



Ministry of Transportation

# 407 East Environmental Assessment

## Alternative Methods Technical Report (Archaeology)

# FINAL DRAFT

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## 1. Introduction

This report documents the assessment and evaluation of the short-listed alternative routes identified for the 407 East Environmental Assessment (EA) from the Archaeological perspective. Following completion of the screening phase, alternative routes were short-listed for detailed assessment and/or comparative evaluation. The short-listed routes were broken down into 5 sections:

- West Mainline
  - Brock Road to Audley Road – 1 route
  - Audley Road to Ashburn Road – 2 route alternatives
- Central Mainline
  - Ashburn Road to Simcoe Street – 1 route
  - Simcoe Street to Enfield Road – 2 route alternatives
- East Mainline
  - Enfield Road to Highway 35/115 – 12 route alternatives
- West Link
  - West Durham Link – 9 route alternatives
- East Link
  - East Durham Link – 13 route alternatives

This report is one of nine stand-alone documents that outline the evaluation of the alternative routes process from the perspective of each discipline. These reports will be used in concert with one another as supporting documents to the Alternative Methods Report. The following 9 discipline specific reports have been prepared and made available for comment:

- Natural Environment
- Noise
- Socio-economic
- Air Quality
- Agricultural
- Waste Contamination
- Archaeology
- Cultural Heritage
- Technical

The evaluation of alternative routes was a three-step process. The first step entailed a detailed field inventory of conditions associated with each alternative route. Each environmental feature was examined to determine the extent of impact and the findings of these were outlined within each of the disciplines Field Investigations Reports. The second step was to assess the findings of the field investigations against the established Criteria and Indicators listed in Table 1 (Appendix A of Alternative Methods Report) for each of the 5 Factor Areas (Natural, Social, Economic, Cultural

and Technical). After determining the initial potential effects, standard mitigation, avoidance, enhancement and compensation measures were applied in order to determine the Net Effects.

The third step was the evaluation itself. This step involved a comparative analysis of the alternative routes considered to select a preferred alternative. At this stage, the relative importance of the environmental features was determined.

### 1.1 Archaeology Study Team

A study team consisting of ASI staff undertook the Archaeology assessment and evaluation of route alternatives. The actual individuals and their specific roles are provided as follows:

- **Project Manager - Robert Pihl, M.A. – Partner and Senior Archaeologist, Manager Environmental Assessments**
- **Project Archaeologist – Carla Parslow, Ph.D. – Assistant Manager, Environmental Assessments**
- **Field Director - Peter Carruthers, M.A. – Staff Archaeologist**

## 2. Assessment and Evaluation of the Alternative Routes

### 2.1 Methodology

The assessment and evaluation of the alternative routes was conducted in three steps:

#### Step 1: Confirm Evaluation Criteria and Indicators/Measures

Prior to undertaking the net effects analysis, the evaluation criteria, indicators, and measures previously developed were confirmed for application to each of the alternative routes.

The approved 407 East EA Terms of Reference (ToR) set out the draft criteria and indicators in **Table 5.2** for evaluating the 'alternative methods' in the EA. In addition, **Supporting Document C** of the 407 East EA ToR provided proposed data sources and measures for each of the indicators. As a result, the draft criteria, indicators, and measures provided for in the ToR were reviewed and modified appropriately to suit the evaluation of the alternative routes.

Specifically, the criteria, indicators and measures were modified in consultation with review agencies and the public to ensure that an appropriate level of scrutiny and rigour was applied in

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evaluating the “short listed” routes. In doing so, the results of the evaluation phase consist of clearly defined net effects for each “short listed” route that were suitable for comparison.

**Step 2: Undertake the Net Effects Analysis**

With the evaluation criteria, indicators and measures confirmed through the preceding step, a net effects analysis of the “short-listed” alternative routes was carried out consisting of the following activities:

- Identify potential effects (based on measures) on the environment;
- Develop and apply avoidance/ mitigation/ compensation/ enhancement measures; and
- Determine net effects on the environment.

**Step 3: Carry Out the Comparative Evaluation**

In Step 3, the net effects identified for each “short-listed” route segment in Step 2 were compared to one another in order to identify a “recommended route segment”. The comparison of net effects was completed using a “Reasoned Argument” or “Trade-off” method, as provided for in the approved 407 East EA ToR.

Each short-listed route segment was assessed based on the evaluation criteria and indicator measures as well as the potential effects based on measures. The measures used included the number and significance.

The number of known archaeological sites within the short-listed route segment was calculated and further assessed through the following measures:

1. Type of site:
  - a. Archaeological sites with human remains
  - b. Aboriginal habitation sites (villages, campsites)
  - c. Euro-Canadian habitation sites (homesteads, farmsteads)
  - d. Isolated findspots, undetermined sites
2. Significance, or heritage value of the known archaeological site (high, medium, low):
  - a. Archaeological sites with human remains - High
  - b. Aboriginal habitation sites (villages, campsites) - High
  - c. Euro-Canadian habitation sites (homesteads, farmsteads) - Moderate
  - d. Isolated findspots and undetermined sites (unsure of cultural affiliation)– Low

The ranking of significance, or heritage value of an archaeological site is based on the Ministry of Culture’s *Standards and Guidelines for Consulting Archaeologists* (Final Draft 2006) where criteria are based on informational value (cultural historic value, historic value, scientific values, rarity or frequency, productivity, and integrity); value to a community (the archaeological site has traditional, social or religious importance to a particular community, First Nation, or group); and value as a

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public resource (the archaeological site has potential for public use for education, recreation, or tourism).

In addition to the criteria for ranking the significance or heritage value mentioned above, the Ministry of Culture’s *Standards and Guidelines for Consulting Archaeologists* (Final Draft 2006: Unit 1E, pg 9) states that in addition to the criteria mentioned, the following classes of archaeological sites always have cultural value or interest:

1. Paleo-Indian archaeological sites (shows the earliest human occupation of the province);
2. Large, dense lithic scatters (very high yields of artifacts per unit);
3. Woodland period archaeological sites;
4. Post-contact archaeological sites pre-dating 1830;
5. Archaeological sites identified as sacred and burial sites; and
6. Late nineteenth and twentieth century archaeological sites where background documentation or archaeological features indicate cultural heritage value or interest.

Should a known archaeological site be identified within the preferred route segment belong to one of these classes, further archaeological investigation is necessary through a Stage 2, and possibly a Stage 3 and Stage 4 archaeological assessment (Final Draft 2006: Unit 1E, pg 9).

Archaeological sites identified as sacred and burial sites are ranked high and the preferred recommendation, as per the Ministry of Culture’s standards and guidelines is avoidance and protection (Final Draft 2006: Unit 1E, pg 10).

Aboriginal habitation sites (campsites, villages) cover many of the above criteria and are also ranked high.

Euro-Canadian habitation sites (homesteads, farmsteads) also meet the above criteria. Pending further investigation through documentation or archaeological features indicate cultural heritage value or interest, these sites are ranked as moderate.

The degree of archaeological potential within the alternative is determined by:

1. Proximity to water
2. Historical land use
3. Other physiographic indicators of archaeological potential

An estimation of archaeological site potential is defined by the percentage of an area of archaeological site potential within each route segment. Percentages were based on estimated percentage of each route segment determined to have archaeological potential.

Degree of site potential (based on the calculations noted above) was evaluated as follows:

1. **0%:** no archaeological site potential
2. **Up to 25%:** 1-25% of study area has low archaeological site potential

3. **Up to 50%:** 26-50% of study area has medium archaeological site potential
4. **Over 50%:** 51-100% of study area has high archaeological site potential

## 2.2 West Mainline – Brock Road to Audley Road

### 2.2.1 Net Effects Analysis

In this segment of the West Mainline between Brock Road and Audley Road, a single route option exists.

There are four archaeological sites within their segments ROW; all are situated around node M1. One site (AIGs-27) is an Aboriginal Archaic campsite; two sites (AIGs-177 and AIGs-179) are Aboriginal Late Paleo-Indian, Hi-Lo Findspots; and the fourth (AIGs-228) is a Euro-Canadian Homestead that has undergone Stage 4 salvage excavation and is considered clear of any further archaeological concern.

The potential for adverse effects to known significant archaeological sites and areas of archaeological potential are high albeit there may be opportunities for avoidance or mitigation of effects.

## 2.3 West Mainline – Audley Road to Ashburn Road

### 2.3.1 Net Effects Analysis

#### WM1

There are no known archaeological sites within this segments ROW but there is a high archaeological potential for this alternative. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

#### WM2

One Aboriginal findspot (AIGs-90) is known within 50 meters of this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

### 2.3.2 Evaluation Results

The potential for adverse effects are comparable for both route segments. WM1 has no net effects while WM2 has low net effects. Both routes have high archaeological potential. While there is an Aboriginal findspot within 50 metres of WM2, there is little distinction between the route segments and either route is preferable.

## 2.4 Central Mainline – Ashburn Road to Simcoe Street

### 2.4.1 Net Effects Analysis

In this segment of the Central Mainline between Ashburn Road to Simcoe Street, a single route option exists.

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

## 2.5 Central Mainline – Simcoe Street to Enfield Road

### 2.5.1 Net Effects Analysis

#### CM1

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

#### CM2

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

### 2.5.2 Evaluation Results

The potential for adverse effects are equally low for both routes. Neither route impacts an archaeological site but there is high archaeological potential for this segment of the Mainline. Therefore, there is no distinction between the routes from an archaeological perspective and either route is preferable.

## 2.6 East Mainline – Enfield Road to Hwy 35/115

### 2.6.1 Net Effects Analysis

#### EM1

One undetermined site (BaGp-8) was identified within this route Segment. A farmer reported that he found the remains of fire pits, cracked rock, bones, etc while ploughing. This is potentially an Aboriginal midden (refuse heap), commonly found in Aboriginal habitation sites. This site is approximately within 100 meters of this route segment. More than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites and areas of archaeological potential are high albeit should this site be affected by construction activities, there may be opportunities for mitigation (protection and/or avoidance).

#### EM2

One undetermined site (BaGp-8) was identified within this route segment. A farmer reported that he found the remains of fire pits, cracked rock, bones, etc while ploughing. This is a potential midden. Site is within approximately 50 meters of this route segment. There is also one Aboriginal isolated find (AlGq-7) within this route segment. More than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites and areas of archaeological potential are high albeit should this site be affected by construction activities, there may be opportunities for mitigation (protection and/or avoidance).

#### EM3

One undetermined site (BaGp-8) was identified within this route segment. A farmer reported that he found the remains of fire pits, cracked rock, bones, etc while ploughing. This is a potential midden. Site is within the route segment. There is also one Aboriginal isolated find (AlGq-7) within this route segment. More than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites and areas of archaeological potential are high albeit should this site be affected by construction activities, there may be opportunities for mitigation (protection and/or avoidance).

#### EM4

One Aboriginal isolated find (AlGq-7) was identified within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

#### EM5

One Aboriginal isolated find (AlGq-7) was identified within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

#### EM6

There are three Aboriginal isolated finds (AlGq-7, BaGp-18, and BaGp-23) within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

#### EM7

One undetermined site (BaGp-8) was identified within this route Segment. A farmer reported that he found the remains of fire pits, cracked rock, bones, etc while ploughing. This is a potential midden (refuse heap). Site is within approximately 100 meters of this route segment. More than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites and areas of archaeological potential are high albeit should this site be affected by construction activities, there may be opportunities for mitigation (protection and/or avoidance).

#### EM8

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

#### EM9

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

#### EM10

There are two Aboriginal isolated finds (BaGp-18 and BaGp-23) within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EM11**

There is one Aboriginal isolated find (AIGq-7) within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EM12**

One Aboriginal isolated find (BaGp-23) was identified within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**2.6.2 Evaluation Results**

The net effects for Routes EM8, EM9 are the lowest among all routes. These two routes have no net effects for known archaeological sites. Routes EM4, EM5, EM11, and EM12 all have similar low net effects but are less preferable to EM8 and EM9 because they impact known archaeological findspots. Routes EM1-3 and 7 impact an undetermined (potential midden) site and are therefore least preferable and have been ranked as having high net effects. All routes have the same net effects for archaeological potential and are ranked as high though there may be opportunities for avoidance or mitigation of effects.

**2.7 West Link****2.7.1 Net Effects Analysis****WL1**

One Aboriginal isolated find (AIGr-46) was identified within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**WL2**

One Aboriginal isolated find (AIGr-46) was identified within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**WL3**

One Aboriginal isolated find (AIGr-46) was identified within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**WL4**

One Aboriginal isolated find (AIGr-46) was identified within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**WL5**

One Aboriginal isolated find (AIGr-46) was identified within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**WL6**

Two archaeological sites identified along this route. One site is an Archaic/Early Woodlands scatter (AIGs-90) the other is an Aboriginal undetermined findspot (AIGr-46). As well, over 50 % of the route segment is identified as having high archaeological potential. The potential for adverse effects to known significant archaeological sites and areas of archaeological potential are high albeit should this site be affected by construction activities, there may be opportunities for mitigation (protection and/or avoidance).

**WL7**

One Aboriginal isolated find (AIGr-46) was identified within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**WL8**

One Aboriginal isolated find (AIGr-46) was identified within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**WL9**

One Aboriginal isolated find (AIGr-46) was identified within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**2.7.2 Evaluation Results**

The net effects for all routes are equal, with the exception of Route WL 6. All routes but WL 6 have low impacts on archaeological sites. Route WL6 ranks high because of the presence of a known Archaic and/or Early Woodlands scatter and therefore has high impacts on archaeological sites. All routes have the same potential impacts to archaeological potential and are ranked as high, though there may be opportunities for avoidance or mitigation of effects.

**2.8 East Link****2.8.1 Net Effects Analysis****EL1**

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EL2**

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EL3**

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EL4**

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EL5**

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EL6**

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EL7**

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EL8**

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EL9**

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EL10**

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EL11**

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EL12**

One Aboriginal isolated find (AIGq-41) was identified within this route segment and more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**EL13**

There are no known archaeological sites within this route segment but more than 50% of the segment is identified as having archaeological potential. The potential for adverse effects to known significant archaeological sites is low while there is a potentially high net effect for areas of archaeological potential.

**2.8.2 Evaluation Results**

The net effects for all routes are equal with the exception of EL12. All routes have low impacts on archaeological sites but route EL 12 impacts an Aboriginal findspot and therefore is not equal to all other route alternatives. All routes have the same potential impacts to archaeological potential and are ranked as high.

**3. Summary**

- **West Mainline:** The net effects are low for both routes. There are no archaeological sites for WM1 and one Aboriginal findspot for WM1 but high archaeological potential for both routes. Routes WM1 is preferred for the west mainline.
- **Central Mainline:** The net effects are equally low for both routes. There are no archaeological sites but high archaeological potential. Routes CM1 and CM2 are tied with regards to preference for the central mainline.
- **East Mainline:** The net effects for Routes EM8 and EM9 are the least among all alternatives route. EM8 and EM9 have no net effect on known archaeological sites. Routes EM4, EM5, EM11, and EM12 all have similar low net effects but are less preferred than EM8 and EM9 as they contain known archaeological findspots. All routes have the same net effects for archaeological potential and are ranked as high. Routes EM8 and EM9 are tied with regards

to preference and EM4, EM5, EM11 and EM12 are tied as second most preferable alternatives. All of the other alternatives (EM 1-3, 6-7, and 10) are the least preferable alternatives.

- **West Link:** The net effects for all routes, except WL6, are equal. These routes have low net effects with regards to archaeological sites. Route WL6 ranks high because of the presence of a known Archaic and/or Early Woodlands scatter. All routes have the same net effects for archaeological potential and are ranked as high. All routes, except WL6, are tied for preference; route WL 6 is the least preferable alternative.
- **East Link:** The net effects for all routes, except EL12, are equal. These routes have low net effects with regards to archaeological sites. Route EL12 also ranks low but is not equal to the other short-listed eastern link routes because of the presence of an Aboriginal findspot. All routes have the same net effects for archaeological potential and are ranked as high. All routes, except EL12, are tied for preference; route EL 12 is the least preferable alternative.