APPENDIX E

Detailed Assessment Tables for Design Alternatives
**McKay Road Interchange**

**Assessment & Evaluation of Alternatives**

### 1.0 SOCIO-ECONOMIC ENVIRONMENT

<table>
<thead>
<tr>
<th>FACTOR / CRITERIA</th>
<th>ALTERNATIVE A</th>
<th>ALTERNATIVE B</th>
<th>ALTERNATIVE C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property and Access</td>
<td>4 Properties impacted in the NE, SE and SW quadrants</td>
<td>3 Properties impacted in the NE, SE and SW quadrants</td>
<td>4 Properties impacted in the NE, SE and SW quadrants</td>
</tr>
<tr>
<td>Number of properties impacted</td>
<td>Additional very minor encroachment on two additional properties may occur</td>
<td>Additional very minor encroachment on up to 4 additional properties may occur</td>
<td>Additional very minor encroachment on two additional properties may occur</td>
</tr>
<tr>
<td>Residences/businesses displaced</td>
<td>1 possible displacement of residence in NE quadrant by E-N on-ramp</td>
<td>1 displacement of business – Kell’s Garden City will be displaced by all Alternatives</td>
<td>1 displacement of business – Kell’s Garden City will be displaced by all Alternatives</td>
</tr>
<tr>
<td>Accesses affected</td>
<td>1 displacement of business – Kell’s Garden City will be displaced by all Alternatives</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 1.2 Agricultural Operations

| Impacts to agricultural operations (including access and operable areas) | All Alternatives will result in impacts to agricultural lands. This is common to all Alternatives. Alternative A results in greater impacts to agricultural lands because it impacts portions of fields in three quadrants. | All Alternatives will result in impacts to agricultural lands. This is common to all Alternatives. This alternative has less impact to existing agricultural operations because it avoids impacts to the NE quadrant. | All Alternatives will result in impacts to agricultural lands. This is common to all Alternatives. |

### 1.3 Community

| Nuisance impacts (i.e., Visual intrusion, Noise, etc.) | No cemeteries, places of worship or community features will be impacted by any of the Alternatives. There are no such community features in proximity to the proposed interchange, regardless of the Alternative. | No cemeteries, places of worship or community features will be impacted by any of the Alternatives. There are no such community features in proximity to the proposed interchange, regardless of the Alternative. | No cemeteries, places of worship or community features will be impacted by any of the Alternatives. There are no such community features in proximity to the proposed interchange, regardless of the Alternative. |
| Impacts to recreation sites, cemeteries, schools, places of worship, and unique community features | Impacts on community activity, character and mobility | Impacts on community activity, character and mobility | Impacts on community activity, character and mobility |
| | | | |

### 1.4 Land Use

| Compatibility with government goals and objectives | All Alternatives are consistent with the City’s Multi-Modal Active Transportation Master Plan (MMAATMP, 2014) and City of Barrie Growth Management Strategy # 3, Infrastructure Master Plans Municipal Class EA and support the City’s plans and policies around an expanded and well connected transportation network to support planned population and employment growth. | All Alternatives are consistent with the City’s Multi-Modal Active Transportation Master Plan (MMAATMP, 2014) and City of Barrie Growth Management Strategy # 3, Infrastructure Master Plans Municipal Class EA and support the City’s plans and policies around an expanded and well connected transportation network to support planned population and employment growth. | All Alternatives are consistent with the City’s Multi-Modal Active Transportation Master Plan (MMAATMP, 2014) and City of Barrie Growth Management Strategy # 3, Infrastructure Master Plans Municipal Class EA and support the City’s plans and policies around an expanded and well connected transportation network to support planned population and employment growth. |
| Compatibility with future land use | All Alternatives are considered to be consistent with approved / designated land use of the Salem Secondary Plan (OPA 38). | All Alternatives are considered to be consistent with approved / designated land use of the Salem Secondary Plan (OPA 38). | All Alternatives are considered to be consistent with approved / designated land use of the Salem Secondary Plan (OPA 38). |

### Socio-Economic Environment Summary

From a Socio-Economic perspective, Alternative B is preferred as it impacts one less property than the other alternatives. All alternatives result in the displacement of Kell’s Garden City.

### 2.0 CULTURAL ENVIRONMENT

#### 2.1 Built Heritage / Cultural Heritage Landscapes

- Directly impacts the Farm Complex at 3480 McKay Road East. This property is not designated under the Ontario Heritage Act or listed in the City’s Municipal Registry. Further assessment is recommended should this property be impacted.

- McKay Road is identified as a Cultural Heritage Landscape. Changes to the road cape are expected that may result in changes to the road character.

- Alternatives B avoids impacting the buildings at 3480 McKay Road East, although minor property encroachment may occur. McKay Road is identified as a Cultural Heritage Landscape. Changes to the road cape are expected that may result in changes to the road character.

- Same as Alternative B.

#### 2.2 Archaeological Resources

-潜在影响的考古遗址

- Potential impacts to known archaeological sites

- Impacts the Cleary site (BBow-10); a 4.6 hectare ancestral Huron-Wendat village located in the NE quadrant of McKay Road and Highway 405. The significance of the site is underscored by its large size.

- A Stage 2 Assessment will be undertaken relative to the preferred design alternatives for this study. However, based on the previous Stage 1 work, a Stage 3 is already recommended for the Cleary site. It is likely that Stage 4 would ultimately be required.

- Given the nature and extent of the Cleary site, it is considered a significant constraint in the context of the McKay Road Interchange.

- Potential for impacts in other areas will be assessed through a Stage 2 Assessment.

- Minimises impacts to the NE quadrant and therefore minimises potential impacts to the Cleary site.

- Potential for impacts in other areas will be assessed through a Stage 2 Assessment.

- Similar to Alternative A. Although the ramp configuration differs, the proposed ramps in the NE quadrant will impact the Cleary site.

- A Stage 2 Assessment will be undertaken relative to the preferred design alternatives for this study. However, based on the previous Stage 1 work, a Stage 3 is already recommended for the Cleary site. It is likely that Stage 4 would ultimately be required.

- Given the nature and extent of the Cleary site, it is considered a significant constraint in the context of the McKay Road Interchange.

- Potential for impacts in other areas will be assessed through a Stage 2 Assessment.

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January 2017
### 2.3 First Nations Interests

- Consideration of places of significance, traditional and treaty rights
- Potential impacts to FN Traditional Use Areas
- Of greatest interest to FN will be potential for impacts to archaeological resources, natural environmental features and access to watercourses and traditional lands.

<table>
<thead>
<tr>
<th>FACTOR / CRITERIA</th>
<th>ALTERNATIVE A</th>
<th>ALTERNATIVE B</th>
<th>ALTERNATIVE C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PARCLO A4</td>
<td>PARCLO A3</td>
<td>DIAMOND</td>
</tr>
<tr>
<td>Impacts to the Cleary site will be of significant interest and potentially significant concern to Huron Wendat and possibly other First Nation communities.</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>All alternatives result in impacts to natural environmental features, however, Alternative A will impact greater area with the ramp located in the NE quadrant.</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Impacts to the Cleary site will be of significant interest and potentially significant concern to Huron Wendat and possibly other First Nation communities.</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>May be of less potential concern to FN given that the Cleary site remains undisturbed.</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Less impact to natural areas since there are no ramps located in the NE quadrant.</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Similar to Alternative A.</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Summary of Cultural Environment

From a Cultural Environment perspective, Alternative B is preferred as it minimises impacts to the NE quadrant and therefore minimise impacts to the Cleary Site. Cleary Site is a site of significant archeological importance.
3.0 NATURAL ENVIRONMENT

3.1 Watercourses / Fish Habitat
- Qualitative assessment considering the magnitude and nature (number, extent, duration, intensity etc.) of potential impacts, sensitivity of fish and aquatic habitat using, as indicators: the number of watercourse crossings, need for channel realignments and length, the fish communities, including any aquatic Species at Risk (SAR), and habitat, including any specialized habitat, potentially affected.

- Only one watercourse is present within the McKay Road Interchange: LOV-007, a headwater tributary to Lover’s Creek. This watercourse originates as standing water within a shallow marsh community approximately 250 m north of McKay Road in the NE quadrant. The watercourse becomes more defined approximately 50 m downstream of its origins where it flows parallel to Highway 400 for approximately 300 m before losing definition in a meadow marsh community (near the limits of the Lover’s Creek PSW).
- LOV-007 is connected seasonally to the more defined habitat downstream (main Lover’s Creek) that has been identified by LSRCA as supporting direct fish use. As there are no permanent barriers to fish movement and the study reaches support refuge habitat, LOV-007 is also considered to provide direct fish habitat.
- Alternative A requires a realignment of a section of LOV-007, resulting from the northbound on-ramp. This is considered direct fish habitat.

Watercourses / Fish Habitat Impact Summary
- This Alternative results in the highest impact due to the realignment required in the NE quadrant.

- Alternative B results in no direct impacts to LOV-007.

Watercourses / Fish Habitat Impact Summary
- This Alternative results in the least impact as there is no ramp proposed in the NE quadrant and therefore no required alterations of the fish habitat.

- Alternative C requires a realignment of a section of LOV-007 resulting from the northbound on-ramp. This is considered direct fish habitat.

Watercourses / Fish Habitat Impact Summary
- This Alternative results in the highest impact due to the realignment required in the NE quadrant.

3.2 Vegetation
- Qualitative assessment considering the magnitude (area in ha) and nature of potential impacts (fragmentation, encroachment, loss), significance and sensitivity of vegetation based on: Significant Woodlands, known flora Species at Risk (SAR), known S-Rank (1-3) flora, sensitive or rare vegetation communities (based on provincial ELC ranks), Provincially Significant Wetlands, other evaluated wetlands, unevaluated wetlands, as well as, potential to avoid or mitigate impacts.

- NW Quadrant - Scotch Pine Coniferous Plantation (CUP9-3) and Dry-Fresh Sugar Maple - Oak Deciduous Forest (FODS-3) present in the NW quadrant would be fragmented by the ramps.
- Community Diversity: Forest patch contains 2 upland vegetation types. Portions of these 2 vegetation community types will be directly impacted by the ramps.
- SW Quadrant - Scotch Pine Coniferous Plantation (CUP9-3), Dry-Fresh Sugar Maple - Deciduous Forest (FODS-3) and Coniferous Plantation (CUP9-1) present on the SW quadrant would be fragmented by the ramp.
- Community Diversity: Forest patch contains 3 upland vegetation types. Portions of all 3 vegetation types will be directly impacted by the ramps.
- SE Quadrant - Roadside and disturbed Dry-Moist Old Field Meadow (CUM1-1) present in the SE quadrant will be fragmented by the ramps.
- NE Quadrant - Mineral Cultural Woodland (CUM1), Fresh-Moist White Elm Lowland Deciduous Forest (FODT1-1) and Fresh-Moist White Cedar – Sugar Maple Mixed Forest (FOMT1-1) and several small marsh communities along the roadside will be fragmented by the ramp.

Species of Conservation Interest
- No SAR flora affected by this Alternative
- One species ranked S2? (provincially rare) - Amethyst Aster - was recorded in Unit 1 (NE Quadrant) and may be impacted by the ramp.

Vegetation Impact Summary
- This Alternative results in the highest impact to vegetation features as it results in the fragmentation of the forest patches in both the NW and SW quadrants as well as potentially impacting small wetland communities and a provincially rare plant species documented.

- NW Quadrant - Same as Alternative A.
- SW Quadrant - Same as Alternative A.
- SE Quadrant - Same as Alternative A.
- NE Quadrant - No ramp proposed in this quadrant therefore no impacts to the vegetation communities in this vicinity.

Species of Conservation Interest
- No SAR flora affected by this Alternative
- One species ranked S3? (provincially rare) - Amethyst Aster - was recorded in Unit 1 (NE Quadrant) but will not be impacted by this alternative.

Vegetation Impact Summary
- This Alternative results in the least impact to vegetation features as it is the only alternative that does not impact the NE quadrant – the only quadrant with wetland communities and a provincially rare plant species documented.

- NW Quadrant - Similar to Alternative A, with slightly less vegetation removal required.
- SW Quadrant - Similar to Alternative A, however ramp only results in edge impacts to the forest community, rather than fragmentation.
- SE Quadrant - Similar to Alternative A, with slightly less vegetation removal.
- NE Quadrant - Very similar to Alternative A.

Species of Conservation Interest
- No SAR flora affected by this Alternative
- One species ranked S2? (provincially rare) - Amethyst Aster - was recorded in Unit 1 (NE Quadrant) and may be impacted by the ramp.

Vegetation Impact Summary
- This Alternative results in impacts similar to Alternative A, with slightly less vegetation removal required.
### 3.3 Designated Natural Features

- Qualitative assessment considering the nature of potential impacts (fragmentation, encroachment, loss) and the features/functions for which they are designated, as well as, potential to avoid or mitigate impacts.

<table>
<thead>
<tr>
<th>Factor / Criteria</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Barrie Natural Heritage System – Core Area</td>
<td>- ramps in the NW and NE quadrants will result in direct impacts to area mapped within the NHS</td>
<td>- ramp in the NW quadrant will result in direct impacts to area mapped within the NHS</td>
<td>- similar to Alternative A</td>
</tr>
<tr>
<td>Lover's Creek Provincialy Significant Wetland (PSW)</td>
<td>- no impacts to the PSW anticipated by this alternative</td>
<td>- no impacts to the PSW anticipated by this alternative</td>
<td>Lover's Creek Provincialy Significant Wetland (PSW)</td>
</tr>
</tbody>
</table>

**Designated Natural Features Summary**
- This Alternative results in the highest impact to designated natural features as it results in impacts to the NHS in both the NW and NE quadrants.

### 3.4 Wildlife and SAR

- Qualitative assessment considering the magnitude (area in ha) and nature of potential impacts (fragmentation, encroachment, loss), significance and sensitivity of wildlife habitat and landscape connectivity based on the presence and density of: interior forest habitat (>100m and >200m), known faunal Species at Risk (SAR) and potential habitat based on known habitat preferences, known or potential wildlife use (e.g., deer overwintering areas, waterfowl staging, etc.), wildlife movement opportunities, considering local and regional scale (landscape-level) linkages and corridors, as well as the potential to avoid or mitigate impacts.

- No regional wildlife corridors impacted by the McKay Road Interchange alternatives. Localized wildlife movement likely occurs across open agricultural fields and within forested communities throughout the study area, particularly in an east-west direction within the NHS / Lovers' Creek Swamp area which also include an identified Deer Wintering Area.

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
</tr>
</thead>
<tbody>
<tr>
<td>NW Quadrant</td>
<td>- Forest patch fragmented by proposed ramps. Impacted forest communities have the potential to support the following SAR species: Wood Thrush (SC – COSSARO, THR - COSEWIC), Eastern Wood Pewee (SC) and Little Brown Myotis (END).</td>
<td>- Same as Alternative A</td>
<td>No ramp proposed in this quadrant therefore, no impacts</td>
</tr>
<tr>
<td>SW Quadrant</td>
<td>- Forest patch fragmented by proposed ramp. Forest is unlikely to support SAR due to small size and habitat characteristics. Ramp creates additional barrier for wildlife species movements with increased risk of road mortality.</td>
<td>- Same as Alternative A</td>
<td>Wildlife and SAR Summary</td>
</tr>
<tr>
<td>SE Quadrant</td>
<td>- Record of Bank Swallow (THR) breeding habitat within this community in 2011 (NRSI and Dougan &amp; Associates, 2012). Additional surveys required to document current use and potential impact to this species during detail design.</td>
<td>- Same as Alternative A</td>
<td>Wildlife and SAR Summary</td>
</tr>
<tr>
<td>NE Quadrant</td>
<td>- Potential habitat for one provincially rare rodent species (Proghorn Clubtail – SJ) occurs within the small wetland communities along the headwater area of LOV-007.</td>
<td>- Same as Alternative A</td>
<td>No impacts due to absence of impacts in the NE quadrant.</td>
</tr>
</tbody>
</table>

**Wildlife and SAR Summary**
- This Alternative results in the highest potential impact to wildlife and SAR due to the absence of impacts in the NE quadrant.

### 3.6 Floodplain Storage and Flood Conveyance

- Qualitative assessment of the potential impacts to floodplain storage and flood conveyance.

- No major impacts to floodplain storage or flood conveyance are expected based on information currently available.

- All Alternatives will result in crossing of the floodplain and LSCPA Regulation limits. It is anticipated that these impacts can be mitigated.

**Negative Impact**

<table>
<thead>
<tr>
<th>Factor / Criteria</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floodplain Storage and Flood Conveyance</td>
<td>- All Alternatives will result in crossing of the floodplain and LSCPA Regulation limits. It is anticipated that these impacts can be mitigated.</td>
<td>- No impacts due to absence of impacts in the NE quadrant.</td>
<td>No major impacts to floodplain storage or flood conveyance are expected based on information currently available.</td>
</tr>
</tbody>
</table>

**Positive Impact**

<table>
<thead>
<tr>
<th>Factor / Criteria</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floodplain Storage and Flood Conveyance</td>
<td>- No major impacts to floodplain storage or flood conveyance are expected based on information currently available.</td>
<td>- No impacts due to absence of impacts in the NE quadrant.</td>
<td>No major impacts to floodplain storage or flood conveyance are expected based on information currently available.</td>
</tr>
</tbody>
</table>

**Assessment & Evaluation of Alternatives**

**January 2017**
### McKay Road Interchange

**Assessment & Evaluation of Alternatives**

**City of Barrie**

**McKay Road Class EA Study**

### Summary of Natural Environmental

- The Study Area is generally not within: Wellhead protection Areas; Intake Protection Zones; Issue Contributing Area; and Groundwater Under Direct Influence.
- The Study Area includes portions of Significant Recharge Areas and Highly Vulnerable Aquifer Areas.
- A hydrogeological assessment, completed for MTO’s McKay Bridge replacement, concluded a Permit To Take Water (PTTW) was not required.
- A hydrogeological assessment will be undertaken for the new McKay Road interchange, in detailed design, to ensure any permit requirements are met.
- In the context of the McKay Road Interchange, groundwater will generally be protected through appropriate stormwater management design.

### 3.8 Groundwater

- Potential impacts to sensitive groundwater areas identified in the Source Water Protection Plan

**Groundwater Management**

- Consideration for the use of LIDs
- Management Practices such as enhanced grassed swales, trenches, or infiltration galleries for water balance may be utilized for any of the Alternatives.
- Overall, all Alternatives will have generally the same impacts on surface water quality and similar opportunities for quantity/stormwater management.

### 3.7 Surface Water Quality and Quantity / Stormwater Management

- Qualitative assessment of the ability to manage surface water quality and quantity/stormwater management.
- Consideration for the use of LIDs

### 4.0 Technical Considerations

#### 4.1 Traffic Operations

- **Traffic Movements**
  - Future level-of-service
  - Parclo A4 configuration typically has the highest performance of all alternatives and will result with the best Level-Of-Service compared to Parclo A3 and Diamond configurations.
  - Quantitative Traffic Analysis dependant on ongoing Needs and Justification Study.

- **Intersection configuration**
  - Typical MTO ‘preferred’ interchange; familiar to most drivers in Ontario.
  - Higher capacity configuration as free-flow moves to access Highway 400.
  - Simple three-leg ramp terminal intersections.
  - The four on-ramps dedicated for each movement simplify traffic operations and provides the least number of conflicts points.

- **Conflict points**
  - Less desired MTO interchange though is familiar to most drivers in Ontario.
  - Low capacity configuration as no free-flow moves to access Highway 400.
  - Four-leg ramp terminal intersections.
  - Left-turn at both ramp terminal increases conflict points

#### 4.2 Geometrics & Safety

- **Weaving Issues**
  - The 10th Line Bridge is currently being replaced and the new structure will be compatible with all alternatives (the structure will be widened to accommodate interchange).

- **Conflict points**
  - All Alternatives will provide for transit and active transportation on the McKay Road bridge.
  - The 10th Line Bridge is currently being replaced and the new structure will be compatible with all alternatives (the structure will be widened to accommodate interchange).

#### 4.3 Compatibility with existing and planned municipal road network.

- Provides for transit operations/service
- Provides for active transportation
- Impacts on existing infrastructure

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**Table: Assessment of Alternatives**

<table>
<thead>
<tr>
<th>Factor / Criteria</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.7 Surface Water Quality and Quantity / Stormwater Management</td>
<td>- All Alternatives result in some increase in impervious areas, leading to an increase in flows and potential impact on water quality.</td>
<td>- All Alternatives will require reconfiguration of existing Highway 400 and McKay Road drainage swales at some locations. Impacts to existing culverts will require some culvert extensions and/or replacements.</td>
<td>- Additional minor drainage culverts will be required at some locations. No Alternative would preclude a SWM opportunity. Flat bottomed grass swales could be used extensively within any of the Alternative interchanges for water quality enhancement. Interim flow control or permanent opportunities will exist for innovative stormwater management and LIDs. Best Management Practices such as enhanced grassed swales, trenches, or infiltration galleries for water balance may be utilized for any of the Alternatives. Overall, all Alternatives will have generally the same impacts on surface water quality and similar opportunities for quantity/stormwater management.</td>
</tr>
<tr>
<td>3.8 Groundwater</td>
<td>- The Study Area is generally not within: Wellhead protection Areas; Intake Protection Zones; Issue Contributing Area; and Groundwater Under Direct Influence. The Study Area includes portions of Significant Recharge Areas and Highly Vulnerable Aquifer Areas. A hydrogeological assessment, completed for MTO’s McKay Bridge replacement, concluded a Permit To Take Water (PTTW) was not required. A hydrogeological assessment will be undertaken for the new McKay Road interchange, in detailed design, to ensure any permit requirements are met. In the context of the McKay Road Interchange, groundwater will generally be protected through appropriate stormwater management design.</td>
<td>- Consideration for the use of LIDs. Management Practices such as enhanced grassed swales, trenches, or infiltration galleries for water balance may be utilized for any of the Alternatives. Overall, all Alternatives will have generally the same impacts on surface water quality and similar opportunities for quantity/stormwater management.</td>
<td></td>
</tr>
<tr>
<td>Summary of Natural Environmental</td>
<td>- From a Natural Environment perspective, Alternative B is preferred due to the absence of a ramp in the NE quadrant. The ramps proposed in the NE quadrant in both Alternatives A and C would result in the need for a waterfront realignment as well as impacts to wetland communities, and potential impacts to a provincially rare plant and provincially rare odonate species. Impacts in all other quadrants are similar, with slightly less vegetation community fragmentation and vegetation removal required for Alternative C (and similar reduced impacts to wildlife and potential SAR habitat), making Alternative A the least preferred.</td>
<td>- Overall, all Alternatives will have generally the same impacts on surface water quality and similar opportunities for quantity/stormwater management.</td>
<td></td>
</tr>
<tr>
<td>4.0 Technical Considerations</td>
<td>- This alternative provides free flow movements from McKay Road to Highway 400, from all quadrants. Parclo A4 configuration typically has the highest performance of all alternatives and will result with the best Level-Of-Service compared to Parclo A3 and Diamond configurations.</td>
<td>- This alternative provides free flow movements from McKay Road to Highway 400, from three quadrants. Traffic entering Highway 400 from McKay Road, east of Highway 400, will have to turn left at the ramp terminal. Left turn at ramp terminal is less desirable as it will result in delay for that movement and increase conflict points at the interchange. Parclo A3 configuration typically has a higher performance than a Diamond, however will have a lower performance than the Parclo A4. Quantitative Traffic Analysis dependant on ongoing Needs and Justification Study.</td>
<td>- This alternative provides no free flow movements from McKay Road to Highway 400. Traffic entering Highway 400 from McKay Road will have to turn left at both ramp terminals. Left turns at ramp terminals are less desirable as they will result in delay and increase conflict points at the interchange. Diamond interchanges typically have a lower performance than Parclo alternatives and will result with the worst Level-Of-Service compared to the Parclo A3 and Parclo A4 configurations. Quantitative Traffic Analysis dependant on ongoing Needs and Justification Study.</td>
</tr>
<tr>
<td>4.1 Traffic Operations</td>
<td>- This alternative provides free flow movements from McKay Road to Highway 400, from all quadrants. Parclo A4 configuration typically has the highest performance of all alternatives and will result with the best Level-Of-Service compared to Parclo A3 and Diamond configurations. Quantitative Traffic Analysis dependant on ongoing Needs and Justification Study.</td>
<td>- This alternative provides free flow movements from McKay Road to Highway 400, from three quadrants. Traffic entering Highway 400 from McKay Road, east of Highway 400, will have to turn left at the ramp terminal. Left turn at ramp terminal is less desirable as it will result in delay for that movement and increase conflict points at the interchange. Parclo A3 configuration typically has a higher performance than a Diamond, however will have a lower performance than the Parclo A4. Quantitative Traffic Analysis dependant on ongoing Needs and Justification Study.</td>
<td>- This alternative provides no free flow movements from McKay Road to Highway 400. Traffic entering Highway 400 from McKay Road will have to turn left at both ramp terminals. Left turns at ramp terminals are less desirable as they will result in delay and increase conflict points at the interchange. Diamond interchanges typically have a lower performance than Parclo alternatives and will result with the worst Level-Of-Service compared to the Parclo A3 and Parclo A4 configurations. Quantitative Traffic Analysis dependant on ongoing Needs and Justification Study.</td>
</tr>
<tr>
<td>4.2 Geometrics &amp; Safety</td>
<td>- Typical MTO ‘preferred’ interchange; familiar to most drivers in Ontario. Higher capacity configuration as free-flow moves to access Highway 400. Simple three-leg ramp terminal intersections. The four on-ramps dedicated for each movement simplify traffic operations and provides the least number of conflicts points.</td>
<td>- Typical MTO interchange; familiar to most drivers in Ontario. Higher capacity configuration as mostly free-flow moves to access Highway 400. Simple three-leg ramp terminal intersections. Left turn at eastern ramp terminal increases conflict points.</td>
<td>- Less desired MTO interchange though is familiar to most drivers in Ontario. Low capacity configuration as no free-flow moves to access Highway 400. Four-leg ramp terminal intersections. Left-turn at both ramp terminal increases conflict points</td>
</tr>
<tr>
<td>4.3 Compatibility with existing and planned municipal road network.</td>
<td>- All alternatives are compatible with the existing and planned municipal road network.</td>
<td>- All Alternatives will provide for transit and active transportation on the McKay Road bridge. The 10th Line Bridge is currently being replaced and the new structure will be compatible with all alternatives (the structure will be widened to accommodate interchange).</td>
<td></td>
</tr>
</tbody>
</table>
## McKay Road Interchange
### Assessment & Evaluation of Alternatives

#### Utilities
- Potential for conflict with major utilities
  - Inpower and Bell plant are located at the proposed interchange location. All interchange alternatives will result in relocations / modifications to utilities.

#### 4.4 Emergency Services
- All alternatives improve access to/from Highway 400 and the surrounding community for emergency services.

#### 4.5 Constructability
- Direct impacts to Cleary Site (archaeological resource) creates significant risk to construction schedule and cost due to:
  - Significant costs associated with Stage 3 and 4 assessment
  - Extended schedule to accommodate archaeological assessment (possible 2-3 seasons)
  - Uncertainty regarding First Nations approval of disturbance and recovery works
- Alternative largely avoids impacts to Cleary Site.
- Direct impacts to Cleary Site (archaeological resource) creates significant risk to construction schedule and cost due to:
  - Significant costs associated with Stage 3 and 4 assessment
  - Extended schedule to accommodate archaeological assessment (possible 2-3 seasons)
  - Uncertainty regarding First Nations approval of disturbance and recovery works

#### 4.6 Cost
- Construction Costs
- Property Costs
- Archaeological Stage 3 and 4 Assessment Costs

<table>
<thead>
<tr>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parclo A4</td>
<td>Parclo A3</td>
<td>Parclo Diamond</td>
</tr>
<tr>
<td>Estimated construction cost of $28.7M</td>
<td>Estimated construction cost of $26.8M</td>
<td>Estimated construction cost of $24.8M</td>
</tr>
<tr>
<td>Requires the largest footprint of all alternatives, thus will have the largest property cost</td>
<td>Requires less footprint than Alternative A however more than Alternative C. Thus, Alternative B will have an average property cost by comparison.</td>
<td>Has the smallest footprint of all alternatives, thus will have the least property cost.</td>
</tr>
<tr>
<td>Cost of Stage 3 assessment in northeast quadrant is approximately $0.7M. Cost of Stage 4 unknown at this time, yet will be significant.</td>
<td>Cost of Stage 3 assessment in northeast quadrant is approximately $0.15M. Cost of Stage 4 unknown at this time, yet will be significant.</td>
<td>Cost of Stage 3 assessment in northeast quadrant is approximately $0.7M. Cost of Stage 4 unknown at this time, yet will be significant.</td>
</tr>
</tbody>
</table>

### Summary of Technical Considerations
From a Technical perspective, Alternative B is the preferred alternative as it minimises impact to the archeological site while accommodating operational needs. The significant archeological site is likely to incur large delay and cost should it be impacted, and therefore any improvements that minimise impacts to the site will be largely favoured over other alternatives.

### Overall Summary
Alternative B – Parclo A3 – is identified as the preferred. In summary, it is preferred due to its high traffic capacity and its minimal impacts to the NE quadrant and the Cleary Site.
Alternative A: Parclo A4 Interchange
Alternative B: Parclo A3 Interchange
Alternative C: Diamond Interchange
# Summary of Cultural Environment

## 1.0 Sociocultural Environment

<table>
<thead>
<tr>
<th>Factor / Criteria</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.1 Property and Access</strong>&lt;br&gt;- Number of properties impacted&lt;br&gt;- Residences/businesses displaced&lt;br&gt;- Accesses affected</td>
<td>12 properties impacted by the road widening and proposed crossing&lt;br&gt;- No residences or businesses displaced.&lt;br&gt;- Potential impacts to Cinema parking lot north of Salem Road and west of Highway 400. Impacts would be largely reduced by the use of a retaining wall.&lt;br&gt;- Access to 60 Salem Road and 10 Lockhart Road likely impacted though impacts will be minimal.</td>
<td>12 properties impacted by the road widening and proposed crossing&lt;br&gt;- No residences or businesses displaced.&lt;br&gt;- Minimal, if any, impacts to Cinema complex north of Salem Road and west of Highway 400. Access to 60 Salem Road and 10 Lockhart Road likely impacted though impacts will be minimal.</td>
</tr>
<tr>
<td><strong>1.2 Community</strong>&lt;br&gt;- Nuisance impacts (e.g., Visual intrusion, Noise, etc.)&lt;br&gt;- Impacts to recreation sites, cemeteries, schools, places of worship, and unique community features&lt;br&gt;- Impacts on community activity, character and mobility</td>
<td>No cemeteries, places of worship or community features will be impacted by either alternative. There are no such community features in proximity to the widening and crossing, regardless of alternative. Although both alignments will create a physical footprint, there are no impacts to mobility within residential communities as there are no residential communities located in close proximity. Overall, mobility within Barrie will be improved with the new Highway 400 crossing. There is 1 residential property in close proximity to both Alternatives. This property could be considered a Noise-Sensitive Receptor, however it is noted that the land is designated industrial and the residence will likely be displaced by redevelopment within the project horizon. Noise assessment to be completed with input from ongoing Needs and Justification Study.</td>
<td>No cemeteries, places of worship or community features will be impacted by either alternative. There are no such community features in proximity to the widening and crossing, regardless of alternative. Although both alignments will create a physical footprint, there are no impacts to mobility within residential communities as there are no residential communities located in close proximity. Overall, mobility within Barrie will be improved with the new Highway 400 crossing. There is 1 residential property in close proximity to both Alternatives. This property could be considered a Noise-Sensitive Receptor, however it is noted that the land is designated industrial and the residence will likely be displaced by redevelopment within the project horizon. Noise assessment to be completed with input from ongoing Needs and Justification Study.</td>
</tr>
<tr>
<td><strong>1.3 Land Use</strong>&lt;br&gt;- Compatibility with government goals and objectives&lt;br&gt;- Compatibility with future land use</td>
<td>Both Alternatives are consistent with the City’s Multi-Modal Active Transportation Master Plan MMATMP (2014) and City of Barrie Growth Management Strategy # 3, Infrastructure Master Plans Municipal Class EA and support the City’s plans and policies around an expanded and well connected transportation network to support planned population and employment growth. Both Alternatives are considered to be consistent with approved / designated land use of the Salem Secondary Plan (OPA 38).</td>
<td>Both Alternatives are consistent with the City’s Multi-Modal Active Transportation Master Plan MMATMP (2014) and City of Barrie Growth Management Strategy # 3, Infrastructure Master Plans Municipal Class EA and support the City’s plans and policies around an expanded and well connected transportation network to support planned population and employment growth. Both Alternatives are considered to be consistent with approved / designated land use of the Salem Secondary Plan (OPA 38).</td>
</tr>
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</table>

## Socio-Economic Environment Summary

From a Socio-Economic perspective, Alternative 2 is preferred. The key difference in alternatives is the impact to the Cinema property, immediately west of Highway 400. Impacts to the property can be reduced or avoided by the use of a retaining wall, however the two alignments provide differing grading options with Alternative 1 resulting in the larger impact to the Cinema property, and requiring the larger retaining wall.

## 2.0 Cultural Environment

<table>
<thead>
<tr>
<th>Factor / Criteria</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2.1 Built Heritage / Cultural Heritage Landscapes</strong>&lt;br&gt;- Direct or indirect impacts to built heritage features and cultural heritage landscapes</td>
<td>Both alternatives impact the access to the Farm Complex at 60 Salem Road. This property is not designated under the Ontario Heritage Act or listed in the City’s Municipal Registry. Further assessment is recommended should this property be impacted.</td>
<td>Both alternatives impact the access to the Farm Complex at 60 Salem Road. This property is not designated under the Ontario Heritage Act or listed in the City’s Municipal Registry. Further assessment is recommended should this property be impacted.</td>
</tr>
<tr>
<td><strong>2.2 Archaeological Resources</strong>&lt;br&gt;- Potential impacts to known archaeological sites</td>
<td>There are no known archeological sites within the study limits.</td>
<td>There are no known archeological sites within the study limits.</td>
</tr>
<tr>
<td><strong>2.3 First Nations Interests</strong>&lt;br&gt;- Consideration of places of significance, traditional and treaty rights&lt;br&gt;- Potential impacts to FN Traditional Use Areas&lt;br&gt;- Of greatest interest to FN will be potential for impacts to archaeological resources, natural environmental features and access to watercourses and traditional lands.</td>
<td>There are no sites of significance, traditional and treaty rights within the study area. Alternative will result in some impacts to natural environmental features, south of Salem Road.</td>
<td>There are no sites of significance, traditional and treaty rights within the study area. Alternative 2 will result in larger impacts to natural environmental features, south of Salem Road, than Alternative 1.</td>
</tr>
</tbody>
</table>

## Summary of Cultural Environment

![Cultural Environment Summary](image)

January 2017
### 3.0 Natural Environment

#### 3.1 Watercourses / Fish Habitat
- Qualitative assessment that considers the magnitude and nature (number, extent, duration, intensity etc.) of potential impacts, sensitivity of fish and aquatic habitat using, as indicators: the number of watercourse crossings, need for channel realignments and length, the fish communities, including any aquatic Species at Risk (SAR), and habitat, including any specialized habitat, potentially affected.

<table>
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<tr>
<th>Factor / Criteria</th>
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</tr>
</thead>
<tbody>
<tr>
<td>North of Salem Road</td>
<td>- There are no watercourses in the vicinity of the Salem / Lockhart Road Alternatives</td>
<td>- No records of SAR flora or SCC affected by Alternative 2</td>
</tr>
<tr>
<td>South of Salem Road</td>
<td>- Vegetation is predominately cultural including: Dry-Moist Old Field Meadow (CUM1-1), Mineral Cultural Thicket (CUT1), Mineral Cultural Woodland (CUW1) and Scotch Pine Coniferous Plantation (CUP3) communities.</td>
<td>- See Alternative 1 for vegetation description.</td>
</tr>
<tr>
<td>Species of Conservation Interest</td>
<td>- Alternative 1 will result in edge impacts to the deciduous forest, cultural woodland and old field meadow communities.</td>
<td>- Alternative 2 will result in greater edge impacts to the mixed forest, cultural woodland, old field meadow and cultural thicket communities south of Salem Road.</td>
</tr>
</tbody>
</table>

#### 3.2 Vegetation
- Qualitative assessment considering the magnitude (area in ha) and nature of potential impacts (fragmentation, encroachment, loss), significance and sensitivity of vegetation based on: Significant Woodlands, known flora Species at Risk (SAR), known S-Rank (1-3) flora, sensitive or rare vegetation communities (based on provincial ELC ranks), Provincialy Significant Wetlands, other evaluated wetlands, unevaled wetlands, as well as, potential to avoid or mitigate impacts.

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>North of Salem Road</td>
<td>- Dry-Fresh Sugar Maple – Oak Deciduous Forest (FOD5-3).</td>
<td>- See Alternative 1 for vegetation description.</td>
</tr>
<tr>
<td>- Alternative 1 will result in edge impacts to the deciduous forest, cultural woodland and old field meadow communities.</td>
<td>- Alternative 2 will result in very limited (min edge) impacts to the deciduous forest, cultural woodland and old field meadow communities.</td>
<td></td>
</tr>
</tbody>
</table>

#### 3.3 Designated Natural Features
- Qualitative assessment considering the nature of potential impacts (fragmentation, encroachment, loss) and the features/functions for which they are designated, as well as, potential to avoid or mitigate impacts.

<table>
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<tr>
<th>Species of Conservation Interest</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>North of Salem Road</td>
<td>- There are no designated natural features on the north side of Salem Road</td>
<td>- There are no designated natural features on the north side of Salem Road</td>
</tr>
<tr>
<td>South of Salem Road</td>
<td>- The City of Barrie Natural Heritage System Core Area extends close to the south side of Salem Road and may be marginally impacted by Alternative 2.</td>
<td>- The City of Barrie Natural Heritage System Core Area extends close to the south side of Salem Road and may be slightly more impacted by Alternative 2.</td>
</tr>
</tbody>
</table>

#### Vegetation Impact Summary
- Alternative 1 and 2 have a similar overall impact to vegetation communities and flora.
### Summary of Natural Environmental Health

**3.4 Wildlife and SAR**
- Qualitative assessment considering the magnitude (area in ha) and nature of potential impacts (fragmentation, encroachment, loss), significance and sensitivity of wildlife habitat and landscape connectivity based on the presence and density of: interior forest habitat (>100m and >200m), known faunal Species at Risk (SAR) and potential habitat based on known habitat preferences, known or potential wildlife use (e.g., deer overwintering areas, waterfowl staging, etc.), wildlife movement opportunities, considering local and regional scale (landscape level) linkages and corridors, as well as the potential to avoid or mitigate impacts.

**3.7 Surface Water Quality and Quantity / Stormwater Management**
- Consideration for the use of LIDs in the Source Water Protection Plan
- Qualitative assessment of the ability to manage surface water quality and quantity/stormwater management.
- Additional minor drainage culverts will be required at some locations.
- No Alternative would preclude a SWM opportunities. Flat-bottomed grass swales could be used extensively within either of the Alternatives for water quality enhancement.
- Interim flow control or permanent opportunities will exist for innovative stormwater management and LIDS. Best Management Practices such as enhanced grassed swales, trenches, or infiltration galleries for water balance may be utilized for any of the Alternatives.

**3.8 Groundwater**
- Potential impacts to sensitive groundwater areas identified in the Source Water Protection Plan
- The Study Area is generally not within: Wellhead protection Areas; Intake Protection Zones; Issue Contributing Area; and Groundwater Under Direct Influence.
- The Study Area includes portions of Significant Recharge Areas and Highly Vulnerable Aquifer Areas.
- Additional surveys are recommended to address potential SAR impacts and ESA requirements, once the preferred alternative has been selected.

### Designated Natural Features Summary

**Alternative 1**
- Alternative 1 results in slightly less impact to designated natural features south of Salem Road.
- No regional wildlife corridors impacted by the Salem Road alternatives. Localized wildlife movement likely occurs across open agricultural fields and within forested communities throughout the study area, particularly in an east-west direction within the NHS / Lovers’ Creek Swamp area which also include an identified Deer Wintering Area (i.e., south of Salem Road).
- No SAR were recorded by MMM in the Salem Road vicinity during 2016 field work. Previous work in the area recorded a number of SAR in the general project vicinity (NRSI and Dougan & Associates, 2012) and MMM confirmed suitable habitat for a number of SAR around Salem Road. Additional surveys are recommended to address potential SAR impacts and ESA requirements, once the preferred alternative has been selected.

**Alternative 2**
- Alternative 2 results in slightly greater impact to designated natural features south of Salem Road.
- No regional wildlife corridors impacted by the Salem Road alternatives.
- No SAR were recorded by MMM in the Salem Road vicinity during 2016 field work. Previous work in the area recorded a number of SAR in the general project vicinity (NRSI and Dougan & Associates, 2012) and MMM confirmed suitable habitat for a number of SAR around Salem Road. Additional surveys are recommended to address potential SAR impacts and ESA requirements, once the preferred alternative has been selected.

### North of Salem Road (WSU 7)
- Provides potential habitat for Common Nighthawk (SC – COSSARO, THR – COSEWIC), Eastern Meadowlark (THR), Eastern Whip-poor-will (THR), Grasshopper Sparrow (SC), Eastern Hog-nosed Snake (THR) and Five-Lined Skink (END).
- Northern limits of a Deer Wintering Area occur just south of Salem Road.

### South of Salem Road (WSU 8)
- Provides potential habitat for Common Nighthawk (SC – COSSARO, THR – COSEWIC), Eastern Whip-poor-will (THR), Grasshopper Sparrow (SC), Eastern Hog-nosed Snake (THR) and Five-Lined Skink (END).
- Alternative 1 results in edge impacts to wildlife habitat and potential SAR habitat on both sides of Salem Road. These impacts are anticipated to be minor, and slightly less than the impacts to the wildlife and potential SAR habitat south of Salem Road.
- Alternative 2 results in edge impacts to wildlife habitat and potential SAR habitat on both sides of Salem Road, with less impact to the north and greater impact to the south. These impacts are anticipated to be minor overall, but slightly greater south of Salem Road, and therefore slightly more potential impact overall.

### 3.6 Floodplain Storage and Flood Conveyance
- Qualitative assessment of the potential impacts to floodplain storage and flood conveyance.
- No major impacts to floodplain storage or flood conveyance are expected based on information currently available.

### 3.8 Groundwater
- Potential impacts to sensitive groundwater areas identified in the Source Water Protection Plan
- Northern limits of a Deer Wintering Area occur just south of Salem Road.

### Summary of Natural Environmental Health

**Alternative 1**
- Alternative 1 results in slightly less impact to designated natural features south of Salem Road.

**Alternative 2**
- Alternative 2 results in slightly greater impact to designated natural features south of Salem Road.

### Assessment & Evaluation of Alternatives

**January 2017**

**McKay Road Class EA Study**

**City of Barrie**
## Technical Considerations

### 4.1 Traffic Operations
- **Traffic Movements**
  - Future level-of-service
  - As the Alternatives will not differ in configuration (number of lanes etc.) they will have the same traffic movements, performance and capacity.

### 4.2 Geometrics & Safety
- Both alternatives will conform to City of Barrie Standards, Transport Association of Canada (TAC) Standards and MTO Standards (the Geometric Design Standards of Ontario Highways (GDSOH)).

### 4.3 Compatibility with existing and planned municipal road network.
- Both alternatives are compatible with the existing and planned municipal road network.
- Both alternatives will provide for transit and active transportation on Salem / Lockhart Road.

### 4.4 Utilities
- A Hydro One Transmission corridor traverses the study area in a southeast-northwest direction, east of Highway 400. Both alternatives will result in the relocation of a Hydro tower.
- Bell and Innpower are located within the study area and will require relocation / modification for both alternatives.
- Improvements to stormwater and sanitary sewers are recommended as part of this study.

### 4.5 Emergency Services
- Both alternatives improve access to/from the surrounding community for emergency services.

### 4.6 Constructability
- Both alternatives will use a central pier located in the median of the future Highway 400.
- Alternative will have to be shifted to the south, east of Highway 400, to tie into the preferred alignment of Salem Road, east of Saunders Road, as identified in adjacent EA study.
- Alternative will tie directly into the preferred alignment of Salem Road, east of Saunders Road, as identified in adjacent EA study.

### 4.7 Cost
- Alternative 1 has an estimated construction cost of $11.8M
- Alternative 1 also requires a larger area of development / industrial property than Alternative 2, likely resulting in a larger property cost
- Cost estimates are approximate and include the Highway 400 crossing structure and retaining wall adjacent the Cinema property.
- Cost estimates will be refined in Preliminary Design.

### Summary of Technical Considerations

From a Technical perspective, both alternatives are very similar and only differ in cost (due to the cost of retaining wall and property cost). As Alternative 2 will cost less, it is preferred.

### Overall Summary

Alternative 2 is identified as preferred.

While resulting in more environmental impacts to the south of Salem Road, Alternative 2 will minimize impacts to the Cinema property, has a slightly lower cost, and will tie directly into the preferred alignment, as identified by STANTEC, with no further shift or impacts.