transit Corridor Options

Below is a brief description of each of the six road and transit corridor options and the accompanying figures for each respective option includes another assessment and further screening. Figure 3 provides the legend to accompany the road and transit corridor concept plans for each option. (Note that Figures 4 to 9 also show some proposed future road widenings and transit corridor extensions as per the TMP that are not part of the current study.)

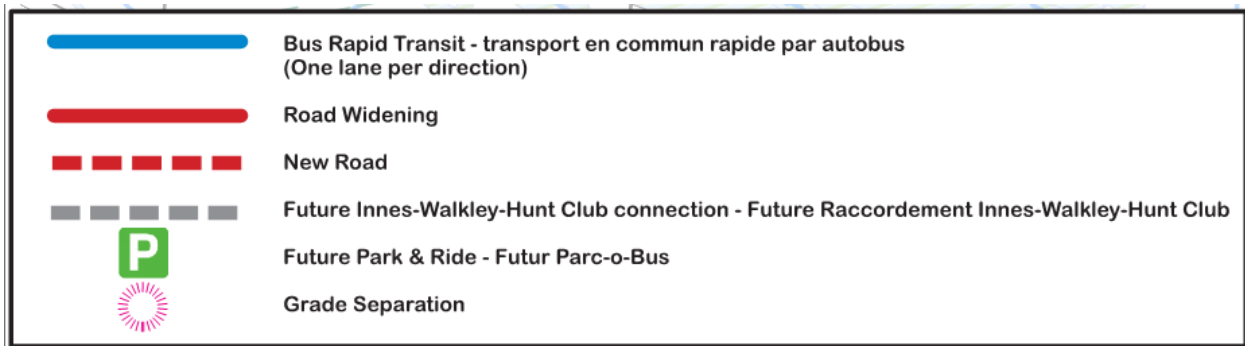


Figure 3: Legend Reference to the Road and Transit Corridor Concept Plan

Option 1 (Figure 4) – Carried Forward

As per the 1999 EA for the BHBP Extension, Option 1 extends BCB with 4 new lanes down the escarpment, turning to run parallel with and southwest of Navan Road within the Greenbelt lands before connecting to the existing BHBP. The BHBP will be widened to six lanes and shifted to the south. From the intersection of Innes Road at the west end of the BHBP, a new 2 lane road extends across Mud Creek to connect to the future IWHC link and to effectively bypass Innes Road.

As per the 2011 EA for the Hospital Link and Cumberland Transitway Westerly, the segregated transitway is adjacent and parallel to the new road corridor extending from BCB, down the escarpment, before turning northwest within the Greenbelt lands. The transitway turns west on a grade separated structure and takes over the westbound lanes of the BHBP. Along the BHBP are two planned transit stations to serve the Blackburn Hamlet community. Further west the transitway drops down to pass under Innes Road via a grade separated structure at the west end of the BHBP and rises back up to grade to the transit station at Blair Road and Innes Road.

Option 2 (Figure 5) – Not Carried Forward

Option 2 is the same as Option 1 for both the road and transitway except for the segment between BCB and the BHBP. Along this segment, the road corridor follows Option 1 but the transitway now runs adjacent and to the east of Navan Road before connecting to the transitway on the BHBP via a grade separated structure.

Option 3 (Figure 6) – Not Carried Forward

Option 3 is also the same as Option 1 for both the road and transitway except for the segment between BCB and the BHBP. Along this segment, both the road and transitway are located along Navan Road with a road widening to 4 lanes and the transitway along the east side before connecting to the transitway on the BHBP via a grade separated structure.

Option 4 (Figure 7) – Carried Forward

Option 4 is also the same as Option 1 except for the segment between BCB and the BHBP. While the transitway follows Option 1, the road corridor involves a widening of Navan Road to 4 lanes.

Option 5 (Figure 8) – Carried Forward

For Option 5, the road and transit corridor split into 2 separate corridors with the transitway following approximately the same route as Option 1. However, the road corridor now extends BCB directly west with 4 new lanes down the escarpment to existing grade to connect to a widened 4 lane Renaud Road, and along a widened 4 lane Anderson Road to connect to the future IWHC link.

Option 6 (Figure 9) – Not Carried Forward

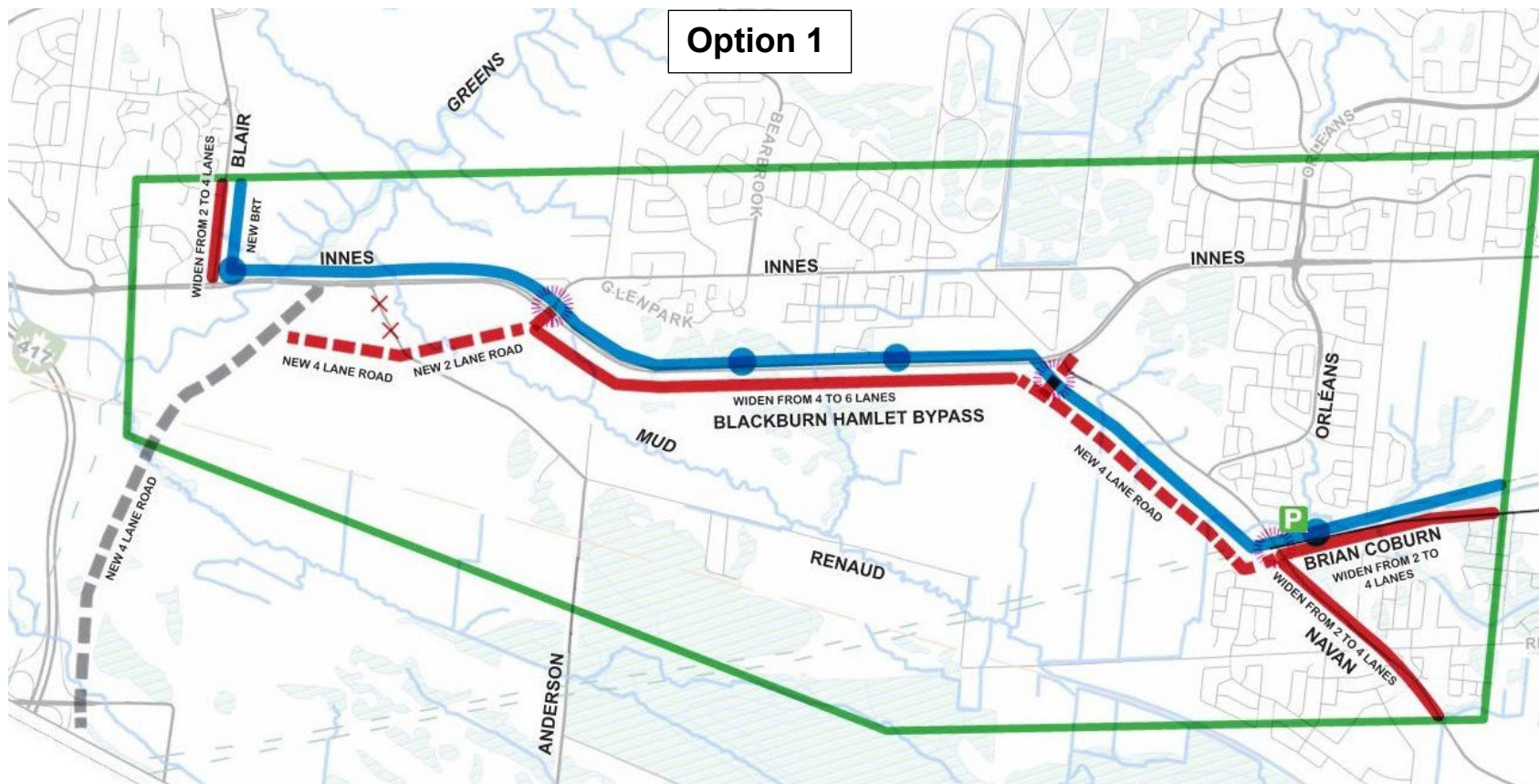
Option 6 also splits the road and transit corridor with the road corridor following the same route as Option 5. However, the transit corridor follows Option 3, along the east side of Navan Road.

When these six short listed options were presented at the first round of public consultations, the local residents proposed a seventh option that was supported by many members of the public. The new Option 7 was subsequently added to the short list for further consideration.

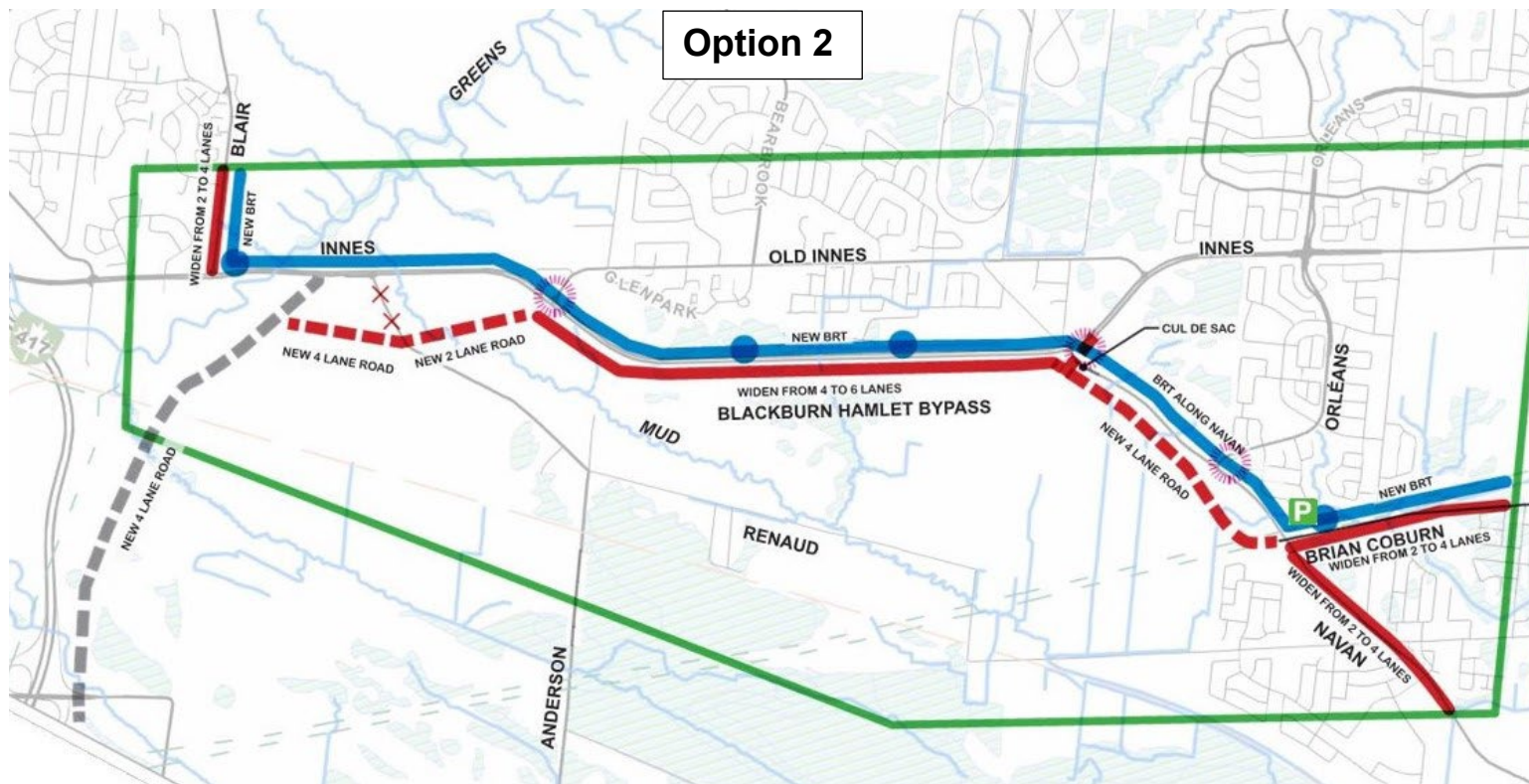
New Option 7 (Figure 10) – Carried Forward

For this option, the road corridor follows Option 5 and the transit corridor is adjacent and runs parallel before turning north from Anderson Road to connect to the transitway on the north side of Innes Road via a grade separated structure.

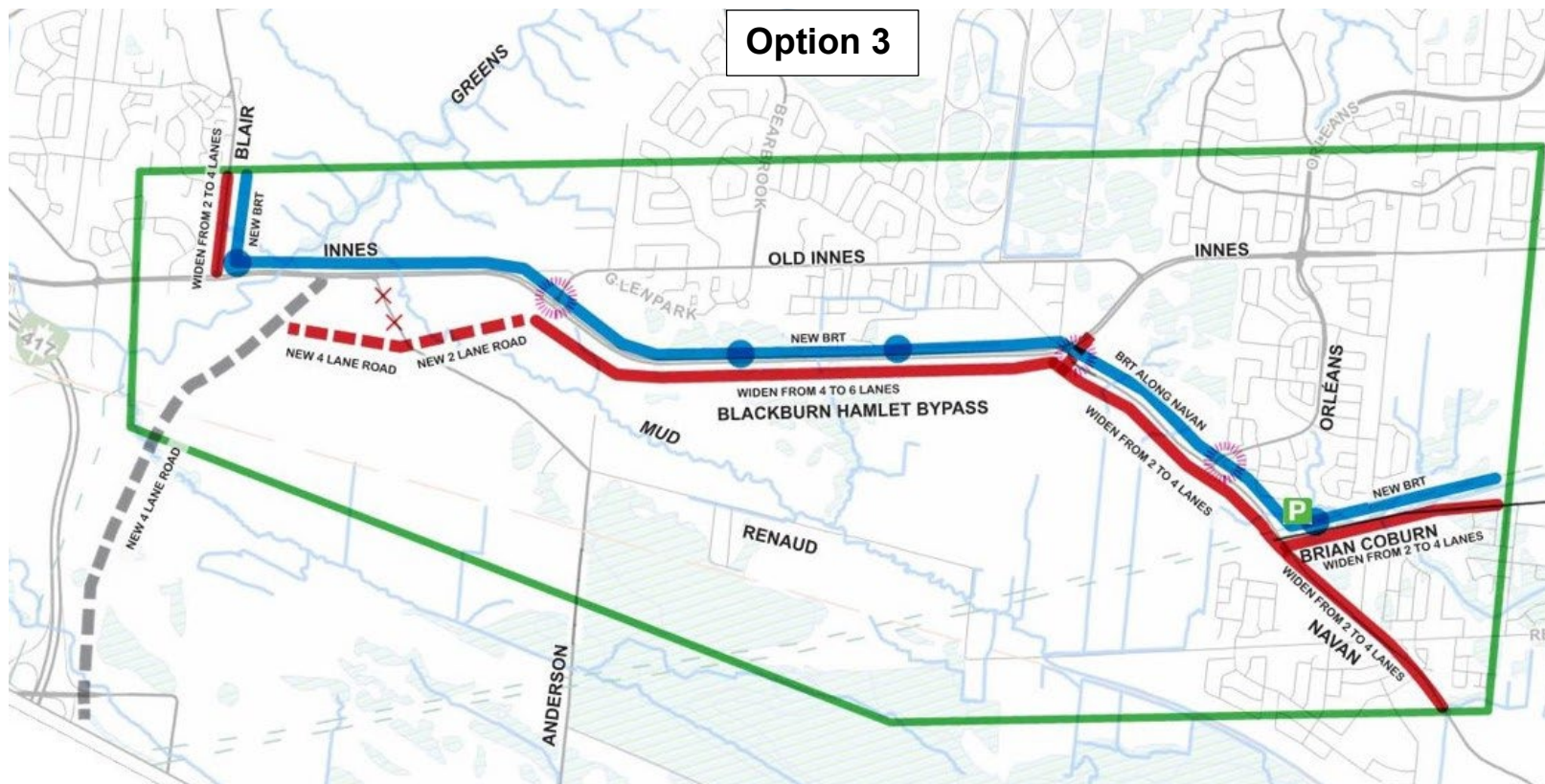
The evaluation of the seven options resulted in a screening to a shorter list of four options that were carried forward for a comprehensive evaluation.



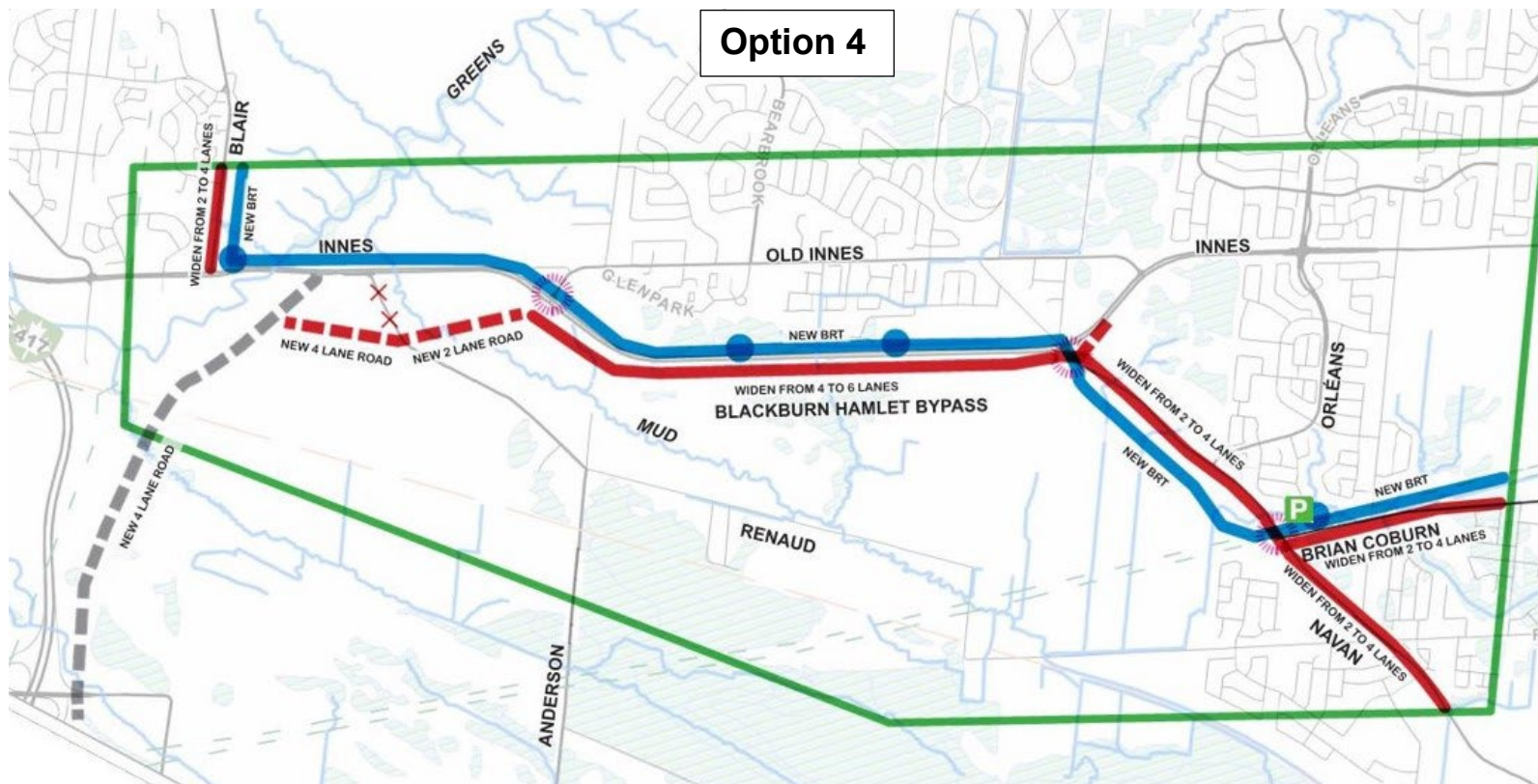
Natural Environment	Social Environment	Cultural Environment	Transportation	Cost	
<ul style="list-style-type: none"> Relatively low impact to Greenbelt Core Natural Areas (except as noted below) Requires new watercourse crossing of Mud Creek (Core Natural Area) 	<ul style="list-style-type: none"> Low community impacts along Navan Road Community impacts along north edge of Bradley Estates Severs tile drained active agricultural lands 	<ul style="list-style-type: none"> Potential impact to areas of archaeological potential 	<ul style="list-style-type: none"> Accommodates Travel Demand (Navan cul de sac removed near P&R based on public feedback) 	<ul style="list-style-type: none"> Moderate costs 	Carry Forward
<i>Average --</i>	<i>Good</i> ✓	<i>Average --</i>	<i>Good</i> ✓	<i>Average --</i>	



Natural Environment	Social Environment	Cultural Environment	Transportation	Cost	
<ul style="list-style-type: none"> Relatively low impact to Greenbelt Core Natural Areas (except as noted below) Requires new watercourse crossing of Mud Creek (Core Natural Area) 	<ul style="list-style-type: none"> Higher community impacts along Navan Road with BRT bridge structure at Orleans Blvd Community impacts along north edge of Bradley Estates Potential for increase in noise and vibration levels to sensitive noise receivers (St. Mary the Virgin Anglican Church, Orleans Montessori Preschool, residential houses) Severs tile drained active agricultural lands 	<ul style="list-style-type: none"> Potential impact to a property that has high potential to be of cultural heritage value or interest (church and cemetery on Navan Road) Impact to areas of archaeological potential 	<ul style="list-style-type: none"> Accommodates Travel Demand 	<ul style="list-style-type: none"> High costs 	Do Not Carry Forward
<i>Average --</i>	<i>Poor X</i>	<i>Poor X</i>	<i>Good ✓</i>	<i>Poor X</i>	

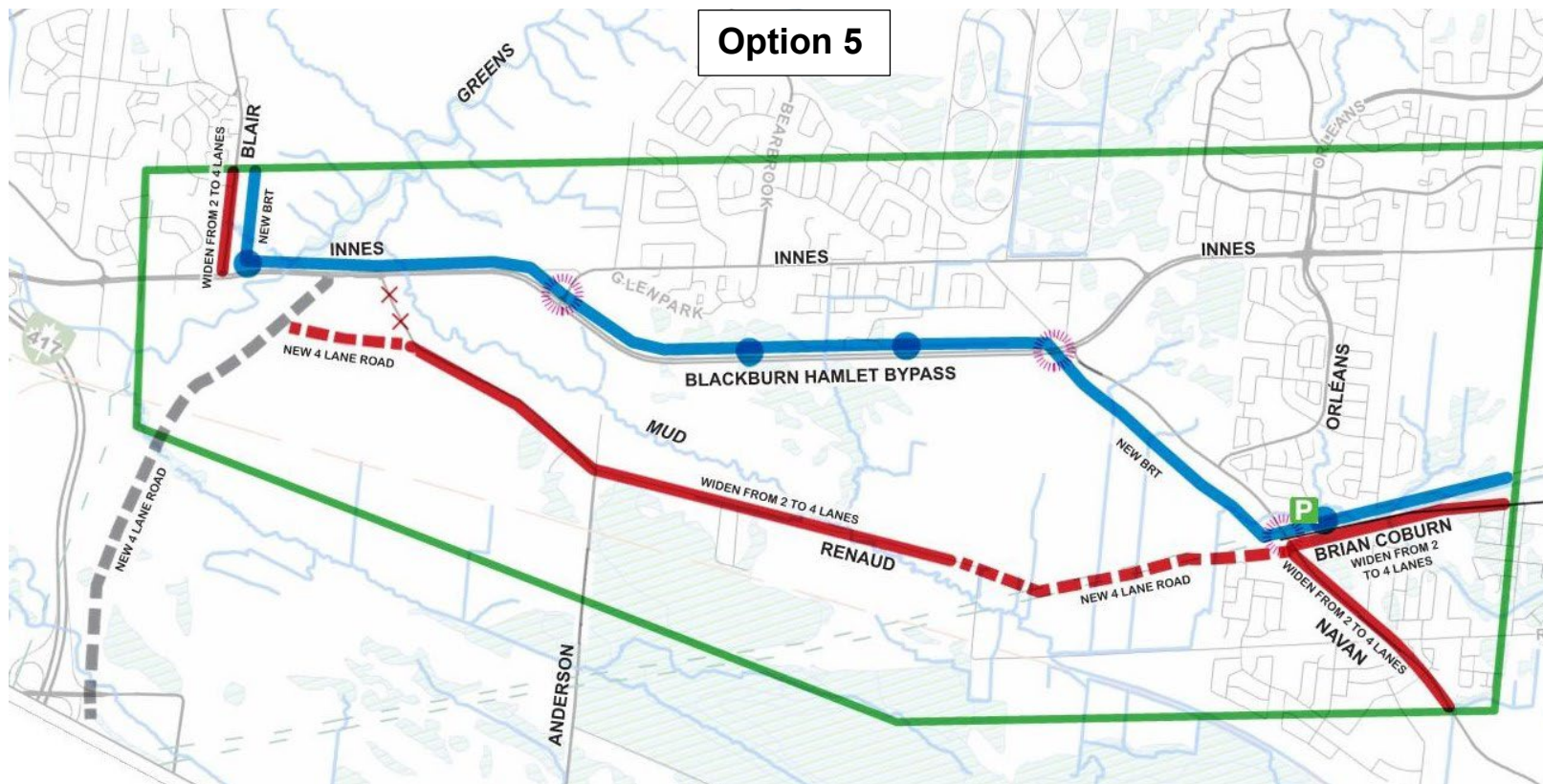


Natural Environment	Social Environment	Cultural Environment	Transportation	Cost	
<ul style="list-style-type: none"> • Relatively low impact to Greenbelt Core Natural Areas (except as noted below) • Requires new watercourse crossing of Mud Creek (Core Natural Area) 	<ul style="list-style-type: none"> • Highest community impacts along Navan Road with widening to 6 lanes and BRT bridge structure at Orleans Blvd • Avoids community impacts along north edge of Bradley Estates • Potential for increase in noise and vibration levels to sensitive noise receivers (St. Mary the Virgin Anglican Church, Orleans Montessori Preschool, residential houses) • Severs tile drained agricultural lands (but less than for Options 1 and 2) 	<ul style="list-style-type: none"> • Impact to areas of archaeological potential • Potential impact to a property that has high potential to be of cultural heritage value or interest 	<ul style="list-style-type: none"> • Accommodates Travel Demand 	<ul style="list-style-type: none"> • High costs 	Do Not Carry Forward
<i>Average --</i>	<i>Poor X</i>	<i>Poor X</i>	<i>Good √</i>	<i>Poor X</i>	

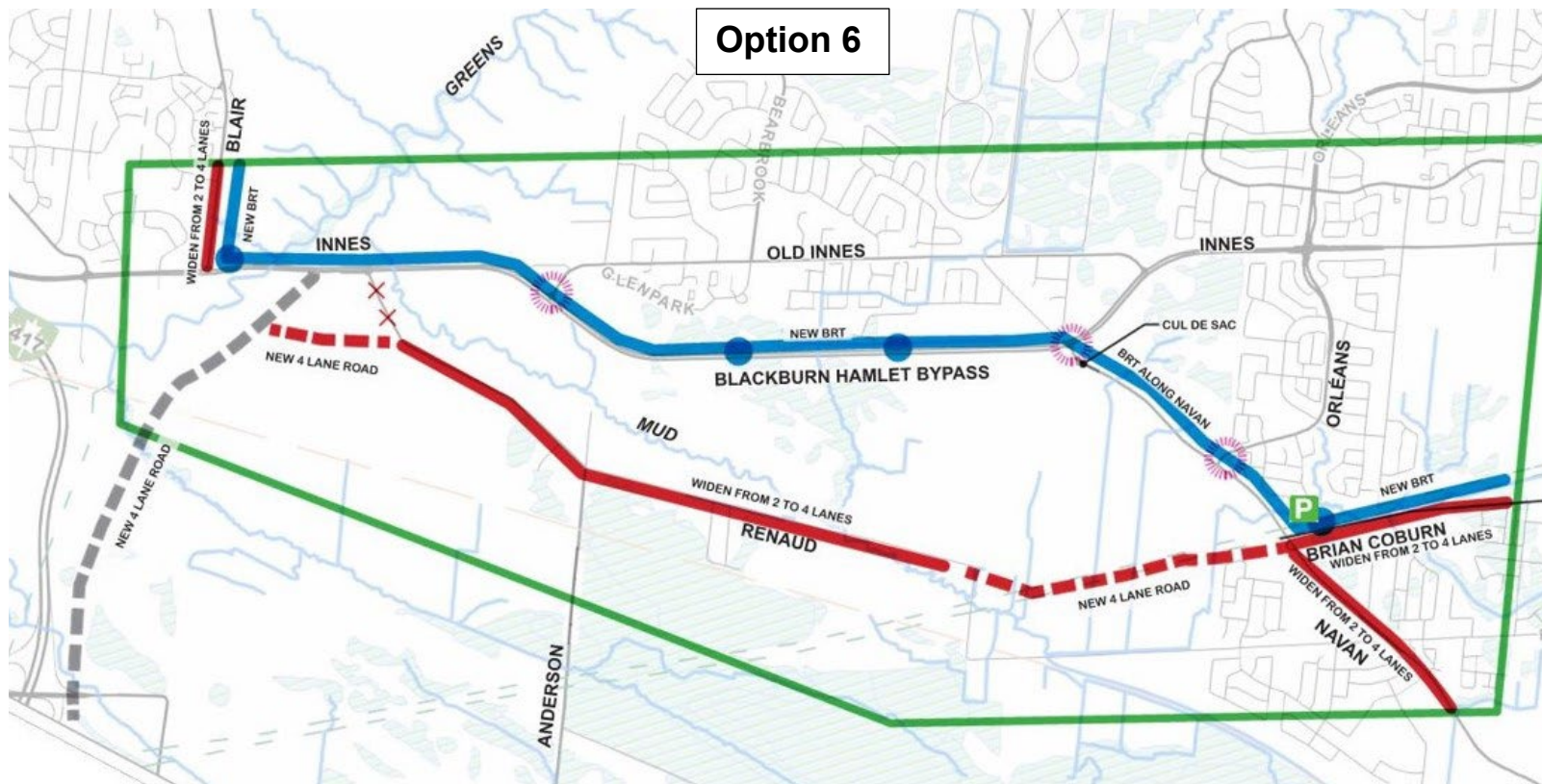


Option 4

Natural Environment	Social Environment	Cultural Environment	Transportation	Cost	
<ul style="list-style-type: none"> Relatively low impact to Greenbelt Core Natural Areas (except as noted below) Requires new watercourse crossing of Mud Creek (Core Natural Area) 	<ul style="list-style-type: none"> Some community impacts along Navan Road Community impacts along north edge of Bradley Estates Potential for increase in noise and vibration levels to sensitive noise receivers (St. Mary the Virgin Anglican Church, Orléans Montessori Preschool and Childcare and residential houses) Severs tile drained active agricultural lands 	<ul style="list-style-type: none"> Impact to areas of archaeological potential Potential impact to a property that has high potential to be of cultural heritage value or interest (church and cemetery on Navan Road) 	<ul style="list-style-type: none"> Accommodates Travel Demand 	<ul style="list-style-type: none"> Moderate costs 	Carry Forward
<i>Average --</i>	<i>Average --</i>	<i>Average --</i>	<i>Good √</i>	<i>Average --</i>	

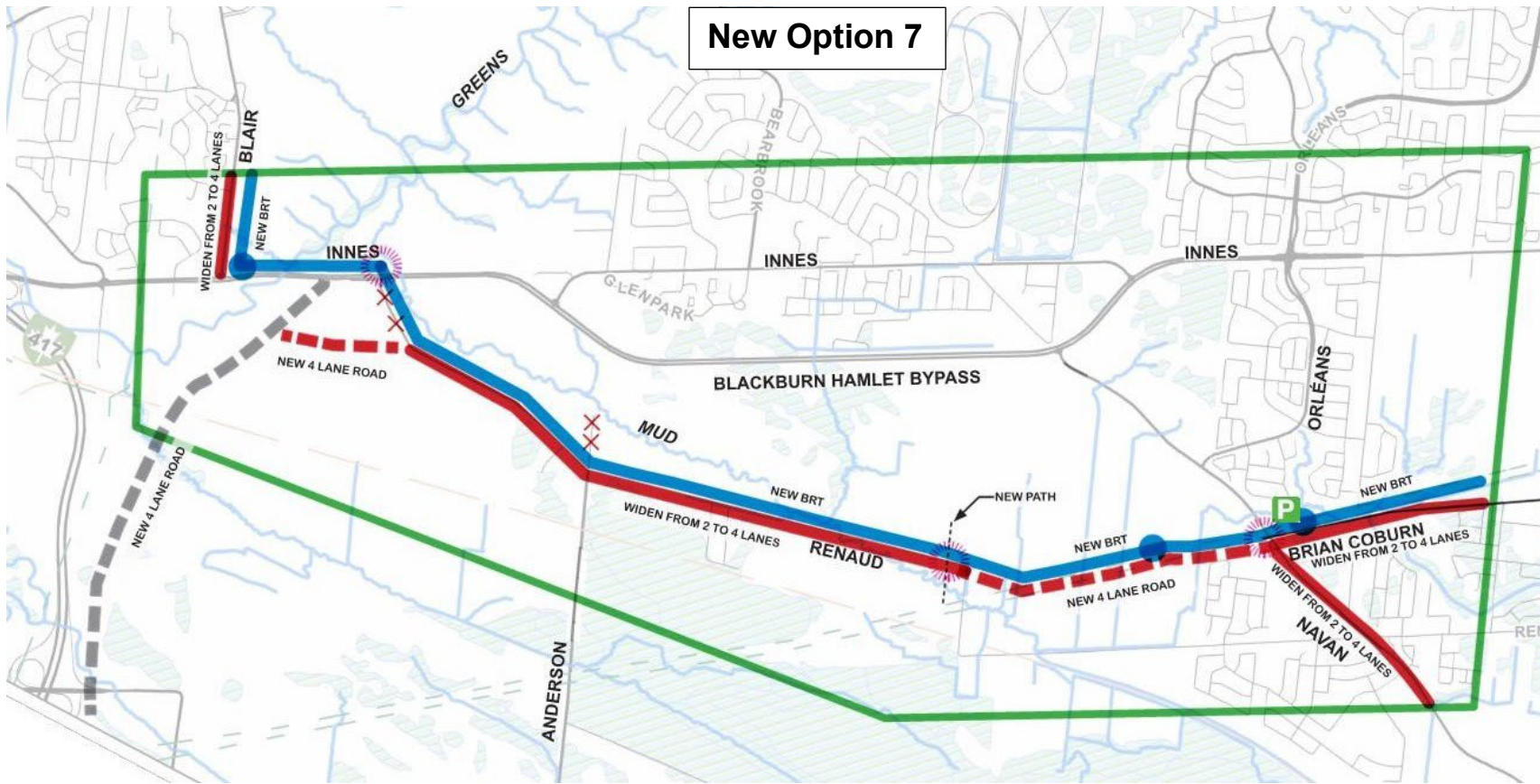


Natural Environment	Social Environment	Cultural Environment	Transportation	Cost	
<ul style="list-style-type: none"> Impacts to Greenbelt from 2 corridors Requires two new watercourse crossings (Mud Creek tributaries) Avoids crossing of deeper Mud Creek valley (and Core Natural Area) as under Options 1 to 4 	<ul style="list-style-type: none"> Less impact to community along Navan Road Community impacts along north edge of Bradley Estates but expect less cut-through traffic Potential for increase in noise and vibration levels to sensitive noise receivers (St. Mary the Virgin Anglican Church, Orléans Montessori Preschool and Childcare and residential houses) Severs tile drained active agricultural lands 	<ul style="list-style-type: none"> Impact to areas of archaeological potential 	<ul style="list-style-type: none"> Accommodates Travel Demand 	<ul style="list-style-type: none"> Higher costs (additional BRT grade separation at Navan/BC with removal of cul de sac) Geotechnical works required 	Carry Forward
<i>Poor X</i>	<i>Good √</i>	<i>Average --</i>	<i>Good √</i>	<i>Poor X</i>	



Option 6

Natural Environment	Social Environment	Cultural Environment	Transportation	Cost	
<ul style="list-style-type: none"> Impacts to Greenbelt from 2 corridors (but less impact vs. Option 5) Requires extension of two existing watercourse crossings (Mud Creek tributaries) Avoids crossing of deeper Mud Creek valley (and Core Natural Area) as under Options 1 to 4 	<ul style="list-style-type: none"> Higher community impacts along Navan Road with BRT bridge structure at Orleans Blvd. Community impacts along north edge of Bradley Estates but expect less cut-through traffic Could create an increase in noise and vibration levels to sensitive noise receivers (St. Mary the Virgin Anglican Church, Orléans Montessori Preschool / Childcare and houses) Severs tile drained active agricultural lands 	<ul style="list-style-type: none"> Impact to areas of archaeological potential Potential impact to a property that has high potential to be of cultural heritage value or interest (church and cemetery on Navan Road) 	<ul style="list-style-type: none"> Accommodates Travel Demand 	<ul style="list-style-type: none"> High costs Geotechnical works required 	Do Not Carry Forward
<i>Poor X</i>	<i>Poor X</i>	<i>Poor X</i>	<i>Good</i> ✓	<i>Poor X</i>	



Natural Environment	Social Environment	Cultural Environment	Transportation	Cost	
<ul style="list-style-type: none"> Impacts to Greenbelt from widest Renaud corridor but focuses infrastructure on a single route Requires extension of two existing watercourse crossings (Mud Creek tributaries) Avoids crossing of deeper Mud Creek valley (and Core Natural Area) as under Options 1 to 4 	<ul style="list-style-type: none"> Least impact to Navan Road community Community impacts along north edge of Bradley Estates but expect less cut-through traffic Severs tile drained active agricultural lands 	<ul style="list-style-type: none"> Impact to areas of archaeological potential 	<ul style="list-style-type: none"> Accommodates Travel Demand Potentially lower transit ridership potential 	<ul style="list-style-type: none"> Moderate to high costs Geotechnical works required 	Carry Forward
<i>Poor X</i>	<i>Good ✓</i>	<i>Average --</i>	<i>Average --</i>	<i>Average --</i>	

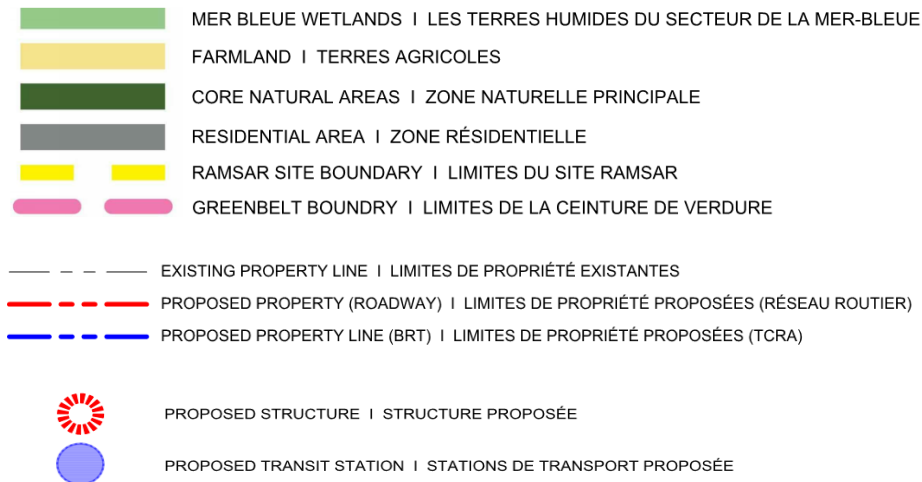
Evaluation of 4 Short-Listed Options

Following the screening to the four short-listed options, each option and corridor alignment was further developed to gain an understanding of the footprint and impacts on the environment. Since these options are located within the NCC Greenbelt lands, the evaluation criteria was developed in consultation with NCC staff to reflect the importance of the Greenbelt and to ensure a comprehensive assessment of potential environmental impacts. The evaluation was based on the four broad criteria groups (Natural environment, Social and Cultural environment, Transportation, and cost) and 31 associated indicators. Quantitative and/or qualitative measurements were obtained for each option, which were then used to rank each option from least to most preferred. A tally of the rankings culminated in the selection of Option 7 as the Technically Preferred Option.

Given the project's high potential impact on the NCC Greenbelt, and to test the rigour of the results, a sensitivity analysis was also performed to examine the extent to which the rankings of the Options are affected by adjusting the weights of each broad criteria group to zero and effectively eliminating one specific criteria. Of the five tests conducted, Option 7 ranked first in four tests by excluding Natural Environment in one test, excluding Social and Cultural Environment in a second test, excluding cost in a third test (Option 1 was a close second), and by weighting all 31 individual factors equally (Option 1 was a close second). For the fifth test, a weighting for the Natural Environment criteria was calculated to force Options 1 and 7 to tie as ranking first overall on the evaluation, resulting in a higher-than-normal weighting of 66% for the Natural Environment alone. While impacts on the natural environment is important, a holistic assessment of the project based on the potential for all environmental impacts must be considered.

Results of the sensitivity testing confirmed Option 7 as the Technically Preferred Option. The detailed assessment and evaluation, ranking of the short-listed options and the sensitivity testing leading to the Technically Preferred Option 7 is documented in Table 3. Table 4 provides a key summary of the evaluation results.

The following is a description of each of the short-listed corridor options and are illustrated in Figures 12 to 15, which have been superimposed over the natural environment features of the area to illustrate the features being impacted. Figure 11 provides the legend for the corridor options.



This option aligns more closely with the City’s Transportation Master Plan and the NCC’s Greenbelt Master Plan (GMP). From Navan Road, the road and transit corridor traverses significant Greenbelt farmland as it runs parallel and south of Navan Road and along the BHBP. It has the highest impact on farmland and higher amounts of habitat fragmentation. Midpoint of the BHBP, the corridor impacts the forested area south of the BHBP, which is designated Core Natural Area. Along this corridor are many water crossings impacting fisheries and aquatic habitat, four grade separated structures, including a significant crossing of the Mud Creek valley south of Innes Road, and two transit stations, resulting in the highest cost of the 4 options.

Benefits of this route include having the least overall natural environmental impact of the four options since bundling of the road and transit corridors reduce the impact on wildlife natural linkages. It is also further away from the Mer Bleue wetland. Although this option ranked first for the natural environment criteria, it had the highest cost and ranked second overall on the evaluation.

Option 4 (Figure 13) – Ranked 3rd Overall and Preferred by NCC

This option also aligns more closely with the City’s TMP and the NCC’s GMP and is similar to Option 1, except that the BCB would be located along a widened Navan Road. While there is less farmland impact, it has the highest private property impacts and associated noise and vibration impacts along Navan Road. This option ranked third overall in the evaluation due to the high social and cultural impacts and higher cost.

Option 5 (Figure 14) – Ranked 4th Overall and Not Supported by NCC

While the BRT in Option 5 follows Option 1, the new roadway splits away from the BRT in a separate corridor west and extends BCB directly west down the escarpment, following the hydro corridor, before dropping down to existing grade through the NCC Greenbelt to connect to the existing Renaud Road and Anderson Road, both widened to four lanes. Approximately 400 metres before Innes Road, the new road corridor splits away from Anderson Road to connect to the future IWCH link. The IWCH link is a separate City project with an approved Environmental Assessment and will need to be implemented in advance for this connection.

Whereas bundling transportation corridors lessens the environmental impacts, splitting the road and transit corridor into two separate corridors results in the highest overall impacts to the natural, social and cultural environment. As the transit corridor follows Option 1, it therefore has similar impacts along that corridor, although to a slightly lesser extent due to the reduced footprint. However, new impacts are introduced along the new 4 lane road corridor extending from BCB resulting in greater overall impacts. As the new road corridor crosses farmland, it also severs the land parcels, is closer to the Mer Bleue wetland and further impacts natural wildlife linkages and terrestrial habitat and has the highest habitat fragmentation. In addition, the road corridor crosses and runs parallel to Mud Creek and note that these impacts are in addition to the BRT corridor impacts. This option also has the most water crossings impacting fisheries and aquatic habitat and ranked fourth and last overall on the evaluation.

Option 7 (Figure 15) – Ranked 1st Overall and Not Supported by NCC

Option 7 bundles the BRT and follows the roadway corridor in Option 5 with the BRT to the north of the roadway corridor. Approximately 400 metres from south of Innes Road, the BRT will take over Anderson Road (which is to be closed west of Renaud Road), then passes under and to the north of Innes Road to connect to Blair Road. This option further bundles the road and transitway with Renaud Road and Anderson Road on an already existing and disturbed corridor. While it traverses farmland west of Navan Road and severs farmland parcels, it has the lowest natural habitat fragmentation (as measured by total new corridor length) and it also crosses and runs parallel to Mud Creek.

This corridor is closer to the Mer Bleue wetland and because of the wider footprint along the new corridor, it has greater impact to terrestrial at risk and sensitive species as well as natural wildlife linkages. Although this option ranked a close second on the natural

environment criteria, it had the lowest cost and ranked first under the Transportation and Social and Cultural Environment and is therefore the Technically Preferred Option.

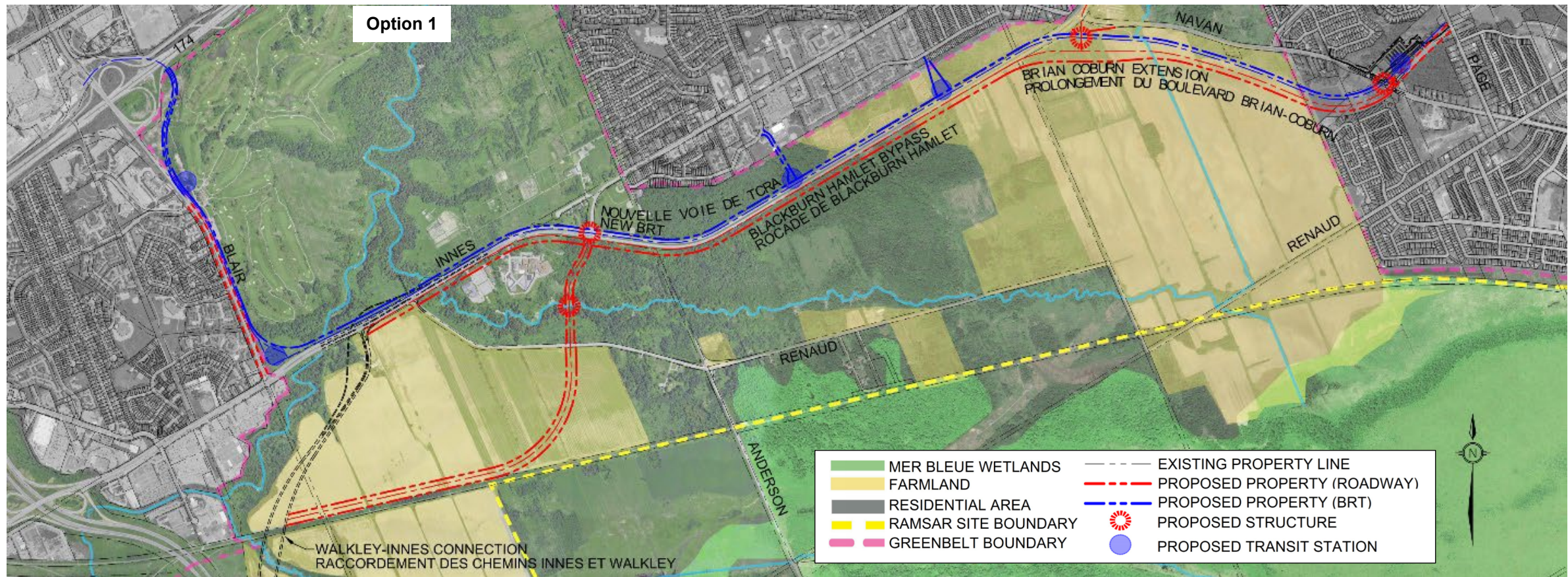


Figure 12: Option 1 – New Road and BRT off Navan (Most Similar to TMP)

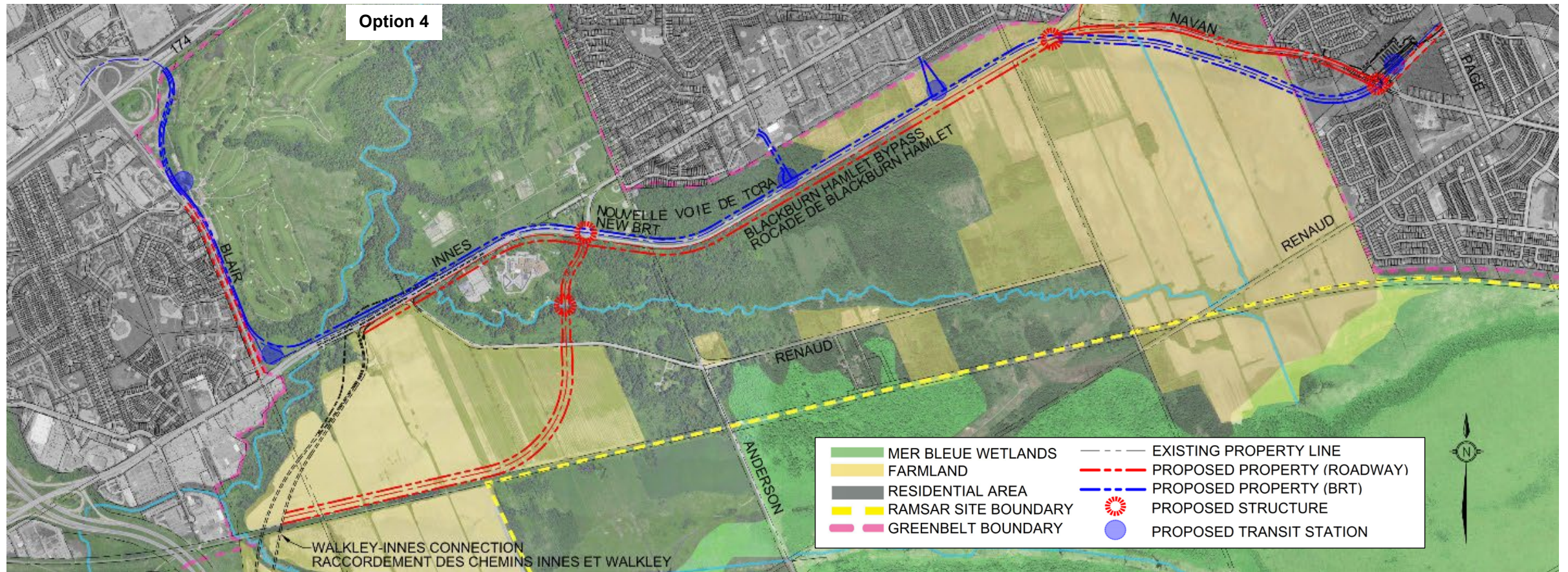


Figure 13: Option 4 – Modified TMP – Widen Navan / BRT off Navan

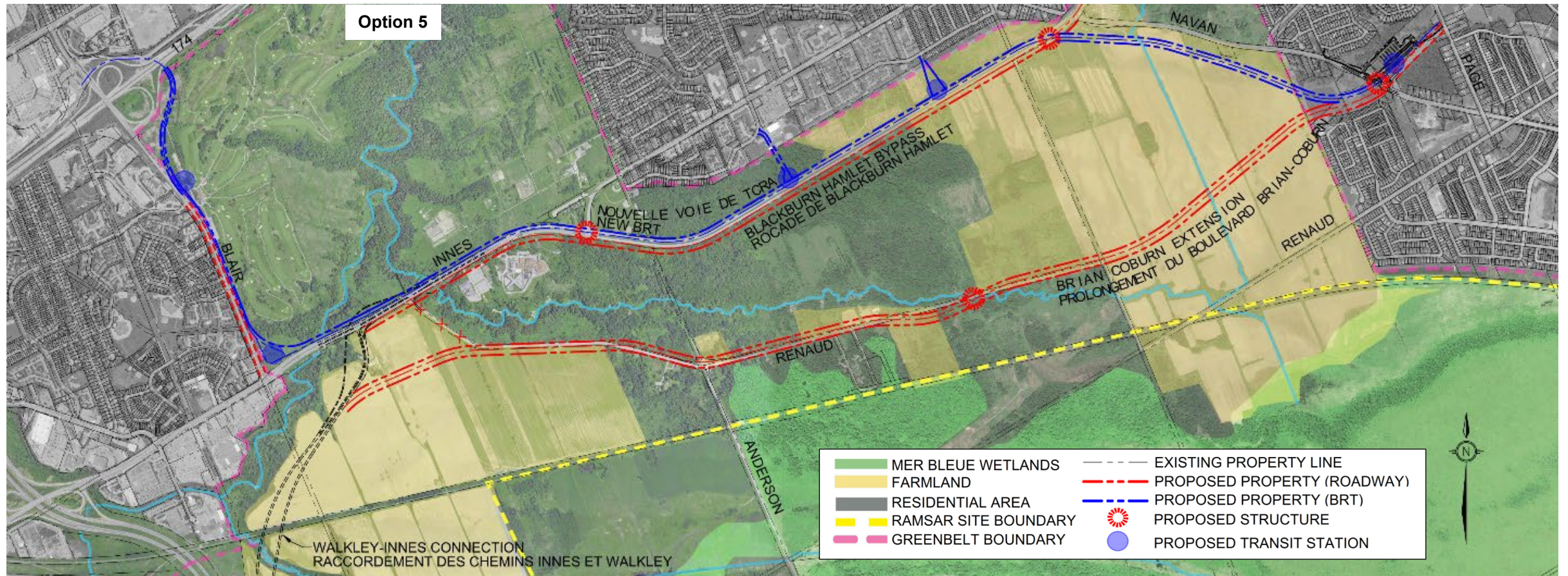


Figure 14: Option 5 – Renaud Extension and BRT off Navan

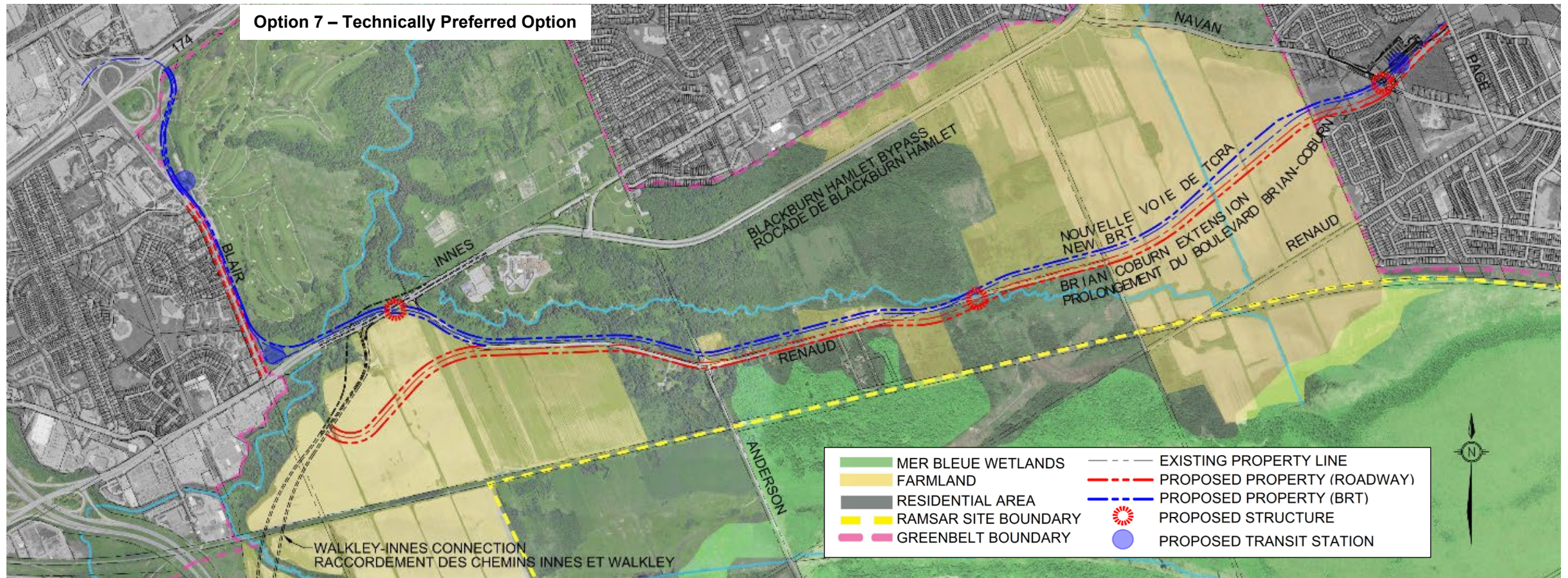






















Figure 15: Option 7 – Renaud Extension and BRT on Renaud

Table 3: Assessment and Evaluation of Four Short-Listed Options








































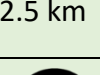
















Evaluation Criteria					Assessment of Alternatives			
Factors	Criteria	Rationale	Indicator	Comparison	Option 1 - New Road and BRT off Navan	Option 4 - Widen Navan/BRT off Navan	Option 5 - Renaud Extension and BRT off Navan	Option 7 - Renaud Extension and BRT on Renaud
1. Transportation and Transit								
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	Maintain / enhance emergency	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.

	Vehicle and Service Access	vehicle and service access						
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					29/32 91%	28/32 88%	31/32 97%	32/32 100%
8 Indicators x 4 (highest score) = 32								

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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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
Climate Change Mitigation	2.10 Carbon Footprint	Avoid / minimize impact to carbon sinks (wetland, plants)	Least amount of area (Ha) within wetland and vegetation	Quantitative	Area = 9.6 Ha	Area = 11 Ha	Area = 8.6 Ha	Area = 6.1 Ha.
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					36/44	31/44	23/44	32/44
Relative Performance (%) = Total score / Maximum Score of 44					82%	70%	52%	73%
11 indicators x 4 (highest score) = 44								

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 - 15 	Private Parcels: 30-40 	Private Parcels: 15-20 	Private 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	- # of businesses affected	Quantitative	Total 17 - 8 businesses on route	Total 18 - 8 businesses on route	Total 19 - 9 businesses on route	Total 15 - 9 businesses on route

		businesses including Agricultural	- # of farms affected		- 9 farms on route 	- 10 farms on route 	- 10 farms on route 	- 6 farms on route 
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. 	Potential impacts to 5 Greenbelt views. 	Potential impacts to ALL 7 Greenbelt views. 	Potential impacts to 4 Greenbelt views. 
					4 above grade features - 3 grade separations - 1 high 8m embankment proposed 	3 above grade features - 3 grade separations - Filling at mud creek required 	3 above grade features - 3 grade separations - 1 high 8 m embankment proposed 	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)	Minimize potential	Potential # of heritage	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

	Heritage Properties	encroachment on listed (Ottawa) heritage properties	properties impacted					
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					3/4 75% 	3/4 75% 	3/4 75% 	4/4 100% 
Relative Performance (%) = Total score / Maximum Score of 4 1 indicator x 4 (highest score = 4)								

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

Evaluation Criteria Groups	Short Listed Options - Assessment of Alternatives					Preferred Option(s)
	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 (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
<u>Overall Ratings (All Criteria)</u>	79% 	75% 	72% 	90% 		Option 7
	Relative Ranking: 1 st =  ; 2 nd =  ; 3 rd =  ; 4 th = 					

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

























	Short Listed Options - Assessment of Alternatives				
<u>SENSITIVITY TESTS DESCRIPTION</u>	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: 1 st =  ; 2 nd =  ; 3 rd =  ; 4 th = 				

Table 4: Highlights of Comparative Evaluation Summary of the 4 Short-Listed Options

Criteria	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)
Transportation and Transit (8 Factors)	<p>Moderately Preferred</p> <ul style="list-style-type: none"> - Impacts neighbourhood traffic with cut-through traffic 	<p>Moderately Preferred -</p> <ul style="list-style-type: none"> - Impacts Navan Road residents with more traffic 	<p>Moderately Preferred -</p> <ul style="list-style-type: none"> - Provides alternate and most direct route between Orléans South to the Walkley/Hunt Club area 	<p>Most Preferred</p> <ul style="list-style-type: none"> - Most direct route for transit - Provides alternate and most direct route between Orleans South to the Walkley/Hunt Club area 	Option 7
Natural Environment (11 Factors)	<p>Most Preferred</p> <ul style="list-style-type: none"> - Highest Core Natural Area impacts - Higher habitat fragmentation - Further away from Mer Bleue wetland 	<p>Moderately Preferred</p> <ul style="list-style-type: none"> - Highest Core Natural Area impacts - Higher habitat fragmentation - Moderate impact on fisheries, aquatic and terrestrial habitat - Higher habitat fragmentation - Further away from Mer Bleue wetland 	<p>Least Preferred</p> <ul style="list-style-type: none"> - Moderate Core Natural Area impacts - Highest impact on fisheries, aquatic and terrestrial habitat - Closer to Mer Bleue wetland - Moderate impact on wildlife natural link areas - Highest impact within areas of unstable slopes 	<p>Moderately Preferred</p> <ul style="list-style-type: none"> - Least Core Natural Area impacts - Closer to Mer Bleue wetland - Least habitat fragmentation - Moderate impact within areas of unstable slopes - Highest impact on Mud Creek - Higher impact on Species at Risk 	Option 1

<p align="center">Social/ Cultural Environment (11 Factors)</p>	<p>Moderately Preferred</p> <ul style="list-style-type: none"> - Highest impact on farmland - Highest impact on Greenbelt experience - Moderate impacts on air quality, noise and vibration 	<p>Moderately Preferred</p> <ul style="list-style-type: none"> - Highest impact on private properties, noise and vibration - Highest potential Heritage property impacts 	<p>Moderately Preferred</p> <ul style="list-style-type: none"> - Severs farm parcels - Moderate impact on areas of archaeological potential - Highest impact on views and vistas 	<p>Most Preferred</p> <ul style="list-style-type: none"> - Severs farm parcels - Least impact on private properties, noise and vibration - Highest impact to areas of archaeological potential 	<p align="center">Option 7</p>
<p align="center">Cost (1 Factor)</p>	<p>Least Preferred</p> <ul style="list-style-type: none"> - 60% greater than Option 7 	<p>Moderately Preferred</p> <ul style="list-style-type: none"> - 40% greater than Option 7 	<p>Moderately Preferred</p> <ul style="list-style-type: none"> - 50% greater than Option 7 	<p>Most Preferred</p> <ul style="list-style-type: none"> - Lowest cost 	<p align="center">Option 7</p>

