APPENDIX J

Detailed Assessment and Evaluation Tables

Dufferin County 109 EA: Evaluation of Alternatives

Factor / Indicator	Weighting	Option 0 Do Nothing	Option 1b: 2nd Line Realignment (CR23 Diverted to CR 3)	Option 2c: CR 23 Realignment (CR3 Continuous)	Option 3b: Roundabout (2nd Line, CR 3, 23, and 109)
Natural Environment					
• Impact to vegetation, wildlife, and terrestrial resources, as well as Species at Risk.		• No impacts	• Minimal impacts to cultural meadow with milkweed present (candidate habitat for species of Special Concern-Monarch) . • Minimal tree removal anticipated. • Minor impacts to wildlife or wildlife habitat; • No anticipated impacts to Threatened or Endangered Species at Risk or their habitat.	• Moderate impact to cultural meadow with milkweed present (candidate habitat for species of Special Concern-Monarch). • Minor tree removal anticipated. • Moderate impacts to general wildlife habitat anticipated. • Potentially suitable nesting habitat for two Threatened Species at Risk (Bobolink and Eastern Meadowlark).	• Minimal impacts to cultural meadow with milkweed present (candidate habitat for species of Special Concern-Monarch). • Minimal tree removal anticipated. • Minor impacts to wildlife or wildlife habitat; • No anticipated impacts to Threatened or Endangered Species at Risk or their habitat.
• Impacts to Groundwater and Drainage Features.	**MEDIUM**	• No impacts	• Hydrogeological program recommended to assess groundwater elevations and potential dewatering. • Door-to-door private water well survey recommended for all potential water well owners within 500m of the alternative area design. • Alternative area is within vulnerable areas including wellhead protection area (WHPA-B), issue contributing areas of sodium and chloride, significant groundwater recharge area (SGRA), highly vulnerable aquifer (HVA), WHPA-Q1, and WHPA-Q2. • If the impervious surface area increases compared to the previous road design, then there is an increased area for road salt application in the WHPA and a potential decrease of infiltration areas. A risk management plan for the handling of/storage of salt on public roads is required and mitigation action items would be necessary to compensate for the reduced recharge area. • No additional water crossings for this option. Increase in impervious area is expected •	• Hydrogeological program recommended to assess groundwater elevations and potential dewatering. • Door-to-door private water well survey recommended for all potential water well owners within 500m of the alternative area design. • Alternative area is within vulnerable areas including WHPA-B, issue contributing areas of sodium and chloride, SGRA, HVA, WHPA-Q1, and WHPA-Q2. • If the impervious surface area increases compared to the previous road design, then there is an increased area for road salt application in the WHPA and a potential decrease of infiltration areas. A risk management plan for the handling of/storage of salt on public roads is required and mitigation action items would be necessary to compensate for the reduced recharge area. • No additional water crossings for this option. Increase in impervious area is expected	• Hydrogeological program recommended to assess groundwater elevations and potential dewatering. • Door-to-door private water well survey recommended for all potential water well owners within 500m of the alternative area design. • Alternative area is within vulnerable areas including WHPA-B, issue contributing areas of sodium and chloride, SGRA, HVA, WHPA-Q1, and WHPA-Q2. • If the impervious surface area increases compared to the previous road design, then there is an increased area for road salt application in the WHPA and a potential decrease of infiltration areas. A risk management plan for the handling of/storage of salt on public roads is required and mitigation action items would be necessary to compensate for the reduced recharge area. • No additional water crossings for this option. Increase in impervious area is expected
• Impacts to Designated Natural Features		• No anticipated impacts to natural heritage features.			

Factor / Indicator	Weighting	Option 0 Do Nothing	Option 1b: 2nd Line Realignment (CR23 Diverted to CR 3)	Option 2c: CR 23 Realignment (CR3 Continuous)	Option 3b: Roundabout (2nd Line, CR 3, 23, and 109)
• Impacts to potentially contaminated properties.		• No impacts	• This alternative impacts the locations of three (3) APECs with high potential for contamination. • This alternative impacts the location one (1) APEC with moderate potential for contamination. • This alternative impacts the location one (1) APEC with low potential for contamination. • For the purpose of the undertaking, if property acquisitions are required within APECs with high or moderate potential for contamination, it is recommended that property specific Phase I ESAs (and if necessary Phase II ESAs) be completed in such areas in support of the property acquisition. • Excess soil management may also be required if excess/surplus soils are to be generated.	• This alternative impacts the location of three (3) APECs with high potential for contamination. • This alternative impacts the location one (1) APEC with moderate potential for contamination. • For the purpose of the undertaking, if property acquisitions are required within APECs with high or moderate potential for contamination, it is recommended that property specific Phase I ESAs (and if necessary Phase II ESAs) be completed in such areas in support of the property acquisition. • Excess soil management may also be required if excess/surplus soils are to be generated.	• This alternative impacts the location of four (4) APECs with high potential for contamination. • This alternative impacts the location of one (1) APEC with moderate potential for contamination. • This alternative impacts the location one (1) APEC with low potential for contamination. • For the purpose of the undertaking, if property acquisitions are required within APECs with high or moderate potential for contamination, it is recommended that property specific Phase I ESAs (and if necessary Phase II ESAs) be completed in such areas in support of the property acquisition. • Excess soil management may also be required if excess/surplus soils are to be generated.
Evaluation					
Summary					
Socio-Economic Environment					
• Impacts to agriculture land uses / operations	**HIGH**	• No impacts	• Permanent loss of designated agricultural lands • No loss of agricultural buildings/facilities • Possible impact to field access from CR23 • Impact to designated agricultural area during construction phase • Creation of fragmentation in a designated agricultural area • Realignment of County Road 3 will occur within Agricultural Areas as per Dufferin County Official Plan and Township of East Garafaxa Official Plan.	• Greatest permanent loss of designated agricultural lands. • Pernanent loss of rural lands. • Loss of agricultural building in rural area • Possible impact to field access from CR23 and CR3 • Possible impact to designated agricultural area during construction phase • Realignment of County Road 3 will occur within Agricultural Areas as per Dufferin County Official Plan and Township of East Garafaxa Official Plan.	• Permanent loss of designated agricultural lands • Pernanent loss of rural lands. • Possible impact to field access from CR23 • Impact to designated agricultural area during construction phase • Loss of agricultural building in rural area • Possible impact to field access from CR23 and CR3 • Creation of severed parcel • Creation of fragmentation in a designated agricultural area • Roundabout will have the greatest impact to the slow moving and heavy agricultural vehicles (no forced stop, difficult to enter) • Realignment of County Road 3 will occur within Agricultural Areas as per Dufferin County Official Plan and Township of East Garafaxa Official Plan.
• Impacts to private properties		• No impacts	• No displacement of private properties • Impacts to two (2) properties.	• Potential displacement of one (1) private property. • Impacts to two (2) properties.	• Impacts to four (4) private properties. • Potential displacement of one (1) property.

Factor / Indicator	Weighting	Option 0 Do Nothing	Option 1b: 2nd Line Realignment (CR23 Diverted to CR 3)	Option 2c: CR 23 Realignment (CR3 Continuous)	Option 3b: Roundabout (2nd Line, CR 3, 23, and 109)
• Impacts to property accesses		• No access impacts	• No access impacts.	• Impacts to existing property access as new accesses are required along County Road 3; creation of severed property in south west quadrant of the County road 109 and County Road 3 intersection.	• Potential impact to one (1) properties access.
• Impact on future land uses and operations		• No impacts	• Realignment of 2nd line road is within Employment area as per Township of Amaranth Official Plan	• Realignment of County Road 3 within Employment area as per Township of East Garafaxa Official Plan	• Realignment of 2nd line road is within Employment area as per Township of Amaranth Official Plan
• Potential Noise Impacts		• No impacts for noise as no changes to road alignments, speeds and thus impacts on existing receptors will remain as current conditions.	• Reduced noise impacts for existing receptors, as the proposed changes bring traffic away from the backyards of houses and increases the distance between the proposed road and existing receptor (i.e. CR3 with the shift of 2nd line, Houses on Paula Ct with the removal of CR23 and the shift of CR3 away from the backyards of houses).	• Potential noise impacts to existing backyard receptors on CR3 as traffic is now closer to houses and backyards. However, there is a decrease to potential noise to existing receptors along Paula Ct and Cameron Ct due to an increase in distance between CR23 and existing dwellings and between CR3 and existing dwellings. s.	• Potential noise imapcts to backyards along CR3 and Paula Ct as you decrease the distance between roads and backyards with the addition of round abouts and entrance/entrance segments. However, there is a decrease to potential noise impacts to existing receptors along Paula Ct and Cameron Ct due to an increase in distance between CR23 and existing dwellings.
• Potential Air Quality Impacts		• Increased impacts to four receptors on CR3 from vehicles on CR109 accessing CR3 and CR23 from 2nd Line. • Increased impacts to four receptors on CR3 and residential area south of CR109 from vehicles idling at intersections with stop signs, especially during peak AM and PM periods.	• 2nd Line road segment length would increase by approximately 40 m, which would likely result in a minimal increase to vehicle emission impacts. • Realignment of existing 2nd Line to the east reduces impacts to one receptor along 2nd Line due to increased distance to the roadway. The realignment could increase impacts to receptors south of County Rd 109 (residential area) due to decreased distance to roadway; however, these impacts are expected to be minimal. • Removal of approximately 110 m of the eastbound section of CR3 and approximately 125 m of the northbound section of CR23 would divert some traffic away from receptors south of County Road 109 (residential area) likely reducing air quality impacts to these receptors; however, potential for increased traffic on CR3 could impact approximately four receptors along CR3. • New road segment of approximately 90 m southwest of Paula Ct would divert some traffic away from receptors on CR3 and Paula Ct likely reducing air quality impacts to these receptors due to the increased distance. • New road segment (CR23 Realignment) of approximately 290 m west of CR23 would divert some traffic away from receptors on CR3, Cameron Ct, and Bennett Dr, likely reducing air quality impacts to these receptors due to the increased distance.	• New road segment (CR3 Realignment) of approximately 200 m west of four receptors along CR3 would increase impacts to these receptors due to reduced distance to the roadway and traffic sources. • Potential signalize intersection at CR109 and 2nd Line would increase impacts to receptors on CR3 due to vehicle idling, especially during peak AM and PM periods. • Traffic to be diverted along CR23 Relaignment and Paula Ct extension to CR3 Realignment would likely decrease impacts to some receptors on CR3 due to an increased distance to the roadways and traffic sources. • Removal of northbound and eastbound sections of CR3 may reduce impacts to receptors on Paula Ct due to a decrease in traffic on these roads; however, due to the distance from the receptors to the roadways, this reduction is expected to be minimal when compared to the increase in potential impacts to receptors on CR3.	• 2nd Line road segment length would decrease by approximately 40 m, which would likely result in minimal change to vehicle emission impacts. • Realignment of existing 2nd Line to the east reduces impacts to one receptor along 2nd Line due to increased distance to the roadway. The realignment could increase impacts to receptors south of County Rd 109 (residential area) due to decreased distance to roadway; however, these impacts are expected to be minimal. • New road segment of approximately 90 m west of Paula Ct would divert some traffic away from receptors on CR3 and Paula Ct likely reducing air quality impacts to these receptors due to the increase distance. • New road segment of approximately 290 m west of Cameron Ct would divert some traffic away from receptors on CR3, Cameron Ct, Paula Ct, and Bennett Dr likely reducing air quality impacts to these receptors due to the increased distance. • New roundabout at CR3, CR23 and CR109 would reduce idling time for vehicles on northbound CR3, southbound 2nd Line, and westbound CR109 (turning left to southbound CR3) which is expected to reduce air quality impacts to receptors on CR3. • No signalized intersection and increased traffic flow would reduce air quality impacts from vehicle idling, especially during peak AM and PM periods.

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Evaluation					
Summary					
Cultural Environment					
• Impact to built heritage resources		• This alternative does not directly impact any known or potential Built Heritage Resources (BHRs) or Cultural Heritage Landscapes (CHLs). • Any upgrades within 40 metres of an identified BHR or CHL within the existing alignment would require vibration studies. The study should be prepared by a qualified engineer to determine the maximum acceptable vibration levels and the zone of influence of the construction area in order to mitigate any negative impacts to the heritage attributes of the resource.	• This alternative does not directly impact any known or potential Built Heritage Resources (BHRs) or Cultural Heritage Landscapes (CHLs). • Any upgrades within 40 metres of an identified BHR or CHL would require vibration studies. The study should be prepared by a qualified engineer to determine the maximum acceptable vibration levels and the zone of influence of the construction area in order to mitigate any negative impacts to the heritage attributes of the resource.	• This alternative does not directly impact any known or potential Built Heritage Resources (BHRs).	• This alternative does not directly impact any known or potential Built Heritage Resources (BHRs). • Any upgrades within 40 metres of an identified BHR or CHL would require vibration studies. The study should be prepared by a qualified engineer to determine the maximum acceptable vibration levels and the zone of influence of the construction area in order to mitigate any negative impacts to the heritage attributes of the resource.
• Impacts to cultural heritage landscapes	**MEDIUM**	• This alternative does not directly impact any known or potential Cultural Heritage Landscapes (CHLs).	• This alternative does not directly impact any known or potential Cultural Heritage Landscapes (CHLs).	• This alternative would result in a direct, negative impact to an identified CHL (CHL-5) and would result in the demolition of the resource and its landscape.	• This alternative does not directly impact any known or potential Cultural Heritage Landscapes (CHLs).
• Impact to potential archaeological resources		• This alternative will not require any further archaeological assessment if no areas are to be subject to ground disturbance.	• This alternative will require a Stage 1-2 archaeological assessment. The eastern and western extent of the proposed work along Dufferin County Road 109 were not covered in the initial Stage 1 AA, and thus a Stage 1-2 is required. Stage 2 pedestrian survey will be required in all areas of agricultural field, and Stage 2 test pit survey will be required for all areas of manicured lawn and overgrown scrub	• This alternative will require a Stage 1-2 archaeological assessment. A portion of the proposed work east of Dutch Line, and at the eastern and western extent of Dufferin County Road 109 were not covered in the initial Stage 1 AA, and thus a Stage 1-2 is required. Stage 2 pedestrian survey will be required in all areas of agricultural field, and Stage 2 test pit survey will be required for all areas of manicured lawn and overgrown scrub	• This alternative will require a Stage 1-2 archaeological assessment. The proposed work at the eastern and western extensions off of the roundabout were not covered in the initial Stage 1 AA, and thus a Stage 1-2 is required. Stage 2 pedestrian survey will be required in all areas of agricultural field, and Stage 2 test pit survey will be required for all areas of manicured lawn and overgrown scrub.
Evaluation					

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Summary					
Transportation/Technical					
• Ability to accommodate predicted traffic (2041)	**HIGH**	• Projected 2041 traffic will exceed the capacity of unsignalized intersections along County Road 109 • Traffic along County Road 109 will be at capacity of a single lane • County Road 109 will have limited capacity to accommodate proposed developments to the north. • Congestion on County Road 109 may promote cut-through via Montgomery Boulevard	• Consolidated CR109 / CR3 / 2nd Line Intersection will require the following elements to maintain an acceptable level of service for all movements: • Extension of two CR109 EB lanes to the intersection to provide 2 EB through lanes • Dedicated left turn lanes with left turn signal heads on all approaches • Dedicated NB right turn lane – dedicated right turn signal head would improve operations of this movement. • New intersection of CR3 / CR 23 can operate unsignalized but will require a left turn lane from CR 3 WB. The left turn from CR 23 will operate at LOS E during PM peak; may require signalization / roundabout in the longer term. • Improvements at CR109 / Riddell Road intersection will be required to mitigate potential for EB queue spillback back to new intersection at County Road 3. • In order to avoid diversion from Paula Court, Paula Court extended to realignment of CR 23 (approx. 85m extension). • EB peak hour queues approaching Riddell Road intersectioin may extend up to 240m by 2041. Spacing between Realigned 2nd Line and Riddell will be apprixiamtly 535m, which will be sufficient to accommodate these queues without impacting upstream operations.	• Projected intersection volumes are the same as for Option 1b, same requirements for intersection lane configurations. • Extension of Paula Court will be more extensive that Option 1b as County Road 3 alignment will be further to the west. Extension of Paula Court by approx. 200m will be required. • EB peak hour queues approaching Riddell Road intersectioin may extend up to 240m by 2041. Spacing between Realigned 2nd Line and Riddell will be apprixiamtly 690m, which will be sufficient to accommodate these queues without impacting upstream operations. This opetion has a slightly longer storage length to accommodate queues if they were to exceed this length in future conditions.	• Projected intersection volumes are the same as for Options 1b and 2. • Projected 2027 and 2041 traffic volumes will require a 2-lane roundabout at a minimum. • Projected NB right and SB left will be at or near capacity under a 2-lane roundabout configuration; potential to accommodate additional traffic growth will be limited.
• Resilience to extreme events and emergency response		• Surges in traffic along County Road 109 would create difficulty and high delays for vehicles attempting to join County Road 109 from strop controlled side road approaches.	• Traffic signal can be monitored and timings adjusted to respond to flictuation or surges in traffic demand. • Traffic at a signallized intersection can be controlled by paid duty police in an emergency situation • Potential for to implement signal pre-emption to reduce delay to emergency vehicles. • Signal operation relies on electricity and may be non-functional during a power outage	• Traffic signal can be monitored and timings adjusted to respond to flictuation or surges in traffic demand. • Traffic at a signallized intersection can be controlled by paid duty police in an emergency situation • Potential for to implement signal pre-emption to reduce delay to emergency vehicles. • Signal operation relies on electricity and may be non-functional during a power outage	• Intersection configuration is fixed and cannot be adjusted to accommodate additional capacity when required. • More limited ability to control traffic using paid duty police in an emergency. • No impacts to roundabout operations during a power outage.
• Impact on goods and services movement		• Through traffic along CR 109 will result in delays to truck movements from stop controlled side road approaches.	• Signalized operation will create additional capacity from truck traffic generated by development to the north. • Intersection amber/red clearance can be adjsuted to reflect required intersection clearance by heavy vehicles.	• Signalized operation will create additional capacity from truck traffic generated by development to the north. • Intersection amber/red clearance can be adjsuted to reflect required intersection clearance by heavy vehicles. • Intersections with 2nd Line and CR23 are approximately 150m to the west	• Heavy truck volumes generated by proposed development, would require roundabout design to include truck aprons to accommodate truck turning paths.

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			• Both CR109 and CR23 have a grade to the west, trucks heading eastbound will be required to stop on a downgrade which may be difficult in winter months. Trucks departing westbound will be required to climb the grade, potenital from an initial stop condition – poteintial impacts to vehicle speeds and GHG emissions from truck acceleration on this grade.	compared with Option 1b. Trucks will experience similar impacts with the road grade as in option 1b, but the length of the grade and consequently the impacts to acceleration and GHG emissions will be slightly shorter.	
• Impacts on active transportation		• No existing pedestrian or cyclig facilities, uncomfortable environment for active modes.	• Potential to integrate cycling facilities or protected crossings into design if desired. • Pedestrian crossings can be accommodated by pedestrian signals.	• Potential to integrate cycling facilities or protected crossings into design if desired. • Pedestrian crossings can be accommodated by pedestrian signals.	• Pedestrian crossings can be accommodated by pedestrian cross-overs. Roundabouts can be difficult to navigate for cyclists.
• Impacts to road user safety, municipal services, and traffic operations (waste removal, snow clearing)		• Close proximity of County Road 23 intersection to County Road 109 may contribute to operational and safety concerns.	• Traffic signals support higher traffic speeds and consequently higher collision severity • Signal operation creates gaps to accommodate movements from side streets; increased safety over traffic having to find gaps in traffic to turn. • Less complex that roundabouts for snow removal. • Buried signal plant infrastructure required for signal operation.	• Traffic signals support higher traffic speeds and consequently higher collision severity • Signal operation creates gaps to accommodate movements from side streets; increased safety over traffic having to find gaps in traffic to turn. • Less complex that roundabouts for snow removal. • Buried signal plant infrastructure required for signal operation.	• Roundabout reduce vehicle speeds and collision severity compared with signalized operation. • Greater complexity for snow clearing and reduced capacity for snow storage – snow on centre island may result in visibility obstructions.
Evaluation					
Summary					
Costs					
• Construction Costs		• No costs.	• Approximately $8M	• Approximately $9M	• Approximately $8.5M
• Property Costs		• No costs.	• Costs associated with two (2) private property buyouts. • Moderate amount of ROW property requirement - approximately31,500 sq.m.	• Costs associated with two (2) private property buyout. • Lowest amount of ROW property requirement - approximately 19,500 sq.m.	• Costs associated with two (2) private potential property buyout. • Highest amount of ROW property requirement – up to approximately 35,000sq.m.
Evaluation	**HIGH**				
Summary					

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Overall Evaluation					
Evaluation					
Summary		**SET ASIDE** **Although having the least direct impacts and the lowest cost, the "Do Nothing" alternative does not achieve the overall goal of the study (i.e. to enhance saftey through the realignment of the intersection).**	**PREFERRED** **Option 1b is the preferred option because of its minimal and minor impacts to the natural environment, minor impacts to socio-economic enviornment, and has no impacts to the cultural environment. From a traffic perspective this option supports increases in traffic safety especially in light of projected future traffic volumes, ease of pedestrian crossings and the potential for integration of cycling facilities in the future. The option has similar costs to Option 2c but has no private buyouts.**	**SET ASIDE** **From a transportation and technical perspective Option 1b and 2c are tied but Option 2c has more negative impacts in all the other categories assessed. Option 2c has potential impacts to two threatened Species at Risk, has socio-economic environemnt impacts and has negative impacts to the cultural environment. Option 2c has the highest cost and has one private buyout.**	**SET ASIDE** **From a transportation and technical perspective Option 3b does not accommodate future traffic volumes without future design changes. Option 3b is least preferred from a socio-economic persective** because of its impacts to property, future land uses, potential noise impacts and potential impacts to air quality. **. Option 3b is tied with Option 1b from a natural environment perspective. Option 3b has the second highest costs and the higest amount of ROW requirements.**