

Document 1

Evaluation of Alternative Solutions

1.0 SUMMARY OF NEEDS AND OPPORTUNITIES

It was established that there is a need and opportunity to reconstruct Leitrim Road between River Road and Bank Street. The planning and design objectives of this study are to:

1. Reinforce east-west connectivity with the north-south arterial road network at River Road, Limebank Road, Albion Road, and Bank Street;
2. Connect the growing communities of Riverside South and Leitrim for general movements by all modes;
3. Enable the Airport Authority's plan for a future southern runway, by realigning the existing roadway;
4. Provide the framework and structure for a network of existing and new collector roads and local streets servicing new urban development areas;
5. Provide a new multi-modal connection to the Leitrim Station on the Trillium Line, and its Park & Ride;
6. Consider the long-term travel demands related to a potential future connection across the Rideau River that is planned to connect Fallowfield Road to Limebank Road at a location to the north of Leitrim Road;
7. Accommodate an in-corridor cycling spine route as well as adjacent pathways and crossings of the Arterial Road;
8. Provide a truck route that will service the needs of existing and future employment uses in Riverside South and Leitrim;
9. Provide a corridor for inclusion of municipal water, sanitary, and stormwater services and utilities in some locations; and,
10. Define the edge and landscape treatment of the abutting portions of the NCC's Greenbelt, and provide opportunities for enhancement of valued natural and cultural heritage features.

To meet these objectives, this study identifies the specific need and opportunity for:

- The relocation and abandonment of the roadway where required from its current location to permit the Airport's construction of a future southern runway;
- The provision of in-corridor cycling and pedestrian facilities suitable to the land use context, as well as appropriate crossings at intersections and connections at mid-block locations;
- The opportunities to provide for bus transit movements and future bus stops;

- The equivalent transportation capacity of one additional travel lane in each direction within the Leitrim Road corridor between Limebank Road and Bank Street, whereas one-lane in each direction will be sufficient for the sector of existing Leitrim Road between River Road and Limebank Road;
- The remediation to natural landscape of portions of the abandoned roadway that are not needed for the Airport’s future southern runway;
- A multi-modal connection to the Leitrim Station on the Trillium Line and its Park & Ride;
- Appropriate traffic-controlled intersections (signalized and/or roundabouts) between Leitrim Road and the intersecting Arterial Roads, namely: River Road; Limebank Road; Albion Road; and Bank Street; and,
- Appropriate connections between Leitrim Road and the intersecting Collector and Major Collector Roads, namely, existing Bowesville Road and Kelly Farm Drive, as well as other future roads to support abutting developments.

These needs and opportunities are identified to provide the required additional transportation capacity within the 2031 planning horizon to/from planned southern growth communities and to/from the central portion of the City, and beyond. The project also creates an opportunity to improve or enhance valued environmental components such natural and cultural heritage features, including those found in the Greenbelt and adjacent to Provincially Significant Wetlands.

1.1 DESCRIPTION OF ALTERNATIVE SOLUTIONS

A list of alternative solutions that have potential to address the project needs and opportunities, at least in part was developed. These are described in Table below.

Table 1: List of Alternative Solutions Evaluated

Alternative		Description
1	Do nothing in the corridor	Provide no new transportation infrastructure in the corridor and do not reconstruct Leitrim Road. Rely on other transportation infrastructure investments outlined in the TMP for transportation capacity for all modes. Do not accommodate the Airport’s new southern runway and associated infrastructure and clearances.
2	Close and abandon a section of Leitrim Road to enable the southern runway and do nothing else	Close and abandon a portion of Leitrim Road where required to accommodate the Airport’s new southern runway, associated infrastructure and clearances. Rely on other transportation infrastructure investments outlined in the TMP.

Alternative		Description
3	Close and abandon a section of Leitrim Road to enable the southern runway and construct a tunnel (under the airfield) to accommodate a below-grade Arterial Road	Close and abandon a portion of Leitrim Road where required to accommodate the Airport's new southern runway and associated infrastructure and clearances, and accommodate the Arterial Road in a tunnel under the airfield in or adjacent to the existing corridor.
4	Close and abandon a section of Leitrim Road to enable the southern runway and construct only new active transportation facilities to the south	Close and abandon a portion of Leitrim Road where required to accommodate the Airport's new southern runway, associated infrastructure and clearances. Construct new multi-use pathway in a southerly alignment.
5	Close and abandon a section of Leitrim Road to enable the southern runway and convert and extend Spratt Road to Findlay Creek Drive as a new Arterial Road and complete street serving the adjacent communities	Close and abandon a portion of Leitrim Road where required to accommodate the Airport's new southern runway and associated infrastructure and clearances, and develop a new east-west arterial by reconstructing and extending Spratt Road to connect to a reconstructed Findlay Creek Drive.
6	Close and abandon a section of Leitrim Road to enable the southern runway and implement enhanced Transportation Demand Management (TDM) and Transit Strategies	Close and abandon a portion of Leitrim Road where required to accommodate the Airport's new southern runway and associated infrastructure and clearances and enact additional TDM and transit strategies above those planned in the TMP. These might include enhanced policies, programs and/or promotions that influence travel behavior, including those related to teleworking, carpooling, and location/distribution of jobs and housing, construct additional Park and Ride lot capacity at Leitrim Station and/or Bowesville Station, and extend the Bus Rapid Transit (BRT) link from Bowesville Station to Riverside South Town Centre Station.

Alternative		Description
7	Close and abandon a section of Leitrim Road to enable the southern runway and add transportation capacity to other Arterial Roads	Close and abandon portion of Leitrim Road where required to accommodate the Airport's new southern runway and associated infrastructure and clearances, and add additional transportation capacity to other Arterial Roads serving east-west travel demand, over and above those planned in the TMP. Potential road reconstruction candidates may include: <ul style="list-style-type: none"> • Hunt Club Road (6 to 8 lanes from Riverside to Bank); • Earl Armstrong Road (4 to 6 lanes from Limebank to Bowesville, and 2 to 4 lanes Bowesville to Bank); and, • Rideau Road (2 to 4 lanes from Limebank to Bank).
8	Close and abandon a section of Leitrim Road to enable the southern runway and Construct a replacement Arterial Road and complete street only in those limits	Close and abandon a portion of Leitrim Road where required to accommodate the Airport's new southern runway and associated infrastructure and clearances. Reconstruct Leitrim Road only to the extent required to accommodate construction and operation of the Airport's new southern runway and associated infrastructure and clearances. Do not modify the remainder of the Leitrim Road corridor.
9	Close and abandon a section of Leitrim Road to enable the southern runway, construct a replacement Arterial Road in those limits, and reconstruct the remainder of Leitrim Road as an Arterial Road and complete street serving the adjacent communities	Close and abandon a portion of Leitrim Road where required to accommodate the Airport's new southern runway and associated infrastructure and clearances. Realign and reconstruct that segment and the remainder of Leitrim Road as a complete street, appropriate to the various adjacent land use contexts.

Note: The TMP investments outside the corridors within the planning horizon are included in all alternative solutions considered, and include:

- *Trillium Line Extension;*
- *New or expanded Park and Ride Facilities;*
- *Widening of other Arterial Roads;*
- *Construction of new Collector and Major Collector Roads; and,*
- *On-road bicycle facilities and multi-use pathways.*

This long list of alternative solutions was subject to a two-step screening/evaluation process. The first step involved a screening of the ability of each alternative to

sufficiently meet the project need/opportunity. If the alternative passed that screening, it was then carried forward for a more holistic evaluation.

1.2 SCREENING OF LONG LIST OF ALTERNATIVE SOLUTIONS

As noted, the first step in the evaluation process is a screening of alternative solutions based on their ability (or not) to sufficiently achieve the identified transportation capacity and need to realign the road. The results are shown in

Table .

Table 2: Results of Screening of Long List of Alternative Solutions based on Project Need/Opportunity

Alternative		Description	Screening Result
1	Do Nothing in the Corridor	Does not sufficiently address the need/opportunity	Screened out, but carried forward for comparison purposes
2	Close and Abandon a Section of Leitrim Road to enable the Southern Runway and do nothing else	Does not sufficiently address the need/opportunity	Screened out
3	Close and Abandon a Section of Leitrim Road to enable the Southern Runway and Construct a tunnel (under the airfield) to accommodate a below-grade Arterial Road	Does not sufficiently address the need/opportunity	Screened out
4	Close and Abandon a Section of Leitrim Road to enable the Southern Runway and construct only new active transportation facilities to the south	Does not sufficiently address the need/opportunity	Screened out
5	Close and Abandon a Section of Leitrim Road to enable the Southern Runway and convert and extend Spratt Road to Findlay Creek Drive as a new Arterial Road and complete street serving the adjacent communities	Does not sufficiently address the need/opportunity	Screened out

Alternative	Description	Description	Screening Result
6	Close and Abandon a Section of Leitrim Road to enable the Southern Runway and implement enhanced Transportation Demand Management (TDM) and Transit Strategies	Does not sufficiently address the need/opportunity	Screened out
7	Close and Abandon a Section of Leitrim Road to enable the Southern Runway and add transportation capacity to other Arterial Roads	Has a potential to sufficiently address the need/opportunity	Carried forward for further evaluation
8	Close and Abandon a Section of Leitrim Road to enable the Southern Runway and Construct a replacement Arterial Road and complete street serving the adjacent communities, only in those limits	Has a potential to sufficiently address the need/opportunity	Carried forward for further evaluation
9	Close and Abandon a Section of Leitrim Road to enable the Southern Runway, Construct a replacement Arterial Road in those limits, and Reconstruct the remainder of Leitrim Road as an Arterial Road and complete street serving the adjacent communities	Has a potential to sufficiently address the need/opportunity	Carried forward for further evaluation

Of the alternative solutions identified and evaluated, four (4) were carried forward for further evaluation. The Do Nothing alternative (Alternative 1) does not address the transportation capacity, but was carried forward as an alternative solution for comparison purposes.

Of note, Alternative 5 was screened out because it would require construction through the Leitrim Wetland, and both Spratt Road and Findlay Creek Drive are designated as collector roads in the Official Plan (OP), and as such are unsuitable candidates for reconstruction as urban arterials. Alternative 3 (a tunnel) would be cost-prohibitive and would create unnecessary safety/security risks. The other alternatives failed to provide sufficient transportation capacity and failed to retain continuity in Leitrim Road as an Arterial Road, which the Official Plan stipulates as the objective of accommodating the highest volumes of travel over the longest distances. Enhanced TDM measures (Alternative 6) do not on their own address the needs/opportunities. They are however,

an important component and are considered part of all solutions. Similarly, new walking and cycling infrastructure will be provided in any preferred solution, in keeping with the corridor's OP and TMP designations. The alternatives carried forward include 1, 7, 8 and 9.

1.3 EVALUATION OF THE REMAINING SOLUTIONS

The three (3) alternative solutions that had at least some potential to sufficiently address the need/opportunity, and the Do Nothing for comparison, were carried forward for further evaluation, and renamed A, B, C and D. Each was subject to a high level environmental impact assessment based on transportation need, social, biological, physical and economic criteria:

1. **The ability of the alternative to fully address the project need.** Alternative solutions must provide transportation capacity for all modes to meet the transportation needs in the study area during the planning horizon, and enable the implementation of the Airport's planned southern runway.
2. **Adherence to policies, regulations, and local standards of practice.** Alternative solutions should comply with provincial/federal policies or municipal regulations or policies.
3. **Consideration of environmental impacts.** Alternatives should result in impacts on the various environmental conditions that are minimal or that have a likelihood of being able to be managed and/or mitigated through design, or have a positive effect. The ability to avoid, reduce and minimize impacts was considered.

The evaluation results are provided in Table 3.

Table 3: Results of Evaluation of Short List of Alternative Solutions

Criteria		Alternative A: Do Nothing	Alternative B: Close and Abandon Section of Leitrim Road and Add Transportation Capacity to Other Arterials	Alternative C: Reconstruct and Realign Leitrim Road for Southern Runway Only	Alternative D: Reconstruct and Realign all of Leitrim Road in the Study Area
1a	<p>Transportation Need:</p> <p>Ability to meet travel demand of all modes throughout the planning horizon</p>	<p>Does not address the need related to vehicular travel demand. Transit users would be served by the Trillium Line Extension, however supporting bus routes would have to operate on other corridors. Cyclists and pedestrians may be accommodated in corridors outside the Leitrim Road corridor.</p>	<p>To address the need the following arterials may need to be reconstructed with additional vehicle lanes as noted:</p> <ul style="list-style-type: none"> • Hunt Club Road • Earl Armstrong Road • Rideau Road <p>Transit users would be served by the Trillium Line Extension and supporting bus routes. Pedestrians and cyclists may be accommodated in corridors outside the Leitrim Road corridor.</p>	<p>Partially addresses the need. Vehicular demand would be accommodated only in the reconstructed section. Transit users would be served by the Trillium Line Extension and supporting bus routes which could operate on the reconstructed section of Leitrim Road. Pedestrians and cyclists would be accommodated within the reconstructed section and may be accommodated in corridors outside the Leitrim Road corridor.</p>	<p>Fully addresses the need. Pedestrians, cyclists and vehicles would be accommodated in the Leitrim Road corridor. Transit users would be served by the Trillium Line Extension and supporting bus routes which could operate on the reconstructed facility and connect directly to Leitrim Station.</p>

Criteria		Alternative A: Do Nothing	Alternative B: Close and Abandon Section of Leitrim Road and Add Transportation Capacity to Other Arterials	Alternative C: Reconstruct and Realign Leitrim Road for Southern Runway Only	Alternative D: Reconstruct and Realign all of Leitrim Road in the Study Area
1b	Airport Need: Enable construction of new Southern Runway	Does not enable the construction of the new southern runway.	Enables the construction of the new southern runway.	Enables the construction of the new southern runway.	Enables the construction of the new southern runway.
1c	Development Need: Provide structure for collector roads and local streets in new development areas	Partially addresses the need. Existing corridor is continuous and provides structure for some planned development areas within Study Area. Does not provide necessary structure for Airport southern development lands as contemplated in their proposed Land Use Plan.	Does not address the need. Discontinuous corridor does not provide necessary structure for all planned development areas across full length of Study Area, specifically Airport southern development lands.	Partially addresses the need. Reconstructed corridor is continuous and provides necessary structure for planned development areas across full length of Study Area. Does not permit airside access for Airport southern development lands as contemplated in their proposed Land Use Plan.	Fully addresses the need. Reconstructed corridor is continuous and provides necessary structure for all planned development areas across full length of Study Area.

Criteria		Alternative A: Do Nothing	Alternative B: Close and Abandon Section of Leitrim Road and Add Transportation Capacity to Other Arterials	Alternative C: Reconstruct and Realign Leitrim Road for Southern Runway Only	Alternative D: Reconstruct and Realign all of Leitrim Road in the Study Area
1d	Rapid Transit Need: Provide new pedestrian and bicycle connection to Leitrim Station	No new connection to station provided. Vehicular access to station from existing Leitrim Road only. Pedestrian and cyclist access from Quinn Road maintained.	No new connection to station provided. Vehicular access to station from existing Leitrim Road only. Pedestrian and cyclist access from Quinn maintained.	New connection to station may or may not be provided depending on extent and location of reconstructed corridor to accommodate runway. If not, vehicular access to station from existing Leitrim Road only. Pedestrian and cyclist access from Quinn maintained.	New connection to station provides access for all modes from reconstructed corridor. Pedestrian and cyclist access from Quinn maintained.
1e	Long-term Need: Accommodate travel demand related to future Rideau River Crossing	Does not address the need. Additional travel demand would have to be accommodated on other corridors.	Does not address the need. Existing and additional travel demand would have to be accommodated on other corridors.	Partially addresses the need. Travel demand would be accommodated on reconstructed section only.	Fully addresses the need. Travel demand accommodated for full length of corridor in Study Area.

Criteria		Alternative A: Do Nothing	Alternative B: Close and Abandon Section of Leitrim Road and Add Transportation Capacity to Other Arterials	Alternative C: Reconstruct and Realign Leitrim Road for Southern Runway Only	Alternative D: Reconstruct and Realign all of Leitrim Road in the Study Area
2a	<p>Policies, Regulations, and Standards:</p> <p>Supports planned function to accommodate growth and policies and/or standards of municipal, provincial, and federal authorities</p>	Does not address the planned function to accommodate growth.	Does not address the planned function to accommodate growth. The reconstruction of other arterials was considered as part of the TMP review and is not supported.	Would only partially address the planned function to accommodate growth over the length of reconstruction.	Would fully address the planned function to accommodate growth in the Study Area.
2b	<p>Policies, Regulations, and Standards:</p> <p>Provide in-corridor Cycling Spine Route</p>	Does not address. No in-corridor cycling facilities provided.	Does not address. No in-corridor cycling facilities provided.	Partially addresses. In-corridor cycling facilities only provided in reconstructed section.	Fully addressed. In-corridor cycling facilities provided for full length of corridor in Study Area fulfilling spine route policy.

Criteria		Alternative A: Do Nothing	Alternative B: Close and Abandon Section of Leitrim Road and Add Transportation Capacity to Other Arterials	Alternative C: Reconstruct and Realign Leitrim Road for Southern Runway Only	Alternative D: Reconstruct and Realign all of Leitrim Road in the Study Area
2c	<p>Policies, Regulations, and Standards:</p> <p>Provide Truck Route to serve Vacant Employment Areas</p>	Partially addresses. Provides direct connection for trucks serving vacant employment lands immediately adjacent to existing Leitrim Road within Study Area.	Does not address. Discontinuous corridor. Only provides direct connection for trucks serving vacant employment lands immediately adjacent to remnant sections of existing Leitrim Road within Study Area.	Partially addresses. Provides direct connection for trucks serving vacant employment lands immediately adjacent to reconstructed and existing Leitrim Road. (Not all vacant employment lands in Study Area abut existing Leitrim Road corridor.)	Fully addresses policy. Provides direct connection for trucks serving vacant employment lands immediately adjacent to reconstructed corridor. Serves greatest amount of vacant employment lands in Study Area.
2d	<p>Policies, Regulations, and Standards:</p> <p>Connect Growing Communities of Riverside South and Leitrim</p>	Connects Riverside South and Leitrim communities.	Does not connect Riverside South and Leitrim communities.	Connects Riverside South and Leitrim communities.	Connects Riverside South and Leitrim communities.

Criteria		Alternative A: Do Nothing	Alternative B: Close and Abandon Section of Leitrim Road and Add Transportation Capacity to Other Arterials	Alternative C: Reconstruct and Realign Leitrim Road for Southern Runway Only	Alternative D: Reconstruct and Realign all of Leitrim Road in the Study Area
2e	<p>Policies, Regulations, and Standards:</p> <p>Provide a corridor for new municipal services in some locations</p>	Does not provide a corridor for new municipal services.	Does not provide a corridor for new municipal services.	Provides a corridor for new municipal services in area of reconstruction only.	Provides a corridor for new municipal services where needed over full length of Study Area.
3a	<p>Social:</p> <p>Minimizes impact on existing and planned communities and development lands</p>	No physical impacts. Congestion impacts to motorists and businesses. May add additional traffic on other east-west arterial and collector roads.	Physical impacts associated with unplanned road reconstruction over and above that identified in the TMP. Existing residential, commercial and employment properties on Leitrim Road east of Trillium Line cut off from access to/from the west. May add additional traffic on other east-west arterial and collector roads.	Physical impacts associated with reconstruction upon residential, commercial and employment properties on Leitrim Road east of Trillium Line. Does not account for southern airport employment/airside uses.	Physical impacts associated with reconstruction can likely be accommodated with minimal impact to adjacent communities and development lands.

Criteria		Alternative A: Do Nothing	Alternative B: Close and Abandon Section of Leitrim Road and Add Transportation Capacity to Other Arterials	Alternative C: Reconstruct and Realign Leitrim Road for Southern Runway Only	Alternative D: Reconstruct and Realign all of Leitrim Road in the Study Area
3b	Biological: Minimizes impact on natural heritage features including designated Core Natural Areas and Natural Links, Significant Wetlands, Species at Risk, surface water and aquatic habitats.	No physical impacts. Increased congestion could result in greater emissions.	Physical impacts associated with additional unplanned arterial road reconstruction.	Physical impacts associated with reconstructed portion of roadway corridor, including implications for stormwater management and ecological footprint of a new corridor through the NCC Greenbelt.	Physical impacts associated with reconstructed roadway corridor, including implications for stormwater management and ecological footprint of a new corridor through and adjacent to the NCC Greenbelt.
3c	Define Edge and Landscape Treatment Abutting NCC Greenbelt	No opportunity.	No opportunity.	Some opportunity to define edge and implement landscape treatments that enhance the visual environment and character of Leitrim Road within/adjacent to NCC Greenbelt.	Greatest opportunity to define edge and implement landscape treatments that enhance the visual environment and character of Leitrim Road within/adjacent to NCC Greenbelt.

Criteria		Alternative A: Do Nothing	Alternative B: Close and Abandon Section of Leitrim Road and Add Transportation Capacity to Other Arterials	Alternative C: Reconstruct and Realign Leitrim Road for Southern Runway Only	Alternative D: Reconstruct and Realign all of Leitrim Road in the Study Area
3d	Physical: Minimization of impacts related to geotechnical considerations (geology and hydrology)	No impacts.	Physical constraints may be variable.	Physical constraints within the Study Area include high water table requiring for designs to be at or above grade.	Physical constraints within the Study Area include high water table requiring for designs to be at or above grade.
3e	Economic: Minimization of capital construction cost as well as land acquisition costs.	No capital cost.	Additional study requirements likely to accommodate unplanned reconstruction outside the Study Area. Land acquisitions required for reconstruction may be deemed unaffordable as many corridors are within established communities and areas not presently protected for reconstruction.	Moderate capital cost anticipated (compared to reconstruction of full length of corridor). Residential, commercial and business land acquisitions anticipated, as well as some federal land acquisitions.	Greatest capital cost anticipated. Some land acquisition anticipated including some federal land acquisition.

Criteria		Alternative A: Do Nothing	Alternative B: Close and Abandon Section of Leitrim Road and Add Transportation Capacity to Other Arterials	Alternative C: Reconstruct and Realign Leitrim Road for Southern Runway Only	Alternative D: Reconstruct and Realign all of Leitrim Road in the Study Area
	Conclusion	Does not address the need and introduces additional impacts on motorists and surrounding communities. Does not permit construction of Southern Runway. Not recommended.	Impact on existing communities and corridors considered too great. Does not add capacity and connectivity in the corridor and does not support planned developments within the Study Area. Not recommended.	Impact of land requirements for a new corridor including effects on existing residential, commercial and employment lands east of Trillium Line corridor. Does not add capacity and connectivity in areas outside of Southern Runway construction and does not support planned developments within the Study Area. Not recommended.	Best accommodates the needs and opportunities within identified corridor. Adds capacity and connectivity for all modes in the corridor and supports planned developments within the study area. Provides greatest opportunity to enhance the visual environment and character of Leitrim Road. Recommended Solution

1.4 PRELIMINARY PREFERRED SOLUTION

Based on the preceding analyses, the Preliminary Preferred Solution is Alternative D, to reconstruct and realign Leitrim Road from River Road to Bank Street. This solution was evaluated to best meet the transportation and community planning needs and opportunities required in the study area within the planning horizon and it provides the greatest flexibility in the long term. New cycling and pedestrian facilities would be accommodated in the corridor. The Trillium Line Extension and supporting bus routes would be supported through a direct connection to Leitrim Station and its Park and Ride

lot. The route could fulfill its function as a Truck Route, serving the needs of vast, vacant employment-generating lands. It also creates the Arterial Road and urban design framework for the development of the adjacent lands. Furthermore, this solution gives the greatest opportunity to enhance the visual character of the roadway and minimize the environmental footprint of this facility. Finally, it provides the best opportunity for the planning and design objectives of the project to be addressed during the evaluation of alternative corridors and designs.

1.5 PREFERRED SOLUTION

The preliminary preferred solution was presented to area stakeholders along with alternative corridors in a series of consultation events, including meetings with the study's three consultation groups (Agency, Business, and Public) and at a Public Open House in September 2017. Comments received during the consultation events and in the public comment period, that relate to the alternative solutions, included expressed concern for congestion that is already in the area road network and the ability to implement interim measures before full project implementation. Other comments include: potential noise impacts, cut-through traffic, impacts to the natural environment, use of the road as a truck route, and overall impacts on adjacent communities. In consideration of the comments received, the preferred solution was confirmed, being to reconstruct and realign Leitrim Road from River Road to Bank Street as a complete street.