# Evaluation of Alternatives - Hillside Bridge (ID# 806)

## Table C.1: Bridge Conditions & Function

| Criteria | Measures | Retain<br>Keep the existing bridge<br>(conduct maintenance repairs) | Rehabilitate<br>Repair the existing bridge<br>(widening / sidewalk not feasible) | Replace<br>Construct a new bridge at same location<br>(remove existing bridge) |
|---|---|---|---|---|
| **Bridge Condition** | Deterioration, structural risk | The existing bridge is currently in fair to poor condition, and would be repaired to address significant deficiencies. | The existing bridge is currently in fair to poor condition, and would be repaired to address significant deficiencies. | The construction of new bridge would meet current standards and include the removal or relocation of the existing bridge. |
| | | **Neutral** | **Neutral** | **Most Preferred** |
| **Bridge Life & Maintenance** | Years to next assessment, frequency, reliability, disruption | The existing structure is nearing the end of its service life. Following repairs, a monitoring and maintenance program would be required to extend the service life until rehabilitation or replacement. | The existing structure is nearing the end of its service life. Following repairs, a monitoring and maintenance program would be required to extend the service life until rehabilitation or replacement. | The design life for a replacement bridge is 75 years. The structure will likely require minimal maintenance for the first 20 years. |
| | | **Least Preferred** | **Least Preferred** | **Most Preferred** |
| **Vehicle types crossing the bridge** | Fire trucks (30 t)<br>Ambulance (9 t)<br>Service vehicles, Snow Removal, Buses (if required) | The current load posting of the structure is 15 tonnes, which allows ambulances to use the bridge. Heavy trucks would continue to not be permitted to use the bridge. | Rehabilitation would likely involve extensive strengthening to improve the load posting, but may not be sufficient to allow heavy trucks to use the bridge. | The construction of a replacement bridge would meet current standards and would allow trucks to use the bridge. No posted load limit signage required. |
| | | **Neutral** | **Neutral** | **Most Preferred** |
| **Bridge Safety & Function** | Width, collision risk, on-road cyclists and pedestrians, deck surface | Bridge would remain one lane wide.<br>Signage requiring vehicles to yield to oncoming traffic would remain, with associated collision risk.<br>Cyclists would be required to dismount and walk their bikes to cross the bridge.<br>The metal open-grating deck type would remain; traction concern for some users.<br>Continued risk of collision with bridge. | Bridge would remain one lane wide.<br>Signage requiring vehicles to yield to oncoming traffic would remain, with associated collision risk.<br>Cyclists would be required to dismount and walk their bikes to cross the bridge.<br>The metal open-grating deck type would remain; traction concern for some users.<br>Continued risk of collision with bridge. | Two lane bridge with shoulders.<br>Separate lane for each direction of travel, reduces collision risk.<br>Cyclists would be in separate lanes.<br>Concrete deck with asphalt.<br>Reduced risk of collision with bridge, due to shoulder width and addition of barriers. |
| | | **Least Preferred** | **Least Preferred** | **Most Preferred** |
| **Bridge Condition & Function Evaluation Summary** | | **Least Preferred** | **Least Preferred** | **Most Preferred** |

## Evaluation of Alternatives - Hillside Bridge (ID# 806)

## Table C.2: Transportation

| Criteria | Measures | Retain<br>Keep the existing bridge<br>(conduct maintenance repairs) | Rehabilitate<br>Repair the existing bridge<br>(widening / sidewalk not feasible) | Replace<br>Construct a new bridge at same location<br>(remove existing bridge) |
|---|---|---|---|---|
| **Roadway Design** | Design criteria, geometry, speed reduction, cross-section, approach sight lines | Narrow, alternating one-way traffic with no shoulder is a mismatch to roadway width and operating speeds.<br>Posted speed reduction at bridge.<br>Roadway profile unchanged.<br>Roadway horizontal alignment kinked. | Narrow, alternating one-way traffic with no shoulder is a mismatch to roadway width and operating speeds.<br>Posted speed reduction at bridge.<br>Roadway profile unchanged.<br>Roadway horizontal alignment kinked. | Two lane bridge matches roadway width and operating speeds.<br>No posted speed reduction required.<br>Potential to reduce roadway sag curve.<br>Roadway horizontal alignment straightened. |
| | | **Neutral** | **Neutral** | **Most Preferred** |
| **Traffic Operations** | Travel delays due to bridge configuration | The bridge would remain one lane wide, and yield-controlled to accommodate alternating traffic directions. This is narrower than the roadway, forming a minor constraint. | The bridge would remain one lane wide, and yield-controlled to accommodate alternating traffic directions. This is narrower than the roadway, forming a minor constraint. | The bridge would be two-lanes wide, matching the roadway, and no longer a constraint on traffic flow. |
| | | **Neutral** | **Neutral** | **Most Preferred** |
| **Network Connectivity & Access** | Alternative routes, Fire & Emergency access | Trucks and emergency vehicles would continue to use an alternative route.<br>The CP Rail crossing over Meadowvale Road north of the bridge would form a vertical clearance constraint on trucks unless the roadway is lowered. | Trucks and emergency vehicles would continue to use an alternative route.<br>The CP Rail crossing over Meadowvale Road north of the bridge would form a vertical clearance constraint on trucks unless the roadway is lowered. | Trucks and emergency vehicles would have full access across the new bridge.<br>The CP Rail crossing over Meadowvale Road north of the bridge would form a vertical clearance constraint on trucks unless the roadway is lowered. |
| | | **Neutral** | **Neutral** | **Most Preferred** |
| **Active transportation** | On-road cyclists & On-road pedestrians<br>(Off-road recreational trail usage not included.) | Meadowvale Road is currently a designated route with signage for cyclists. Cyclists would continue to share the lanes with vehicles, due to narrow/soft shoulders, and share the lanes on the bridge, single file. At the bridge, signage advises cyclists to dismount prior to crossing for safety reasons associated with the open grate decking.<br>Currently, there are no sidewalks along the roadway. Pedestrians would continue to walk along the shoulder of the road and on the edge of the driving lanes on the bridge. | Meadowvale Road is currently a designated route with signage for cyclists. Cyclists would continue to share the lanes with vehicles, due to narrow/soft shoulders, and share the lanes on the bridge, single file. At the bridge, signage advises cyclists to dismount prior to crossing for safety reasons associated with the open grate decking.<br>Currently, there are no sidewalks along the roadway. Pedestrians would continue to walk along the shoulder of the road and on the edge of the driving lanes on the bridge. | Meadowvale Road is currently a designated route with signage for cyclists. The replacement bridge would be designed to accommodate cyclists.<br>Currently, there are no sidewalks along the roadway. A sidewalk is considered optional and not included in this alternative. A separate pedestrian bridge could be constructed if needed in the future. |
| | | **Neutral** | **Neutral** | **Most Preferred** |
| **Recreational Access** | Maintains or improves recreational access to RNUP and Zoo | Maintains existing recreational access. | Maintains existing recreational access. | Improves recreational access. |
| | | **Neutral** | **Neutral** | **Most Preferred** |
| **Transportation Evaluation Summary** | | **Neutral** | **Neutral** | **Most Preferred** |

## Evaluation of Alternatives - Hillside Bridge (ID# 806)

## Table C.3: Heritage & Archaeology

| Criteria | Measures | Retain<br>Keep the existing bridge<br>(conduct maintenance repairs) | Rehabilitate<br>Repair the existing bridge<br>(widening / sidewalk not feasible) | Replace<br>Construct a new bridge at same location<br>(remove existing bridge) |
|---|---|---|---|---|
| **Cultural Heritage** | Role in community, namesake and history | The bridge was named after the wider Hillside community, which has managed to maintain its rural character. | Rehabilitation has the potential to impact the cultural heritage. | A replacement bridge would not have a pre-existing role in the community. Consideration could be given to designing a bridge of a similar configuration, or erection of a memorial monument to recognize and document the history of the original bridge. |
| | | **Most Preferred** | **Neutral** | **Least Preferred** |
| **Built Heritage** | Uniqueness of bridge | The existing bridge is designated under Part IV of the Ontario Heritage Act, By-law No. 25153 as being of historical and architectural value or interest. | The work to rehabilitate the bridge may detract from some of the heritage characteristics. | The new bridge may conserve little or no heritage characteristics. |
| | | **Most Preferred** | **Neutral** | **Least Preferred** |
| **Archaeological Potential** | Area of disturbance | The work to retain the bridge are anticipated to remain within previously disturbed lands or areas of no potential within the existing right-of-way. | The work to rehabilitate the bridge is anticipated to remain in previously disturbed lands and areas of no potential within the existing right-of-way. A detour bridge is not anticipated. There is potential to impact areas of archaeological potential. Hillside Bridge and its roadway approaches are areas of ossuary potential. | A replacement bridge is anticipated to remain on the existing alignment and within the existing right-of-way. A detour bridge is not anticipated. There is potential to impact areas of archaeological potential with temporary works outside of the existing right-of-way. Hillside Bridge and its roadway approaches are areas of ossuary potential. |
| | | **Most Preferred** | **Neutral** | **Neutral** |
| **Heritage & Archaeology Evaluation Summary** | | **Most Preferred** | **Neutral** | **Least Preferred** |

## Evaluation of Alternatives - Hillside Bridge (ID# 806)

## Table C.4: Natural Environment & Hydraulics

| Criteria | Measures | Retain<br>Keep the existing bridge<br>(conduct maintenance repairs) | Rehabilitate<br>Repair the existing bridge<br>(widening / sidewalk not feasible) | Replace<br>Construct a new bridge at same location<br>(remove existing bridge) |
|---|---|---|---|---|
| **Terrestrial Habitat** | Potential for impacts to Species at Risk (SAR) and Significant Wildlife Habitat (SWH) (temporary and permanent) | No impacts to SAR if no construction is proposed. | Potential temporary impacts related anthropogenic disturbances (i.e. noise, lights) to adjacent potential SAR bird and SAR bat habitat (i.e. forests and swamps) during construction.<br>Minimal permanent impacts to potential SAR bird and SAR bat habitat if construction limits remain within ROW. | Potential temporary impacts related anthropogenic disturbances (i.e. noise, lights) to adjacent potential SAR bird and SAR bat habitat (i.e. forests and swamps) during construction.<br>Minimal permanent impacts to potential SAR bird and SAR bat habitat if construction limits remain within ROW. |
| | | No impacts to SWH if no construction is proposed. | Potential temporary impacts related anthropogenic disturbances (i.e. noise, lights) to adjacent potential SWH habitat for birds and bats (i.e. forests) during construction.<br>Minimal permanent impacts to potential SWH for birds and bats if construction limits remain within ROW.<br>Removal of potential snake hibernacula habitat if bridge abutments are proposed to be disturbed. | Potential temporary impacts related anthropogenic disturbances (i.e. noise, lights) to adjacent potential SWH habitat for birds and bats (i.e. forests) during construction.<br>Minimal permanent impacts to potential SWH for birds and bats if construction limits remain within ROW.<br>Removal of potential snake hibernacula habitat if bridge abutments are proposed to be replaced. |
| | | **Most Preferred** | **Neutral** | **Neutral** |
| **Aquatic Habitat** | Potential for impacts to Species at Risk and aquatic habitat (temporary and permanent) | No anticipated impacts to aquatic SAR since none have been identified within the vicinity of the crossing. | No anticipated impacts to aquatic SAR since none have been identified within the vicinity of the crossing. | No anticipated impacts to aquatic SAR since none have been identified within the vicinity of the crossing. |
| | | No impacts to aquatic habitat if no in-water work is proposed. | Permanent loss of aquatic habitat if proposed widening work extends below the high water mark.<br>Temporary loss of aquatic habitat to accommodate construction footprint if in-water work is proposed. | Permanent loss of aquatic habitat if proposed widening work extends below the high water mark.<br>Temporary loss of aquatic habitat to accommodate construction footprint if in-water work is proposed. |
| | | **Most Preferred** | **Least Preferred** | **Least Preferred** |
| **River Conveyance** | Clearance, span, bank scour, climate change resilience (potential damage to structure) | No improvement to river conveyance, continued risk of substandard clearances. | No improvement to river conveyance, continued risk. | A replacement bridge would be designed to meet current standards, involving raising the roadway profile and bridge soffit, potentially combined with lengthening the span to provide adequate clearance, In addition, fluvial geomorphology over the life of the bridge and protection of adjacent river banks against scour would be considered. |
| | | **Neutral** | **Neutral** | **Most Preferred** |
| **Natural Environment & Hydraulics Evaluation Summary** | | **Most Preferred** | **Neutral** | **Neutral** |

## Evaluation of Alternatives - Hillside Bridge (ID# 806)

### Table C.5: Public Uses in RNUP

| Criteria | Measures | Retain<br>Keep the existing bridge<br>(conduct maintenance repairs) | Rehabilitate<br>Repair the existing bridge<br>(widening / sidewalk not feasible) | Replace<br>Construct a new bridge at same location<br>(remove existing bridge) |
|---|---|---|---|---|
| **Rouge National Urban Park (RNUP)** | Public and worker access to amenities (visitor centre, trailheads, etc.) | Maintains existing public and worker access. | Maintains existing public and worker access. | Minor improvement to public and worker access as a result of widening the bridge. |
| | | **Neutral** | **Neutral** | **Neutral** |
| **Toronto Zoo** | Public and worker access to zoo | Maintains existing public and worker access. | Maintains existing public and worker access. | Minor improvement to public and worker access as a result of widening the bridge. |
| | | **Neutral** | **Neutral** | **Neutral** |
| **Public Uses in RNUP Evaluation Summary** | | **Neutral** | **Neutral** | **Neutral** |

### Table C.6: Implementation

| Criteria | Measures | Retain<br>Keep the existing bridge<br>(conduct maintenance repairs) | Rehabilitate<br>Repair the existing bridge<br>(widening / sidewalk not feasible) | Replace<br>Construct a new bridge at same location<br>(remove existing bridge) |
|---|---|---|---|---|
| **Complexity & Constructability** | Construction access, staging, methods, duration, and other factors | Complexity is high due to old grades of metal being less compatible for welding and weaker as well. Risk of fatigue cracking on existing bridge may lead to more replacement members. Old pony truss bridges like this seldom meet modern code requirements requiring extensive strengthening, with diminishing benefits. | Complexity is high due to old grades of metal being less compatible for welding and weaker as well. Risk of fatigue cracking on existing bridge may lead to more replacement members. Old pony truss bridges like this seldom meet modern code requirements requiring extensive strengthening, with diminishing benefits.<br>Widening not feasible, and would trigger full bridge replacement. | Replacement options would include low complexity slab-on-girder type of bridge, or moderate complexity pony truss bridge.<br>If slab-on-girder bridge is selected, consideration should be given to rehabilitation (and potential narrowing) of the existing bridge for re-use as a pedestrian bridge at another site, instead of demolition. |
| | | **Least Preferred** | **Least Preferred** | **Most Preferred** |
| **Cost Considerations** | Design & Construction, Lifecycle, Maintenance and Future replacement | Low initial cost, high maintenance cost. | Moderate initial cost, high maintenance cost. | Normal initial cost, lower maintenance cost. |
| | | **Neutral** | **Neutral** | **Neutral** |
| **Implementation Evaluation Summary** | | **Least Preferred** | **Least Preferred** | **Most Preferred** |

## Evaluation of Alternatives - Hillside Bridge (ID# 806)

### Table C.7: Overall Preferred Alternative

| **Retain**<br>Keep the existing bridge<br>(conduct maintenance repairs)<br>(optionally realign south approach road) | **Rehabilitate**<br>Strengthen the existing bridge<br>(widening not feasible)<br>(adding a sidewalk not feasible) | **Replace**<br>Construct a new bridge at the same location<br>(remove existing bridge) |
|---|---|---|
| **Least Preferred** | **Least Preferred** | **Most Preferred** |