

4 Evaluation of Alternative Solutions

The conclusions set out in **Section 2** of this report has demonstrated the need to extend rapid transit from Baseline Station to Barrhaven Town Centre and provide for rail grade-separation at the Woodroffe Avenue, Southwest Transitway and Fallowfield Road crossings of the VIA Rail line. This section summarizes the development and evaluation of alternative solutions to best meet the established needs. While the City of Ottawa’s Transportation Master Plan identifies extending LRT to Barrhaven as the preferred solution for this corridor, the City of Ottawa as part of the pre-planning for each project, reconfirms the preferred solution as a general practice regardless of the EA process followed.

4.1 Planning and Design Objectives for the Project

As presented in the 2013 Transportation Master Plan, “Ottawa’s Transportation system [in 2031] will enhance our quality of life by supporting social, environmental, and economic sustainability in an accountable and responsive manner.” This vision for transportation in the City is supported by several elements and coinciding principles. This EA uses these elements to provide a basis for developing planning and design objectives for the Project and the subsequent evaluation of alternative solutions based on these objectives. Elements as identified in the TMP and the ensuing six (6) objectives as developed for this EA are presented in **Table 4-1**.

Table 4-1 Planning and Design Objectives for the Project

Element	Planning and Design Objectives for the Project
Reduce automobile dependence	1. Improve travel time, reliability, efficiency of rapid transit
Meet mobility needs	2. Improve universal accessibility and connectivity of the active transportation networks
Integrate transportation and land use	3. Provide for safety, efficiency, resiliency (a system that can tolerate unexpected events by implementation of pocket tracks, cross-overs, elevator redundancy, parallel pathway etc.) and mobility on the area transportation network
Protect public health and safety	4. Eliminate the risk of a near-miss or collision between roadway and pathway users and trains
Enhance the economy	5. Improve connectivity with the VIA Rail Fallowfield Station
Deliver cost-effective services; protect public health and safety and protect the environment	6. Regard for social, natural, physical and economic environmental aspects, and life-cycle cost

4.2 Description of Alternative Solutions

There are three distinct aspects of the study that require a review and confirmation of alternative solutions. These include the:

1. Extension of LRT from Baseline Station to Barrhaven Town Centre;
2. Grade-separation of Woodroffe Avenue and the Southwest Transitway from the VIA Rail line; and,
3. Grade-separation of Fallowfield Road from the VIA Rail line.

A range of alternative solutions were developed for the LRT extension and the rail grade-separations and were subsequently evaluated for their suitability to address the above-noted planning and design objectives. The range of alternative solutions for the Woodroffe Avenue/Southwest Transitway and Fallowfield Road rail grade-separations are the same, however, the evaluation for each solution was completed separately. The alternative solutions are described in **Table 4-2** and **Table 4-3**.

Table 4-2 Description of Alternative Solutions - LRT Extension

Alternative Solution	Description
1 Do Nothing	Used as a baseline for comparison, includes regular on-going maintenance of the corridor in its present BRT configuration. Does not include modifications or enhancements to the pedestrian and cycling environment.
2 Implement Transportation Demand Management measures	Transportation Demand Management includes measures aimed at influencing demand to reduce the need or delay timing of infrastructure projects by making more efficient use of existing capacity. Measures such as high-occupancy vehicle lanes (which would require re-designation and roadway modifications), carpooling and encouraging telework/working from home are included as part of this solution. This solution would not include enhancements to the pedestrian and cycling environment.
3 Improve pedestrian and cycling infrastructure	Under this scenario, significant investment would be made in pedestrian and cycling infrastructure to reduce the need for additional road and transit investments. This solution could involve potential widening to enhance corridor pedestrian and cycling facilities only.
4 Improve roadway infrastructure	This solution would involve reconstruction and widening of arterial roadways and other potential measures on the existing road network within the Study Area to address future capacity requirements if rapid transit service is not improved. This would include roadways already identified for future widening in the City's TMP as well as other widenings not currently being considered. Transit would continue to operate in existing dedicated bus lanes. Enhancements to the pedestrian and cycling environment would also be included in this solution.
5 Complete the SW Transitway as BRT	Under this scenario, the transitway would be completed as a fully exclusive and grade-separated BRT facility between Baseline Station and Barrhaven Town Centre, as currently envisaged in the 2013 TMP (2031 RTP Network Concept). This would involve building new BRT infrastructure, primarily between Baseline Station and the Nepean Sportsplex to replace the existing on-street dedicated bus lanes with an exclusive and grade-separated transitway. Enhancements to the pedestrian and cycling environment would also be included in this solution.
6 Convert and complete the SW Transitway as LRT	Under this scenario, the completion of the transitway as a BRT facility would not take place and would instead be implemented as a fully segregated grade-separated electrically powered LRT facility from Baseline Station to Barrhaven Town Centre, as envisaged in the 2013 TMP (Ultimate RTP Network). Enhancements to the pedestrian and cycling infrastructure would also be considered as part of this solution.

Table 4-3 Description of Alternative Solutions -Rail Grade-Separation

Alternative Solution	Description
1 Do Nothing	Used as a baseline for comparison, includes regular on-going maintenance of the corridor in its present configuration. Does not include modifications or enhancements to the pedestrian and cycling environment.
2 Close the road/transitway at the VIA Rail crossing location	The existing roads and transitway would be closed at the VIA Rail line crossing until such time they could be grade-separated. Existing roads, transitway traffic, pedestrian and cycling facilities would be redirected to an existing and alternative grade-separated crossing.
3 Improve the existing at-grade road/SW Transitway crossing	The existing roads and transitway crossing of the VIA Rail line would remain but with infrastructure improvements reflective of current best practices. This could include changing the angle to which the roads and transitway cross the VIA Rail line, upgrades to the railway gates, signalization, flashing lights, pavement markings amongst others. This solution would include enhancements to pedestrian and cycling facilities isolated to the crossing area.
4 Realignment of roads/SW Transitway that avoids crossing the VIA Rail line	A realignment of Woodroffe Avenue, Fallowfield Road and the transitway could be constructed that avoids crossing of the VIA Rail line in this area. The original alignments would be closed off and connection across the VIA Rail line would no longer be possible so as to remove at-grade rail crossings. Pedestrian and cycling enhancements would be part of this solution.
5 Grade-separation	A grade-separation of roads and transitway including pedestrian and cycling facilities would be implemented.

4.3 Evaluation of Alternative Solutions

The full range of alternative solutions was subject to an evaluation process that compared the outcome of each solution to the planning and design objectives listed in **Section 4.1**. The results are presented individually in the following tables for each

of: the LRT extension (Table 4-4), grade-separation of Woodroffe Avenue and the Southwest Transitway (Table 4-5) and of Fallowfield Road (Table 4-6) from the VIA Rail line.

Table 4-4 Evaluation of Alternative Solutions Results - LRT Extension

Alternative Solution	Description	Preferred Solution
1 Do Nothing	<p>Does not deliver a multi-modal system as this solution maintains the status quo. As rapid transit service would continue to operate in dedicated lanes within the Woodroffe Avenue corridor with no changes, there would be no opportunity to improve travel time, reliability, or efficiency. With no changes being implemented, this solution does not provide the opportunity to result in a modal shift. There would be no opportunity to improve universal accessibility or connectivity for the active transportation network. This solution does not provide resiliency and mobility on the area transportation network. There would be no opportunity to improve connectivity with the VIA Rail Fallowfield Station.</p> <p>There would be no impact to the physical or natural environment as additional Right-of-Way would not be required, however, there would be little to no opportunity to improve these environments either. No capital cost involved.</p>	Not Recommended X
2 Implement Transportation Demand Management measures	<p>Does not deliver a cost-effective multi-modal system. This solution may improve the area transportation network slightly. However, this solution implemented on its own does not meet transit ridership projections or required capacity, therefore, would limit the opportunity to improve travel time, reliability, or efficiency to meet future needs. As such, this solution does not provide the opportunity to result in a modal shift. This solution does not provide the opportunity to improve connectivity with the VIA Rail Fallowfield Station. This solution may include only re-designation of the existing road surface, therefore there would be little opportunity to improve universal accessibility and connectivity of the active transportation network. No additional Right-of-Way would be acquired. This solution does not provide resiliency and mobility on the area transportation network.</p> <p>There would be little to no impact to the physical or natural environment as no additional Right-of-Way would be required, however, there would be little to no opportunity to improve these environments either.</p>	Not Recommended X
3 Improve pedestrian and cycling infrastructure	<p>Does not deliver a cost-effective multi-modal system as this solution maintains existing travel lanes and implemented on its own does not meet transit ridership projections or required capacity. This solution would not address long-term needs as it would result in little to no improvements to transit operations and therefore there would be no opportunity to improve travel time, reliability, efficiency or provide resiliency. This solution does not address long distance travel demand for many people in a practical fashion but offers significant opportunity to address local trips within the Study Area, safety, including access to rapid transit stations and VIA Rail Fallowfield Station for only the active modes. This solution provides the opportunity to improve universal accessibility and connectivity of the active transportation network and may result in a modal shift only for pedestrians and cyclists. During winter months, use of pedestrian and cycling facilities may be impacted while snow removal activities are underway. Close to stations and main networks are typically cleared first leaving local routes more difficult to navigate until cleared.</p> <p>To accommodate this solution within the existing Right-of-Way there would be impacts to the natural environment and would offer limited opportunity for new landscaping unless additional Right-of-Way is acquired.</p>	Not Recommended X
4 Improve roadway infrastructure	<p>Does not deliver a cost-effective multi-modal system. This solution would identify some road widenings in/near the Study Area; but is not consistent with the direction of the TMP which seeks to encourage increased transit use, particularly for trips to/from downtown Ottawa. It also does not address future transit needs and objectives within the Study Area. This solution does not support the objective to improve transit travel time, reliability, or efficiency. The solution provides the opportunity to improve the universal accessibility, safety, and connectivity of the active transportation network. Ultimately this solution would not result in a modal-shift as it enhances the road network which does not support a reduction in automobile dependence. This solution does not provide the opportunity to improve connectivity with the VIA Rail Fallowfield Station for transit.</p> <p>Considerable additional Right-of-Way would be required which will impact the natural environment. However, there would be opportunity to improve corridor landscaping with the additional space.</p>	Not Recommended X
5 Complete SW Transitway as BRT	<p>Does not deliver a cost-effective solution given the cost involved. If a BRT facility is pursued it would likely need to remain as a BRT facility for a substantial period to justify the capital investment required and reduce opportunity cost/throwaway costs associated with future</p>	Not Recommended X

Alternative Solution	Description	Preferred Solution
	<p>conversion to LRT. This period is likely to be decades given the investment required to construct a grade-separated transitway from Baseline Station to West Hunt Club Road. The removal of dedicated on-street transit on Woodroffe Avenue would provide the opportunity to redevelop the corridor and enhance existing facilities.</p> <p>This solution supports the 2031 RTP Network identified in the City's TMP, which envisions completion of the Southwest Transitway as an exclusive BRT facility prior to long-term conversion to LRT technology as identified in the TMP Ultimate RTP Network. This solution would improve travel time, reliability, and efficiency of rapid transit to some degree. However, it would still require riders travelling beyond Baseline Station to transfer to LRT, which may discourage future ridership growth or a modal shift. This solution meets transit ridership projections or required capacity. This solution provides a limited opportunity to improve universal accessibility and connectivity of the active transportation network (reconstructing existing stations and facilities would not be practical) as it could not be constructed the entire length of the corridor. A dedicated BRT facility would improve connectivity with the VIA Rail Fallowfield Station.</p> <p>Considerable additional Right-of-Way would be required which will impact the natural environment. However, there would be opportunity to improve corridor landscaping with the additional space.</p>	
<p>6 Convert and complete SW Transitway as LRT</p>	<p>This solution supports the Ultimate RTP Network identified in the City's TMP but changes the implementation phasing of the City's RTP network, which currently identifies completion of the SW Transitway as a BRT facility prior to eventual conversion to LRT technology. This solution provides a cost-effective multi-modal system. This solution meets transit ridership projections or required capacity. By developing as LRT, it avoids potential throw-away costs of constructing an interim BRT facility first. Based on the Project Need and Opportunities identified (Section 2) and the City's long-term plan for rapid transit, this solution best addresses the planning objectives with respect to improving travel time, reliability, safety, and efficiency of rapid transit. The solution provides a dedicated and consistent connection (via LRT) not only to the VIA Rail Fallowfield Station but the entire LRT network. It also increases transit capacity, improves reliability and user experience, and addresses issues around conversion from BRT to LRT technology.</p> <p>This solution provides the best opportunity for enhancing the active transportation network by improving universal accessibility and connectivity. TOD policies and other City planning policies support making connections and implementing higher order active transportation facilities in the Study Area associated with LRT throughout the entire corridor.</p> <p>Additional Right-of-Way would result in impacts to the natural environment. However, this solution provides the opportunity to define spaces for new corridor landscaping.</p>	<p>Recommended Preferred Solution</p> <p style="text-align: center;">✓</p>

Table 4-5 Evaluation of Alternative Solutions Results – Rail Grade-Separation: Woodroffe Avenue and Southwest Transitway

Alternative Solution	Description	Preferred Solution
<p>1 Do Nothing</p>	<p>This solution does not eliminate the risk of a near-miss or collision between all users and trains. This solution does not address the Project Need and Opportunities established for the Study Area. There would be no capital cost involved to implement this solution. It does not provide the opportunity to improve universal accessibility, safety, and connectivity of the active transportation network. This solution does not provide resiliency and mobility on the area transportation network. There would be no opportunity to improve connectivity with the VIA Rail Fallowfield Station.</p> <p>There would be no impact to the physical or natural environment as additional Right-of-Way would not be required, however, there would be little to no opportunity to improve these environments either.</p>	<p>Not Recommended</p> <p style="text-align: center;">✗</p>
<p>2 Close the road/transitway at the VIA Rail crossing location</p>	<p>This solution eliminates the risk of a near-miss or collision between all users and trains. This solution also eliminates the need for rail-crossing infrastructure maintenance and inspection as it removes the crossing altogether. However, this solution performs poorly in consideration of the planning objectives, as it removes accessibility across the tracks, removes connectivity for all modes and does not contribute towards enhancing the natural or social environments. All modes would be forced to re-route out of their way which would severely affect travel time, reliability, or efficiency. Pedestrian and cycling facilities would be redirected to an existing and alternative grade-separated crossing. Transit would be rerouted long distances to connect to Fallowfield Station adding travel time, decreasing resiliency,</p>	<p>Not Recommended</p> <p style="text-align: center;">✗</p>

Alternative Solution	Description	Preferred Solution
	and preventing connectivity. Further, this solution does not address the Project Need and Opportunities established for the Study Area.	
3 Improve the existing at-grade road/transitway crossing	This solution partially addresses the project objectives but does not fully eliminate the risk of a near-miss or collision between all users and trains. Upgrading the rail infrastructure equipment or improving the angle of crossing partially improves the safety and leads to a better-quality environment for users and better accessibility. Improving travel times and efficiency for all modes will ultimately be limited by the frequency of train crossings. This solution may have impacts to the natural environment depending on the improvement(s) implemented. This solution does not address the Project Need and Opportunities established for the Study Area.	Not Recommended X
4 Realignment of Woodroffe Avenue and the Southwest Transitway that avoids crossing the VIA Rail line	This solution would eliminate the risk of a near-miss or collision between all users and trains. However, this solution performs poorly in consideration of the planning objectives, as it would remove accessibility and connectivity across the tracks for all modes on the networks where the roads would be closed to prevent the rail crossing. The closure of the existing roads to remove crossing of the rail line would force all modes to re-route to the realignment to make connections which would not improve travel time, reliability, or efficiency. This solution does not contribute towards enhancing the natural or social environments or address the Project Need and Opportunities established for the Study Area. This solution would require substantial land acquisition. The land impacts would be almost entirely Greenbelt lands that are actively farmed. As such, this solution results in social, natural, and economic environmental impacts and is not consistent with established planning policy.	Not Recommended X
5 Grade-separation	This solution eliminates the risk of a near-miss or collision between roadway and pathway users and trains. This solution also eliminates the need for rail-crossing infrastructure maintenance and inspection as it removes the crossing altogether. This solution provides the best opportunity to provide efficiency, resiliency, and mobility on the area transportation network. All modes would result in improved travel time, reliability, and efficiency as there would be no crossing where waits are experienced to let trains pass. Connectivity with the VIA Rail Fallowfield Station would be direct. This solution is consistent with addressing the Project Need and Opportunities. This solution results in impacts to the natural environment. However, there would be opportunity to improve corridor landscaping with implementation.	Recommended Preferred Solution ✓

Table 4-6 Evaluation of Alternative Solutions Results – Rail Grade-Separation: Fallowfield Road

Alternative Solution	Description	Preferred Solution
1 Do Nothing	This solution does not eliminate the risk of a near-miss or collision between all users and trains. This solution does not address the Project Need and Opportunities established for the Study Area. There would be no capital cost involved to implement this solution. It does not provide the opportunity to improve universal accessibility, safety, and connectivity of the active transportation network. This solution does not provide resiliency and mobility on the area transportation network. There would be no opportunity to improve connectivity with the VIA Rail Fallowfield Station. There would be no impact to the physical or natural environment as additional Right-of-Way would not be required. However, there would be little to no opportunity to improve these environments either.	Not Recommended X
2 Close the road at the VIA Rail crossing location	This solution eliminates the risk of a near-miss or collision between all users and trains. This solution also eliminates the need for rail-crossing infrastructure maintenance and inspection as it removes the crossing altogether. However, this solution performs poorly in consideration of the planning objectives, as it removes accessibility across the tracks, removes connectivity for all modes and does not contribute towards enhancing the natural or social environments. All modes would be forced to re-route out of their way which would severely affect travel time, reliability, or efficiency. Pedestrian and cycling facilities would be redirected to an existing and alternative grade-separated crossing. Transit would be rerouted long distances to connect to Fallowfield Station adding travel time, decreasing resiliency, and preventing connectivity. Further, this solution does not address the Project Need and Opportunities established for the Study Area.	Not Recommended X

Alternative Solution	Description	Preferred Solution
3 Improve the existing at-grade road crossing	This solution partially addresses the project objectives but does not fully eliminate the risk of a near-miss or collision between all users and trains. Upgrading the rail infrastructure equipment or improving the angle of crossing partially improves the safety and leads to a better-quality environment for users and better accessibility. Improving travel times and efficiency for all modes will ultimately be limited by the frequency of train crossings. This solution may have impacts to the natural environment depending on the improvement(s) implemented. This solution does not address the Project Need and Opportunities established for the Study Area.	Not Recommended X
4 Realignment of Fallowfield Road that avoids crossing the VIA Rail line	This solution would eliminate the risk of a near-miss or collision between all users and trains. However, this solution performs poorly in consideration of the planning objectives, as it would remove accessibility and connectivity across the tracks for all modes on the networks where the roads would be closed to prevent the rail crossing. The closure of the existing roads to remove crossing of the rail line would force all modes to re-route to the realignment to make connections which would not improve travel time, reliability, or efficiency. This solution does not contribute towards enhancing the natural or social environments or address the Project Need and Opportunities established for the Study Area. This solution would require substantial land acquisition. The land impacts would be almost entirely Greenbelt lands that are actively farmed. As such, this solution results in social, natural, and economic environmental impacts and is not consistent with established planning policy.	Not Recommended X
5 Grade-separation	This solution eliminates the risk of a near-miss or collision between roadway and pathway users and trains. This solution also eliminates the need for rail-crossing infrastructure maintenance and inspection as it removes the crossing altogether. This solution provides the best opportunity to provide efficiency, resiliency, and mobility on the area transportation network. All modes would result in improved travel time, reliability, and efficiency as there would be no crossing where waits are experienced to let trains pass. Connectivity with the VIA Rail Fallowfield Station would be direct. This solution is consistent with addressing the Project Need and Opportunities. This solution results in impacts to the natural environment. However, there would be opportunity to improve corridor landscaping with implementation.	Recommended Preferred Solution ✓

4.4 Preliminary Preferred Solution

Based on the preceding analyses the Preliminary Preferred Solution is to extend rapid transit from Baseline Station to Barrhaven Town Centre using LRT (including converting the Southwest Transitway from BRT to an LRT facility) and grade-separate the Southwest Transitway/Barrhaven LRT, Woodroffe Avenue and Fallowfield Road from the VIA Rail line.

4.5 Stakeholder Consultation

4.5.1 FIRST ROUND OF CONSULTATION GROUP MEETINGS

The first round of Study Consultation group meetings (Agency, Business and Public) were held on November 27 and 28, 2018. The Study Team, including members from the City of Ottawa and the consultant team, were available to discuss the study and answer questions in a round table forum. At these meetings, participants were presented information including: confirmation of project need and opportunities, an overview of existing conditions, evaluation of alternative solutions criteria, methodology and results, and the preliminary preferred solutions.

The first POH was held on October 30, 2019 and is discussed in **Section 6.3.2** to correspond with the level of detail presented. Information presented includes the needs and opportunities, existing conditions, evaluation of alternative solutions and preliminary preferred solutions. Feedback received from stakeholders in these consultation meetings included the following:

- General support for the preliminary preferred solution to extend LRT from Baseline Station to Barrhaven Town Centre;
- General support for the preliminary preferred solution for grade-separating the Southwest Transitway/Barrhaven LRT, Woodroffe Avenue and Fallowfield Road from the VIA Rail line;

- Redevelopment plans for Barrhaven Town Centre;
- Considering phasing plans to improve the area transportation network sooner; and,
- Consideration for extending the southerly limit of the study to serve to quickly growing communities south of the Jock River.

For a full account of discussion from these consultation group meetings and the first public open house, refer to **Appendix A**.

4.6 Preferred Solution

The Study Team also took into consideration additional feedback received including opportunities to implement phasing options to improve the area transportation network sooner. The desire for a potential southerly extension beyond Barrhaven Town Centre was not part of this study but further considered by the City.

In consideration of the comments received the preferred solution is confirmed as an extension of rapid transit from Baseline Station to Barrhaven Town Centre as LRT (including converting the Southwest Transitway from BRT to an LRT facility) and grade-separating the Southwest Transitway/Barrhaven LRT, Woodroffe Avenue and Fallowfield Road from the VIA Rail line.

