

Warden Avenue EA Study - Evaluation of Alternative Design Concepts

| | Criteria for Evaluating Alternatives | Indicators | Alternative Design Concept 1 Construction of typical 4-lane road with 3.0 m median island. | Alternative Design Concept 2 Construction of typical 4-lane road with 5.0 m median island. | Alternative Design Concept 3 Construction of typical 4-lane road with narrow marked median. |
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| A | Natural Environment | | | | |
| 1 | Potential impact to vegetation and designated natural features | <ul style="list-style-type: none"> - Removal of existing trees and vegetation. - Disturbance to significant woodlands and wetlands. - Opportunities to improve canopy within ROW through Regional street trees. | Potential impact to lands in the Protected Countryside designation of the Greenbelt Plan and within the NHS area as defined by the Greenbelt Plan, located in northern portion of the corridor, north of Elgin Mills Road. Potential impact to the edge of a wooded area located within the central portion of the study area. Impact to vegetation adjacent to the existing road and within the expanded right-of-way. Full form trees can be provided in boulevard. | Potential impact to lands in the Protected Countryside designation of the Greenbelt Plan and within the NHS area as defined by the Greenbelt Plan, located in northern portion of the corridor, north of Elgin Mills Road. Potential impact to the edge of a wooded area located within the central portion of the study area. Impact to vegetation adjacent to the existing road and within the expanded right-of-way. Full form trees can be provided in boulevard. Opportunities to provide additional tree canopy cover from the tree median. | Potential impact to lands in the Protected Countryside designation of the Greenbelt Plan and within the NHS area as defined by the Greenbelt Plan, located in northern portion of the corridor, north of Elgin Mills Road. Potential impact to the edge of a wooded area located within the central portion of the study area. Impact to vegetation adjacent to the existing road and within the expanded right-of-way. Full form trees can be provided in boulevard. |
| | <i>Rating</i> | | Somewhat Preferred | More Preferred | Somewhat Preferred |
| 2 | Potential impact to wildlife | <ul style="list-style-type: none"> - Effect on wildlife and habitat. - Changes to habitat connectivity. | A wider corridor may impact general connectivity of wildlife habitat. Impact not anticipated to be significantly greater than existing conditions. | A wider corridor may impact general connectivity of wildlife habitat. Impact not anticipated to be significantly greater than existing conditions. | A wider corridor may impact general connectivity of wildlife habitat. Impact not anticipated to be significantly greater than existing conditions. |
| | <i>Rating</i> | | Somewhat Preferred | Somewhat Preferred | Somewhat Preferred |
| 3 | Potential impact to aquatic habitat | <ul style="list-style-type: none"> - Change or removal of existing aquatic habitat. | With appropriate mitigation measures, minimal impact to aquatic habitat in the Bruce Creek tributary is anticipated. | With appropriate mitigation measures, minimal impact to aquatic habitat in the Bruce Creek tributary is anticipated. | With appropriate mitigation measures, minimal impact to aquatic habitat in the Bruce Creek tributary is anticipated. |
| | <i>Rating</i> | | More Preferred | More Preferred | More Preferred |
| 4 | Potential impact to species at risk | <ul style="list-style-type: none"> - Effects on SAR habitat. | Impact to previously identified potential Bobolink, Eastern Meadowlark habitat not anticipated-habitat not observed within the study area corridor. Potential for indirect impact to Redside Dace habitat (sedimentation) adjacent to the corridor. Impact to potential individual SAR bat habitat trees located within the Study Area corridor. However, potentially preferred habitat for bats located adjacent to the corridor in larger wooded areas will not be impacted. | Impact to previously identified potential Bobolink, Eastern Meadowlark habitat not anticipated-habitat not observed within the study area corridor. Potential for indirect impact to Redside Dace habitat (sedimentation) adjacent to the corridor. Impact to potential individual SAR bat habitat trees located within the Study Area corridor. However, potentially preferred habitat for bats located adjacent to the corridor in larger wooded areas will not be impacted. | Impact to previously identified potential Bobolink, Eastern Meadowlark habitat not anticipated-habitat not observed within the study area corridor. Potential for indirect impact to Redside Dace habitat (sedimentation) adjacent to the corridor. Impact to potential individual SAR bat habitat trees located within the Study Area corridor. However, potentially preferred habitat for bats located adjacent to the corridor in larger wooded areas will not be impacted. |
| | <i>Rating</i> | | Somewhat Preferred | Somewhat Preferred | Somewhat Preferred |

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| 5 | Potential impact to water resources and drainage | <ul style="list-style-type: none"> - Decreased/increased infiltration. - Effects on floodplains. - Disruption of natural drainage. - Increased sedimentation to watercourses due to construction activities. - Impact to aquifers and groundwater (considering mitigation provided by LID facilities). - Fluvial geomorphological impacts. | Provides moderate capacity for LID treatment within the boulevards, which will provide moderate reduction of impacts. Mitigation includes ability for maintaining area for infiltration. Existing fluvial geomorphological conditions of watercourse crossing (mid block) anticipated to be maintained through appropriate design of new crossing. | Less capacity for LID treatment within the boulevards, capacity for LID to mitigate impacts is reduced. Existing fluvial geomorphological conditions of watercourse crossing (mid block) anticipated to be maintained through appropriate design of new crossing. | Provides a wider boulevard with opportunity for increased LID treatment capacity and greater reduction of impacts. Mitigation includes ability for maintaining area for infiltration. Existing fluvial geomorphological conditions of watercourse crossing (mid block) anticipated to be maintained through appropriate design of new crossing. |
| Rating | | | Somewhat Preferred | Less Preferred | More Preferred |
| 6 | Potential climate change impact and resilience | <ul style="list-style-type: none"> - Impact to carbon sinks (impact to wetland/vegetation removal).- Snow accumulation.- Potential for greenhouse gas emissions.- Resilience or vulnerability.- Change in air quality. | Moderate capacity to mitigate climate change impacts. Space is available for LID treatment within the road cross-section, providing stormwater detention and treatment to support climate resiliency. Vegetation clearing associated with a wider road footprint is not anticipated to significantly impact the availability of carbon sinks. Vegetation removal will be somewhat off-set by opportunity to include a vegetated median and vegetated area adjacent to the road surface between the curb and active transportation facility. Increase in traffic over time may result in an increase in associated greenhouse gas emissions over existing conditions. Additional lanes are anticipated to reduce traffic congestion/delay. Provision of active transportation option is anticipated to reduce traffic congestion. | Less space is available for LID treatment within the road cross-section to provide stormwater detention and treatment in support of climate resiliency. Vegetation clearing associated with a wider road footprint is not anticipated to significantly impact the availability of carbon sinks. Opportunity to include a wider vegetated median and a vegetated area adjacent to the road surface between the curb and active transportation facility will help to off-set impact of vegetation removal. Increase in traffic over time may result in an increase in associated greenhouse gas emissions over existing conditions. Additional lanes are anticipated to reduce traffic congestion/delay. Provision of active transportation option is anticipated to reduce traffic congestion. | Moderate capacity to mitigate climate change impacts. Space is available for LID treatment within the road cross-section, providing stormwater detention and treatment to support climate resiliency. Vegetation clearing associated with a wider road footprint is not anticipated to significantly impact the availability of carbon sinks. Vegetation removal will be somewhat off-set by opportunity to include a wider vegetated area adjacent to the road surface between the curb and active transportation facility. Increase in traffic over time may result in an increase in associated greenhouse gas emissions over existing conditions. Additional lanes are anticipated to reduce traffic congestion/delay. Provision of active transportation option is anticipated to reduce traffic congestion. |
| Rating | | | Somewhat Preferred | Somewhat Preferred | Somewhat Preferred |
| 7 | Potential impact from contaminated sites | <ul style="list-style-type: none"> - Level of contamination risk based on Contamination Overview Study. | Potential for contaminated soil and groundwater in areas of expanded right-of-way as a result of adjacent property activities. Further assessment may be required. | Potential for contaminated soil and groundwater in areas of expanded right-of-way as a result of adjacent property activities. Further assessment may be required. | Potential for contaminated soil and groundwater in areas of expanded right-of-way as a result of adjacent property activities. Further assessment may be required. |
| Rating | | | More Preferred | More Preferred | More Preferred |
| Summary Natural Environment | | | Somewhat Preferred | Somewhat Preferred | Somewhat Preferred |

| | Criteria for Evaluating Alternatives | Indicators | Alternative Design Concept 1 | Alternative Design Concept 2 | Alternative Design Concept 3 |
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| B | Socio-Cultural Environment | | | | |
| 1 | Potential impact to heritage resources | <ul style="list-style-type: none"> - Potential to impact cultural heritage features. - Potential to impact archaeological resources. | There are six features of cultural heritage value within the Study Area. An impact assessment will be required to confirm impacts as a result of the road widening. There are lands within the study area corridor that have potential for archaeological resources and will require further Archaeological Assessment if impacted. | There are six features of cultural heritage value within the Study Area. An impact assessment will be required to confirm impacts as a result of the road widening. There are lands within the study area corridor that have potential for archaeological resources and will require further Archaeological Assessment if impacted. | There are six features of cultural heritage value within the Study Area. An impact assessment will be required to confirm impacts as a result of the road widening. There are lands within the study area corridor that have potential for archaeological resources and will require further Archaeological Assessment if impacted. |
| | <i>Rating</i> | | More Preferred | More Preferred | More Preferred |
| 2 | Nuisance impacts | <ul style="list-style-type: none"> - Perceivable changes to existing noise levels. - Visual impacts/aesthetics. - Temporary disruption to residents during construction. | Perceived increase in noise levels. No significant increases to traffic noise are expected as a result of the project. Construction will result in a temporary disruption to residents. | Perceived increase in noise levels. No significant increases to traffic noise are expected as a result of the project. Construction will result in a temporary disruption to residents. | Perceived increase in noise levels. No significant increases to traffic noise are expected as a result of the project. Construction will result in a temporary disruption to residents. |
| | <i>Rating</i> | | Somewhat Preferred | Somewhat Preferred | Somewhat Preferred |
| 3 | Land acquisition needs/Impacts to driveway access | <ul style="list-style-type: none"> - Financial and social effects of relocation or removal of homes or businesses. - Change in use or layout due to property loss. - Temporary changes to driveway access during construction. | Potential for land acquisition to accommodate road improvements within future road right-of-way from non-participating landowners to adjacent developments. | Potential for land acquisition to accommodate road improvements within future road right-of-way from non-participating landowners to adjacent developments. | Potential for land acquisition to accommodate road improvements within future road right-of-way from non-participating landowners to adjacent developments. |
| | <i>Rating</i> | | More Preferred | More Preferred | More Preferred |
| 4 | Conformity to municipal and agency policy | <ul style="list-style-type: none"> - Ability to conform to federal, provincial, and local policy. | Conforms to municipal policy of road network connectivity. Conforms to intention of connectivity of active transportation network. Possible impact to fish and fish habitat through sediment mobilization. DFO review is required. Road improvements within the TRCA regulated limit will require permits. SAR permits may be required if potential impacts to Redside Dace habitat can't be avoided. The project will need to consider protection of natural features. | Conforms to municipal policy of road network connectivity. Conforms to intention of connectivity of active transportation network. Possible impact to fish and fish habitat through sediment mobilization. DFO review is required. Road improvements within the TRCA regulated limit will require permits. SAR permits may be required if potential impacts to Redside Dace habitat can't be avoided. The project will need to consider protection of natural features. | Conforms to municipal policy of road network connectivity. Conforms to intention of connectivity of active transportation network. Possible impact to fish and fish habitat through sediment mobilization. DFO review is required. Road improvements within the TRCA regulated limit will require permits. SAR permits may be required if potential impacts to Redside Dace habitat can't be avoided. The project will need to consider protection of natural features. |
| | <i>Rating</i> | | More Preferred | More Preferred | More Preferred |

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| 5 | Connectivity | <ul style="list-style-type: none"> - Ability of the Alternative to increase connectivity by facilitating transit service and active transportation along the corridor. - Ability of Alternatives to create pedestrian and cyclist friendly environment. | Provides increased connectivity by protecting for future transit service and integrating active transportation facilities within the boulevards. A moderate setback from traffic provides a comfortable pedestrian environment. Tree canopy from street trees provides shade to create pedestrian and cyclist friendly environment. | Provides increased connectivity by protecting for future transit service and integrating active transportation facilities within the boulevards. The smallest setback from traffic provides the least comfortable pedestrian environment. Tree canopy from street trees provides shade to create pedestrian and cyclist friendly environment. | Provides increased connectivity by protecting for future transit service and integrating active transportation facilities within the boulevards. The greater setback from traffic provides the most comfortable pedestrian environment. Tree canopy from street trees provides shade to create pedestrian and cyclist friendly environment. |
| <i>Rating</i> | | | Somewhat Preferred | Less Preferred | Somewhat Preferred |
| Summary Socio-Cultural Environment | | More Preferred | Somewhat Preferred | More Preferred | |

| | Criteria for Evaluating Alternatives | Indicators | Alternative Design Concept 1 | Alternative Design Concept 2 | Alternative Design Concept 3 |
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| C | Engineering Environment | | | | |
| 1 | Level of service/traffic congestion | - Anticipated intersection traffic and delays at intersections in 2041. | Alternative will prevent and minimize traffic and delays at intersections in 2041. | Alternative will prevent and minimize traffic and delays at intersections in 2041. | Alternative will prevent and minimize traffic and delays at intersections in 2041. |
| | Rating | | Most Preferred | Most Preferred | Most Preferred |
| 2 | Speed management | - Ability of Alternative to facilitate speed management along corridor. | Provides moderate speed management along the corridor. Narrower roads with less lateral clearance generally contribute to more cautious driving and slower speeds. Alternative 1 will be more constrained than Alternative 2 but less constrained than Alternative 3. | Provides the least ability for speed management. Narrower roads with less lateral clearance generally contribute to more cautious driving and slower speeds. Alternative 2 with the largest median will be a less constrained space with inside lanes bordered by a median separating from opposing traffic. | Provides optimal speed management along the corridor. Narrower roads with less lateral clearance generally contributes to more cautious driving and slower speeds. Alternative 3 with limited marked median will be a more constrained space with inside lanes immediately adjacent to opposing traffic. |
| | Rating | | More Preferred | Somewhat Preferred | Most Preferred |
| 3 | Traffic safety | - Effects on layout or operations of intersections and roadways. - Ability address roadside safety requirements. - Roadway alignment implications on positive guidance. | Adequate separation of north-bound and south-bound traffic. Roadside safety requirements will be met. | Provides consistent alignment and positive guidance throughout the corridor. Roadside safety requirements will be met. | Limited marked median can provide some separation between north-bound and south-bound traffic. Roadside safety requirements will be met. |
| | Rating | | More Preferred | Most Preferred | Somewhat Preferred |
| 4 | Design constraints | - Professional opinion on the design limitations and restrictions. - Conformance to York Region Streetscaping Policy and Design Elements (e.g., Median design, boulevards, lane widths, landscaping). - Conformance to York Region's Street Tree and Horticultural Design Guidelines (e.g., offset and spacing for street trees, minimum planting width for median) | No anticipated design limitations or restrictions. Conforms to Region Streetscaping Policy and Design Elements. Conforms to Region's Street Tree and Horticultural Design Guidelines. Centre median can result in constraints to access for emergency services vehicles. | No anticipated design limitations or restrictions. Conforms to Region Streetscaping Policy and Design Elements. Conforms to Region's Street Tree and Horticultural Design Guidelines. Centre median can result in constraints to access for emergency services vehicles. | No anticipated design limitations or restrictions. Conforms to Region Streetscaping Policy and Design Elements. Conforms to Region's Street Tree and Horticultural Design Guidelines. |
| | Rating | | More Preferred | More Preferred | Most Preferred |
| 5 | Utility impacts | - Effects on utilities (e.g., relocations) | Utilities impacts will be similar for all alternatives. | Utilities impacts will be similar for all alternatives. | Utilities impacts will be similar for all alternatives. |
| | Rating | | Somewhat Preferred | Somewhat Preferred | Somewhat Preferred |

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| 6 | Constructability | <ul style="list-style-type: none"> - Professional opinion on the ease and efficiency of construction of the project, including ease of construction staging and relative construction traffic management. - Disruption to municipal services during construction (snow removal, garbage pick-up). - Levels of disruption to road users (automobiles and cyclists) due to construction. | With median, construction staging and traffic management are relatively more complex than Alternative 3. | With median, construction staging and traffic management are relatively more complex than Alternative 3. | With limited marked median, construction staging and traffic management are relatively less complex than other alternatives. |
| <i>Rating</i> | | | Somewhat Preferred | Somewhat Preferred | More Preferred |
| Summary Engineering Environment | | | More Preferred | More Preferred | More Preferred |

| | Criteria for Evaluating Alternatives | Indicators | Alternative Design Concept 1 | Alternative Design Concept 2 | Alternative Design Concept 3 |
|----------|--|---|---|---|---|
| D | Financial Environment | | | | |
| 1 | Estimated capital costs | - Cost of the materials for road construction. - Cost of the installation of irrigation system for tree planting. | Capital costs of are relatively lower than Alternative 2 due to narrower median. | Capital costs are relatively higher than other alternatives due to wider median and installation of irrigation system for tree planting. | Capital costs are relatively lower than Alternative 2 as there is a limited marked median. |
| | <i>Rating</i> | | More Preferred | Somewhat Preferred | Most Preferred |
| 2 | Estimated operation and maintenance costs | - Costs associated with typical operation and maintenance of the road. - Increased operation and maintenance costs associated due to planted median (tree or shrub). | Operation and maintenance costs are relatively lower than Alternative 2 due to the narrower median and only shrub planting. | Operation and maintenance costs are relatively higher than other alternative due wider median, tree planting and irrigation system. | Operation and maintenance costs are relatively lower than Alternative 1 and 2 as there is a limited marked median. |
| | <i>Rating</i> | | More Preferred | Somewhat Preferred | Most Preferred |
| 3 | Property acquisition costs | - Costs associated with private property requirements, including easements, land purchases, restoration of private lands. | Potential for land acquisition costs to accommodate road improvements within future road right-of-way from non-participating landowners to adjacent developments. | Potential for land acquisition costs to accommodate road improvements within future road right-of-way from non-participating landowners to adjacent developments. | Potential for land acquisition costs to accommodate road improvements within future road right-of-way from non-participating landowners to adjacent developments. |
| | <i>Rating</i> | | More Preferred | Most Preferred | More Preferred |
| | Summary Financial Environment | | More Preferred | Somewhat Preferred | Most Preferred |

| Criteria for Evaluating Alternatives | Alternative Design Concept 1 | Alternative Design Concept 2 | Alternative Design Concept 3 |
|--------------------------------------|------------------------------|------------------------------|------------------------------|
| Overall Summary | More Preferred | Least Preferred | Most Preferred |