

Table 1. Criteria, Indicators, Data Sources and Measures

Column 1	Column 2	Column 3	Column 4
Env. Factor/Criteria	Indicators	Data Source	Measures
Natural Environment			
<i>Groundwater</i>	<ol style="list-style-type: none"> Effect on groundwater recharge areas. Effect on groundwater discharge areas Shallow water supply wells within 500 m of the alternative. Changes to groundwater quality 	<ul style="list-style-type: none"> Use existing information to determine areas of high water table, areas of groundwater discharge, areas of high groundwater overburden permeability and location and usage of private and municipal wells. Information sources consist of the following: <ul style="list-style-type: none"> Information gathered in previous Environmental Assessment studies (1989-1994); MOE well records; OGS surficial geology mapping; York-Peel-Durham-Toronto Groundwater Study; Field Reconnaissance. 	<ol style="list-style-type: none"> Measured by the area (m²) of the alternative crossing areas, potentially sensitive to groundwater contamination or alteration (e.g. high water table, high permeability soils, significant ecological function). Measured by the area (m²) of locations where the alternative crosses identified/anticipated deep road cuts that could intercept/interfere with groundwater. Measured by the number and type of wells (such as Municipal, private, shallow [<15 m], deep) based on MOE well records and any additional information on wells. Qualitative assessment of potential changes to groundwater quality.
<i>Surface Water Quality and Quantity</i>	<ol style="list-style-type: none"> Watercourse crossings and surface water features 	<ul style="list-style-type: none"> 1:50 000 topographic maps; air photos 1:10 000 base maps MOE, Conservation Authorities, interest groups, municipal government CA floodplain mapping Watershed and Subwatershed studies Information gathered in previous Environmental Assessment studies (1989-1994) Lakewide Management Plans (Lake Ontario) Canadian Water Quality Guidelines for the Protection of Aquatic Life Provincial Water Quality Objectives of the Ministry of the Environment Ontario Drinking Water Objectives Protection and Management of Aquatic Sediment Quality in Ontario Fill Quality Guidelines for Lakefilling in Ontario Field reconnaissance 	<ol style="list-style-type: none"> Qualitative assessment considering the nature (i.e permanent or intermittent), quality and sensitivity of the watercourses and surface water features affected. Measured by the total number of watercourses and surface water features (i.e. kettle lakes and ponds) crossed by the alternative.
<i>Fisheries and Aquatic Habitat</i>	<ol style="list-style-type: none"> Degree of Highly Sensitive Fish Habitat Affected Degree of Moderately Sensitive Fish Habitat Affected Degree of Low Sensitive Fish Habitat Affected Degree of Unconfirmed Sensitivity Habitat Affected 	<ul style="list-style-type: none"> Existing information gathered during the ToR will be supplemented with information from MNR, Conservation Authorities, Interest Groups, public consultation, municipalities Information gathered in previous Environmental Assessment studies (1989-1994) Existing fish community and habitat mapping collected for 407 EA 2001 1:10 000 base mapping MNR (Natural Resource Values Inventory Systems (NRVIS) mapping Air photo interpretation Reconnaissance data from Terms of Reference supplemented by site specific field reconnaissance NHIC (MNR) and Species At Risk mapping (DFO) Watershed and subwatershed studies http://www.sararegistry.gc.ca/species/default_e.cfm http://www.on.ec.gc.ca/wildlife/sar/sar-e.html Species at Risk Recovery Plans and Management Guidelines, Fisheries Management Plans Field reconnaissance 	<p>Determination of Sensitivity of Fish and Fish Habitat based on evaluation of attributes such as species tolerance, species habitat requirements (critical/specialized habitat), migratory corridors, rarity of species (species of conservation concern or Species At Risk as identified by MNR, CA, DFO or other resource groups), rarity of habitat type/distribution, and habitat resiliency based on thermal regimes (warm, cool, cold water) and flow regime (DFO Risk Management Framework 2006, MTO Environmental Guide for Fish and Fish Habitat 2006).</p> <ol style="list-style-type: none"> Length of Highly Sensitive Fish Habitat Affected Length of Moderately Sensitive Fish Habitat Affected Length of Low Sensitive Fish Habitat Affected Length of Channel with an Unconfirmed Habitat Sensitivity Affected

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Vegetation	10. Effect on upland vegetation units. 11. Effect on significant vegetation communities. 12. Effect on known species of conservation concern or Species at Risk	<ul style="list-style-type: none"> • Interpretation of aerial photography • Information gathered in previous Environmental Assessment studies (1989-1994) • 1:10 000 base mapping and topographic mapping • Field assessment of habitat types and significance/quality in areas of particular interest or where data gaps exist • Existing information from NHIC, naturalist clubs, public consultation, consultant reports • Species at Risk Recovery Plans 	10. Qualitative assessment considering the nature, quality, sensitivity and area (m ²) of upland vegetation units crossed by the alternative including consideration of severance/encroachment, increased edge and changes to patch size. 11. Qualitative assessment considering the nature, quality, sensitivity and area (m ²) of significant vegetation communities crossed by the alternative, including consideration of severance/encroachment, increased edge and changes to patch size. Significant vegetation communities determined as per provincial ELC rarity ranks. 12. Qualitative assessment considering the nature (i.e. species type), significance (designation), sensitivity and number of documented plant species of concern or Species at Risk occurrences crossed by the alternative. Defined as species designated by COSEWIC, COSSARO or Provincial S-Ranks 1, 2 or 3.
Wetlands	13. Effect on wetlands (Evaluated and Unevaluated)	<ul style="list-style-type: none"> • Information gathered in previous Environmental Assessment studies (1989-1994) • Use existing wetland mapping from the Terms of Reference (MNR Source) • Field assessment of habitat types and significance/quality • Existing information residing with MNR, Conservation Authorities, NHIC, local field naturalists • Ontario Wetland Evaluation Records 	13. Qualitative assessment considering the quality, sensitivity and area (m ²) of Provincially, Locally Significant or unevaluated wetlands crossed by the alternative reported by wetland designation (PSW, LSW, unevaluated), considering wetland severance and encroachment into adjacent lands. Unevaluated wetlands 2 ha or greater will be included in evaluation. The number of times the alternative encroaches into adjacent lands will be reported. Adjacent lands are those within 120 m of the individual wetland or individual wetland within a complex.
Wildlife	14. Effect on core wildlife habitat (including indirect effects such as noise and light) 15. Effect on specialized or sensitive wildlife habitat areas (including indirect effects such as noise and light) 16. Effect on habitat of known species of conservation concern or Species At Risk (including indirect effects such as noise and light)	<ul style="list-style-type: none"> • Interpretation of aerial photography • Information gathered in previous Environmental Assessment studies (1989-1994) • 1:10 000 base mapping • MNR NRVIS mapping • Field inventories breeding birds, amphibians and Species at Risk • Existing information from the Breeding Bird Atlas, NHIC • Existing or ongoing research being conducted in the area (breeding bird surveys, herptiles; Bird Studies Canada) • Consultation, consultation with interest groups, Provincial Parks, Conservation Authorities • Scientific literature http://www.sararegistry.gc.ca/species/default_e.cfm http://www.on.ec.gc.ca/wildlife/sar/sar-e.html • Species at Risk Recovery Plans 	14. Qualitative assessment considering the nature, quality, sensitivity and area (m ²) of core wildlife habitat removed by the alternative, including consideration of severance/encroachment, increased edge, effect on interior and deep interior habitat (> 100m and > 200m from edge), reduction of patch size and direct and indirect effects (such as noise and light). Core wildlife habitat is defined as natural areas greater than 25 ha. 15. Qualitative assessment considering the nature, quality, sensitivity and area (m ²) of specialized or sensitive wildlife habitat affected by the alternative, including consideration of severance/encroachment, increased edge, loss of interior forest habitat and direct and indirect effects (such as noise, light). 16. Qualitative assessment considering the significance (species designation), quality, sensitivity and the number of habitat areas supporting documented presence of species of conservation concern or Species At Risk that are crossed by or within 50 m of the alternative, including consideration of severance/encroachment. Habitat areas are defined as ELC polygon at the Community Class level. Species are those designated by COSEWIC, COSSARO or Provincial S-ranks 1, 2 or 3 including avian SARA species. Potential avian SARA habitat is based on documented known historical records and/or the presence of suitable habitat requirements for SARA species.
Environmentally Significant Features	17. Effect on identified ESAs and ANSIs	<ul style="list-style-type: none"> • Existing information ESA reports, ANSI reports collected during the Terms of Reference from MNR, Conservation Authorities, NHIC • Field surveys to verify area boundaries 	17. Qualitative assessment considering the nature, quality, and the number of ESAs and ANSIs crossed by the alternative including consideration of severance/encroachment.
Landscape Connectivity	18. Effect on linkages between core natural areas and other connectivity zones	<ul style="list-style-type: none"> • Interpretation of aerial photographs • Existing natural heritage information • 1:10 000 base mapping • MNR NRVIS mapping 	18. Qualitative assessment considering the nature (i.e. valleylands, tablelands), quality and number of functional movement corridors (linkages) between areas of core wildlife habitat that are crossed by the alternative. Core habitat is defined as natural areas greater than 25 ha.

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Social Environment			
<i>Noise</i>	1. Separation distance to sensitive receptors, sound levels and impacts.	<ul style="list-style-type: none"> Aerial Photographs Municipal land use information 1:50,000 or 1:25,000 topographic maps 1:10,000 Ontario Base Maps Traffic data Public consultation Municipal By-laws Engineering Drawings Field Monitoring / Measurements 	1. Number of sensitive receptors within the predicted area of influence, including residences, schools, daycares, and senior citizen homes.
<i>Community Fabric</i>	2. Encroachment on or severance of established and/or proposed settlement areas. 3. Likely effects on planned/ approved community structure, as may be identified or proposed in provincial land use policies and/or regional official plans, within and east of the study area. 4. Delivery of community services (emergency, school bus). 5. Urban or rural barrier effects	<ul style="list-style-type: none"> Information gathered in previous Environmental Assessment studies (1989-1994) Existing land use mapping and Regional and Local Official Plan will be used as the source to determine where the alternative creates these barriers. Regional and Local Official Plans and existing Land Use Maps (as compiled through windshield surveys and/or air photo interpretation). 	2. Qualitative assessment based on the number of settlement areas severed, the extent to which the alternative encroaches upon the area, and whether or not the settlement area is existing (built) or proposed (not yet built, but designated in the Official Plan), will all be considered. 3. Qualitative assessment of the extent to which the alternative would be compatible with the approved urban structure, as set out in the Local and Regional Official Plan and supplemented by interviews with Regional staff and a planning analysis. 4. Qualitative assessment based on the ability to efficiently and safely provide an alternative route for services, such as school buses, ambulances and fire trucks. 5. Qualitative assessment based on the extent to which the alternative creates physical and psychological barriers between and within communities.
<i>Recreational Opportunities</i>	6. Effect on hiking, hunting, fishing, nature viewing, recreational facilities (golf) and educational opportunities	<ul style="list-style-type: none"> Ministry of Natural Resources 	6. Loss of hunting opportunities; loss of nature-related recreational opportunities, such as, hiking, nature viewing and education.
<i>Property Impacts</i>	7. Residential and institutional property effects: <ul style="list-style-type: none"> Full removal/Displacement Frontage/Reduced frontage Severance - Complete/Partial Loss of Access/Access Impacted 	<ul style="list-style-type: none"> Information gathered in previous Environmental Assessment studies (1989-1994) Site visits and interviews with residents potentially displaced. Land use surveys Windshield surveys Municipal mapping and regional land use plans Air photos MPAC files Conservation Authorities MNR 	7. Number of properties displaced for each of the land use types impacted and the area (ha.) of property required for each. Type of impact will also be determined for each of the land uses, which include: <ul style="list-style-type: none"> Full removal/Displacement Frontage/Reduced Frontage Severance/Complete/Partial Loss of Access/Access Impacted
<i>Traffic Nuisance</i>	8. Potential for diversion of longer distance travel to/from local roadways	<ul style="list-style-type: none"> Traffic volume projections from Region of Durham and local municipalities. 	8. Level of traffic infiltration experienced in adjacent areas (volumes)
<i>Visual Aesthetics</i>	9. Potential impacts of the facility on Visible Landscape Components	<ul style="list-style-type: none"> Inventory of existing visual resources, comprising all visible landscape components including vegetation corridors, agricultural fields, terrain/topography and high points, hedgerows, woodlots, and valleys, and including those that also represent receptor locations such as residences, built form/land uses, and roads/utilities/railways/structures. Tabletop review of aerial photography Review of Google Earth and Flash Earth web-based aerial photography to assess significant landscape elements such as valleys, woodlots, agricultural fields, and built form. Identification of facility receptor locations from which indicator #11 is assessed. 	9. Qualitative assessment of the facility's imposition on and through the visible landscape features as viewed from receptor locations.

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<i>Light</i>	10. Effect on light sensitive receptors	<ul style="list-style-type: none"> Aerial photography, existing land use mapping and Regional and Local Official Plan will be used as the source to determine where the alternative creates potential lighting effects. Aerial photography, Regional and Local Official Plans and existing Land Use Maps and windshield surveys. 	10. Level of light infiltration in areas adjacent to facility.
<i>Air Quality</i>	11. Separation distance to sensitive receptors, predicted concentrations and impacts.	<ul style="list-style-type: none"> 1:10 000 Ontario base maps Alternative locations Aerial photographs 	11. Number of sensitive receptors within the predicted concentration separation distance, including residences, schools, daycares, and senior citizen homes.
Economic/ Land Use Environment			
<i>Provincial/Municipal/Private Land Use Development Strategies</i>	<ol style="list-style-type: none"> Degree of compatibility with municipal and regional development goals and objectives. Capability to provide transportation service/stimulate development of major development initiatives (Seaton, Pickering Airport). Compatibility with federal/provincial/municipal planning goals/ objectives/ policies, including principles and policy directions under development in the Greater Golden Horseshoe Growth Plan and Greenbelt Plan, the proposed Watershed based Source Protection Planning and the proposed GTA Transportation Strategy Effects on approved private development proposals. 	<ul style="list-style-type: none"> Provincial, municipal land use plans Federal/provincial land use goals, objectives, policies and Policy Statements Current land use proposals Public consultation Municipal zoning by-laws Land Use Management Plans Oak Ridges Moraine Conservation Plan, land use mapping Municipal and Agency consultation 	<ol style="list-style-type: none"> Qualitative assessment of the compatibility of the project with approved land use policies based on Regional and Local Official Plans, current proposals and interviews with key stakeholders. Qualitative assessment of the alternative's ability to provide transportation services and stimulate planned and projected growth based on approved land use policies, current proposals and interviews with key stakeholders. Qualitative assessment based on compatibility with other Provincial /Federal Planning goals/objectives/policies including those which have not been formally incorporated into the planning process as Policy Statements or other legislation. Qualitative assessment of the potential effect of the alternative on approved, but not constructed, private development proposals based on interviews with key stakeholders.
<i>Non-Farm Commercial Activities</i>	<ol style="list-style-type: none"> Businesses displaced. Businesses with access affected. Number of employees working for businesses displaced within the right-of-way Changes (+/-) in business exposure. Construction impacts on businesses 	<ul style="list-style-type: none"> Public consultation Land use plans Interviews with business owners/operators Municipal mapping MPAC files 	<ol style="list-style-type: none"> Quantitative assessment of number of businesses within the property/ right-of-way displaced based on land use information. The analysis to include un-built approved facilities and businesses on farms Qualitative analysis of the impacts of changed accessibility to businesses*, both positive and negative. The qualitative assessment of negative impacts will be based on loss of access to and within a property or changes necessary to retain access to a property. The analysis to include un-built approved facilities and to be based on land use information and interviews if needed. Number of employees displaced*. Qualitative assessment based on improved/reduced visibility of a business due to its proximity to the new alternative based on interviews or information obtained from local sources. Quantitative and qualitative analysis of the number and types of businesses affected by construction in terms of access, dust, noise and other similar activities based on interviews or information obtained from local sources (quantitative analysis). <p>* Provided that the businesses and number of employees displaced can be identified.</p>
<i>Mineral Aggregate Resources</i>	<ol style="list-style-type: none"> Effect on licensed aggregate resource facilities. Effect on aggregate resource areas. 	<ul style="list-style-type: none"> Information gathered in previous Environmental Assessment studies (1989-1994) Ministry of Northern Development and Mines (MNDM) mapping and data on current value of resource Official plans Surficial Geology mapping; soils mapping 	<ol style="list-style-type: none"> Degree of access to, or encroachment on existing licensed aggregate resource operations. The number of directly or indirectly (within 50m) affected sites are counted for the alternative. Degree of access to, encroachment on or severance of primary and secondary aggregate resource areas that have been identified and mapped by Ministry of Northern Development and Mines (MNDM). The number of directly or indirectly (within 50 m) affected sites are counted for the alternative.

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<i>Agriculture</i>	12. Removal or sterilization of Class 1-3 agricultural land(s) 13. Specialty crops/cropland affected. 14. Dairy/livestock operations affected. 15. Field crop operations affected. 16. Farm properties greater than 20 ha affected. 17. Severed parcels greater than 20 ha created. 18. Severed parcels less than 20 ha created. 19. High investment operations affected. 20. Farm equipment Transportation routes affected. 21. Division of agricultural community areas	<ul style="list-style-type: none"> Information gathered in previous Environmental Assessment studies (1989-1994) Canada Land Inventory mapping (1:50 000) will be used to identify capability ratings of soils within the study area. Terms of Reference Study OMAF land use mapping Windshield surveys Air photo interpretation Public consultation Municipal mapping Individual Property Assessment 	12. Area (m2) of affected Class 1-3 land removed by the alternative. 13. Number of specialty crop operations affected by the alternative. 14. Direct count of separate operations impacted by the alternative as well land potentially impacted or lost from production. 15. Number of individual field crop operations that will be impacted by the alternative as well as the areas of land impacted or lost from farming production. 16. Number of properties greater than 20 ha impacted by the alternative. 17. Number of parcels greater than 20 ha that are severed from farm property by the alternative. 18. Number of parcels smaller than 20 ha that are severed from farm property by the alternative. 19. Number of high capital investment operations crossed by the alternative. 20. Number of disturbances to inter-property movements and property/market movements that may be interrupted by the alternative. 21. Impact of the alternative on agricultural communities.
<i>Property Contamination</i>	22. Impact on properties in urban areas 23. Impact on properties in rural areas.	<ul style="list-style-type: none"> Field Reconnaissance MOE Waste Generator Database MOE PCB Storage Site Database MOE Waste Disposal Site Inventory MOE Coal Gasification Plant Database Andersons Waste Disposal Sites Database Ecolog ERIS Retail Fuel Storage Tanks Database Ecolog ERIS Spills Occurrence Reporting Information System Brownfield's Environmental Site Registry Federal Contaminated Sites and Solid Waste Landfills Aerial Photographs Municipal and Regional Offices 	22. Identify the number of properties in urban areas with respect to potential site contamination (i.e., low, moderate or high potential) based on current and historical land use; and visual evidence of potential site contamination such as surface staining, waste piles/debris and storage drums and tanks. 23. Identify the number of properties in rural areas with respect to potential site contamination (i.e., low, moderate or high potential) based on current and historical land use; and visual evidence of potential site contamination such as surface staining, waste piles/debris and storage drums and tanks.
<i>Waste Management</i>	24. Impact on (known) operating and closed waste management facilities (e.g. transfer stations, stormwater treatment plants, waste disposal sites, landfills).	<ul style="list-style-type: none"> Field Reconnaissance MOE Waste Disposal Site Inventory Andersons Waste Disposal Site Database Andersons Automobile Wrecking and Supply Database OBM and NTS Mapping Municipal and Regional Offices 	24. Identify the number of (known) closed and operating waste management sites in proximity to the alternative, considering the significance of each of the properties with respect to potential site contamination (i.e., low, moderate or high potential).
Cultural Environment			
<i>Archaeological Features</i>	1. Disturbance or destruction of known significant archaeological sites 2. Disturbance of areas of archaeological potential	<ul style="list-style-type: none"> Ontario Ministry of Culture (Ontario Archaeological Sites Database) Archaeological/heritage studies and reports Historic mapping Other published and unpublished archaeological literature, as appropriate Topographic maps Field review as appropriate Other local informants as appropriate 	1. Number of known sites within or proximate to the alternative. 2. Area of archaeological potential within the alternative.
<i>Built Heritage Resources</i>	3. Displacement or disruption of built heritage resources	<ul style="list-style-type: none"> Historical mapping, photographs, municipal, provincial and federal inventories, listings and plaques and/or heritage reports and designations of National Historic Sites and under the Ontario Heritage. Windshield survey of the study area. Consultation with municipal and regional heritage planning staff or designates, municipal heritage committees, historical societies and other heritage groups as necessary. Consultation with Ministry of Culture. 	3. Number of built heritage resources displaced or disrupted within the property (or ROW) or adjacent.

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<i>Cultural Heritage Landscape Resources</i>	4. Displacement or disruption of heritage landscape resources	<ul style="list-style-type: none"> Historical mapping, photographs, municipal, provincial and federal inventories, listings and plaques and/or heritage reports and designations of National Historic Sites and under the Ontario Heritage. Windshield survey of the study area. Consultation with municipal and regional heritage planning staff or designates, municipal heritage committees, historical societies and other heritage groups as necessary. Consultation with Ministry of Culture. 	4. Number of cultural landscape resources displaced or disrupted, adjacent to or within the property assessed for significance or importance and sensitivity.
Technical Considerations			
<i>Overall Transportation System Performance</i>	1. Out of way travel 2. Support for transit service	<ul style="list-style-type: none"> Travel Demand Forecasting Model results 	1. Qualitative assessment of directness of route alternative. 2. Qualitative assessment of proximity of alternative to built up areas.
<i>Transportation System Compatibility</i>	3. Transportation Network Compatibility	<ul style="list-style-type: none"> Durham Transportation Master Plan Durham Transit Improvement Plan GO Transit Expansion Plans Greater Toronto Area Airport Authority Expansion Plans 	3. Qualitative measure of compatibility of alternative with <ul style="list-style-type: none"> existing/planned road network provincial highway network
<i>Transportation System Connectivity</i>	4. Ability of each alternative to support or connect to existing or proposed travel modes	<ul style="list-style-type: none"> Federal, provincial, GO Transit and municipal studies and reports regarding existing and proposed transportation system improvements 	4. Measures: <ul style="list-style-type: none"> Number of possible connection nodes between alternative and other modes (existing) Number of possible connection nodes between alternative and other modes (planned)
<i>Accessibility</i>	5. Accessibility of alternative to population and employment centres	<ul style="list-style-type: none"> Official Plans Base Mapping Aerial Photography 	5. Qualitative measure of proximity of alternative to trip origin/destinations
<i>Emergency Access</i>	6. Impact of alternative on emergency access to adjacent lands	<ul style="list-style-type: none"> Emergency Services locations (ambulance stations, hospitals, etc) Base mapping 	6. Qualitative impact of change in emergency access/routing
<i>Cost</i>	7. Examines the short and long term costs associated with each alternative	<ul style="list-style-type: none"> MTO, Region and Municipal data on: <ul style="list-style-type: none"> Unit costs for construction Unit costs for operation Life-Cycle maintenance costs Property cost estimates 	7. Costs: <ul style="list-style-type: none"> Quantitative construction cost based on unit cost per kilometer of new corridor