Comparative Evaluation of Net Effects and Ranking – Section S8
2020 Evaluation

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4	Alternative S8-5
		Summary of Potential Net Effects and Ranking	
1.0 Natural Environment			
1.1 Fish and Fish Habitat			
1.1.1 Fish Habitat	Standard net effects to watercourses, as outlined in the accompanying memo, at the following: **9 watercourses impacted:** • 1 permanent, SAR (occupied habitat for Redside Dace) Main East Humber • 1 permanent, baitfish and sculpin (contributing habitat for Redside Dace) • 1 permanent, baitfish and migratory trout (cool/cold water) • 1 intermittent, unconfirmed fish • 1 permanent; unconfirmed fish habitat (contributing habitat for Redside Dace) • 1 permanent, unconfirmed fish habitat • 3 ephemeral, no fish habitat (contributing habitat for Redside Dace) Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, offsetting / enhancement measures; until confirmed, net effects remain the same as potential effects: • Crossing 1 watercourse identified as occupied habitat for Redside Dace (East Humber River). Crossing main stem East Humber River, although perpendicular crossing possible – effects can be minimized following the *Guidance for Development Activities in Redside Dace Protected Habitat* document (MNRF 2016) and consultation with MECP and DFO. • Crossing main stem Main Humber River at relatively perpendicular angle. Main stem Main Humber River would require a crossing structure of ~660 m long and 30 m deep (along centerline of corridor) to span valley; field confirmed to have highly eroding banks. ○ Floodplain width is ~175 m. ○ The channel is less sinuous (meander belt width to be confirmed). ○ Valley confirmed to have highly eroding west slope; on east side, there is a low rise to a gradually sloping 'terrace' that extends some distance to the steep upper east slope. ○ Watercourse supporting diverse moderately sensitive coolwater fish communities. • Within the proposed Highway 27 interchange, there is potential for the realignment of a permanent tributary within a deep ravine (skewed for ~310 m) and another permanent tributary of East Humber River (skewed for ~800 m); both contributing habitat to Redside Dace; however, effects can be minimized following the	Standard net effects to watercourses, as outlined in the accompanying memo, at the following: **12 watercourses impacted:** • 1 permanent, SAR (occupied habitat for Redside Dace) • 1 permanent, baitfish and sculpin (contributing habitat for Redside Dace) • 1 permanent, baitfish and trout migration (cool/cold water) • 1 permanent; unconfirmed fish habitat (contributing habitat for Redside Dace) • 1 permanent, unconfirmed fish habitat • 1 intermittent, unconfirmed fish • 3 ephemeral, no fish habitat (contributing habitat for Redside Dace) • 3 ephemeral, unconfirmed fish habitat • Infilling of 1 waterbody (approximately 46 m x 35 m) connected online to the intermittent, unconfirmed fish unless alignment shifted to avoid; two tributaries drain into the waterbody within the alignment at the north end Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, offsetting / enhancement measures; until confirmed, net effects remain the same as potential effects: • Crossing 1 watercourse identified as occupied habitat for Redside Dace (East Humber River). Crossing main stem East Humber River, although perpendicular crossing possible – effects can be minimized following the *Guidance for Development Activities in Redside Dace Protected Habitat* document (MNRF 2016) and consultation with MECP and DFO. • Crossing main stem Main Humber River on large meander bend along the east side of the valley, as well as directly on a parallel section of a meandering reach that flows along south edge of alignment with presumed highly eroding banks (assessed based on aerial imagery). Requires a crossing structure ~1020 m long and 40 m deep (along centreline of corridor) to span valley. ○ Floodplain width is ~430m. ○ Highly meandering channel section. ○ Tributary outfall at west edge of valley at a meander could affect structure placement. ○ Potential requirement to realign and/or harden/armour portions of the river channel to site piers to avoid erosion and maintain long	Standard net effects to watercourses, as outlined in the accompanying memo, at the following: **9 watercourses impacted:** • 1 permanent, SAR (occupied habitat for Redside Dace) • 1 permanent, baitfish and sculpin (contributing habitat for Redside Dace) • 1 permanent, baitfish and trout migration (cool/cold water) • 1 permanent; unconfirmed fish habitat (contributing habitat for Redside Dace) • 1 intermittent, unconfirmed fish (associated with a reach supporting baitfish assessed during the 2015 field work) • 3 ephemeral, no fish habitat (contributing habitat for Redside Dace) • 1 waterbody (approximately 46 m x 35 m) connected online to the intermittent, unconfirmed fish tributary; two tributaries drain into the waterbody immediately north of the alternative Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, offsetting / enhancement measures; until confirmed, net effects remain the same as potential effects: • Crossing 1 watercourse identified as occupied habitat for Redside Dace (East Humber River). Crossing main stem East Humber River, although perpendicular crossing possible – effects can be minimized following the *Guidance for Development Activities in Redside Dace Protected Habitat* document (MNRF 2016) and consultation with MECP and DFO. • Crossing main stem Main Humber River on large meander bend that flows along base of steep valley slope along the west side of the valley with presumed highly eroding banks (assessed based on aerial imagery). Requires a crossing structure ~700 m long and 35 m deep (along centreline of corridor) to span valley. ○ Floodplain width is ~460 m. ○ Meandering channel section. ○ Erosion scarp present along the valley wall identified on aerial imagery at the east side of the valley where the meandering channel abuts the valley wall. Meandering channel appears to be eroding toe of valley slope. ○ Potential requirement to realign and/or harden/armour portions of the river channel and/or toe of west valley slope to site piers to

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		Summary of Potential Net Effects and Ranking	
	Guidance for Development Activities in Redside Dace Protected Habitat document (MNRF 2016) for indirect/contributing habitat. Realignment requirement and extent dependent on Highway 27 interchange configuration. MODERATE NET EFFECT	term river migratory patterns and associated habitat quality. ○ Watercourse supporting diverse moderately sensitive coolwater fish communities. • Within the proposed Highway 27 interchange, there is potential for the realignment of a permanent tributary within a deep ravine (skewed for ~310 m) and another permanent tributary of East Humber River (skewed for ~870m); both contributing habitat to Redside Dace; however, effects can be minimized following the *Guidance for Development Activities in Redside Dace Protected Habitat* document (MNRF 2016) for indirect/contributing habitat. Realignment requirement and extent dependent on Highway 27 interchange configuration. • Potential for infilling of the waterbody on the tributary immediately east of Main Humber River; alignment and structure alternatives would be considered to minimize impact. HIGH NET EFFECT	avoid erosion and maintain long term river migratory patterns and associated habitat quality. ○ Watercourse supporting diverse moderately sensitive coolwater fish communities. • Within the proposed Highway 27 interchange, there is potential for the realignment of a permanent tributary within a deep ravine (skewed for ~310 m) and another permanent tributary of East Humber River (skewed for ~820 m); both contributing habitat to Redside Dace; however, effects can be minimized following the *Guidance for Development Activities in Redside Dace Protected Habitat* document (MNRF 2016) for indirect/contributing habitat. Realignment requirement and extent dependent on Highway 27 interchange configuration. • Potential for infilling of the waterbody on the tributary immediately east of Main Humber River; alignment and structure alternatives would be considered to minimize impact. HIGH NET EFFECT
	RANKING: 1st All alternatives cross both the Main and East Humber main stem Rivers as well as several permanent, fish bearing tributaries; tributaries of East Humber River identified as contributing habitat for Redside Dace, and occupied habitat for Redside Dace in the East Humber River. This alternative has the most perpendicular and stable crossing site of the Main Humber River. All alternatives have the same crossing site of the occupied habitat for Redside Dace and is relatively perpendicular and can be mitigated following the guidance document and consultation with MECP and DFO. Ranking based on highway alignment over main stem Humber River.	**RANKING: 3rd** All alternatives cross both the Main and East Humber main stem Rivers as well as several permanent, fish bearing tributaries; tributaries of East Humber River identified as contributing habitat for Redside Dace, and occupied habitat for Redside Dace in the East Humber River. This alternative has the most difficult and longest crossing of Main Humber River and valley with commensurate challenges to avoid valley infilling and to site piers to avoid erosion and maintain long term channel functioning and migration that in turn affects fish habitat. If shifting of the highway alignment to the north cannot be achieved, this alternative becomes impossible to construct without significant effects. Potential requirement to realign portions of the river channel to properly site piers to avoid erosion and maintain long term river migratory patterns and associated habitat quality. All alternatives have the same crossing site of the occupied habitat for Redside Dace and is relatively perpendicular and can be mitigated following the guidance document and consultation with MECP and DFO. Ranking based on highway alignment over main stem Humber River.	**RANKING: 2nd** All alternatives cross both the Main and East Humber main stem Rivers as well as several permanent, fish bearing tributaries; tributaries of East Humber River identified as contributing habitat for Redside Dace, and occupied habitat for Redside Dace in the East Humber River. In comparison to Alternative S8-4, this alternative has a slightly less difficult crossing of Main Humber River with challenges to avoid valley infilling and to site piers to avoid erosion and maintain long term channel functioning and migration that in turn affects fish habitat. All alternatives have the same crossing site of the occupied habitat for Redside Dace and is relatively perpendicular and can be mitigated following the guidance document and consultation with MECP and DFO. Ranking based on highway alignment over main stem Humber River.
1.1.2 Fish Community	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, offsetting / enhancement measures; until confirmed, net effects remain the same as potential effects: • Crossing 1 watercourse identified as occupied habitat for Redside Dace • Crossing 5 watercourses identified as contributing habitat for Redside Dace with potential for two of these requiring realignments	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, offsetting / enhancement measures; until confirmed, net effects remain the same as potential effects: • Potential requirement of the main stem Main Humber River to realign portions of the river channel and/or channel hardening measures to properly site piers to avoid erosion and maintain long term river migratory patterns and associated habitat quality; however, unlikely to alter fish community	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, offsetting / enhancement measures; until confirmed, net effects remain the same as potential effects: • Potential requirement of the main stem Main Humber River to realign portions of the river channel and/or channel hardening measures to properly site piers to avoid erosion and maintain long term river migratory patterns and associated habitat quality, however, unlikely to alter fish community

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4	Alternative S8-5
		Summary of Potential Net Effects and Ranking	
	• Humber River and East Humber River main stems supporting diverse moderately sensitive coolwater fish communities HIGH NET EFFECT	• Crossing 1 watercourse identified as occupied habitat for Redside Dace • Crossing 5 watercourses identified as contributing habitat for Redside Dace with potential for two of these requiring realignments • Humber River and East Humber River main stems supporting diverse moderately sensitive coolwater fish communities HIGH NET EFFECT	• Crossing 1 watercourse identified as occupied habitat for Redside Dace • Crossing 5 watercourses identified as contributing habitat for Redside Dace with potential for two of these requiring realignments • Humber River and East Humber River main stems supporting diverse moderately sensitive coolwater fish communities HIGH NET EFFECT
	RANKING: 1st All alternatives cross Redside Dace habitat and main stem coolwater rivers supporting diverse and moderately sensitive fish communities. Redside Dace crossings can be mitigated following *Guidance for Development Activities in Redside Dace Protected Habitat* document (MNRF 2016) and consultation with MECP and DFO. Ranking based on habitat.	**RANKING: 1st** All alternatives cross Redside Dace habitat and main stem coolwater rivers supporting diverse and moderately sensitive fish communities. Redside Dace crossings can be mitigated following *Guidance for Development Activities in Redside Dace Protected Habitat* document (MNRF 2016) and consultation with MECP and DFO. Ranking based on habitat. However, both S8-4 and S8-5 have the potential for long term impacts to fish habitat. which in turn can impact fish communities as a result of potential channel realignment / hardening measures of the main stem Main Humber River.	**RANKING: 1st** All alternatives cross Redside Dace habitat and main stem coolwater rivers supporting diverse and moderately sensitive fish communities. Redside Dace crossings can be mitigated following *Guidance for Development Activities in Redside Dace Protected Habitat* document (MNRF 2016) and consultation with MECP and DFO. Ranking based on habitat. However, both S8-4 and S8-5 have the potential for long term impacts to fish habitat. which in turn can impact fish communities as a result of potential channel realignment / hardening measures of the main stem Main Humber River.
1.2 Terrestrial Ecosystems			
1.2.1 Wildlife and Wildlife Habitat	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation/enhancement measures; until confirmed, net effects remain the same as potential effects. Net effects include: • Permanent loss of wildlife habitat including confirmed habitat for 2 SAR and 6 SCC, large tracts of confirmed SWH and other areas for breeding and rearing of young (e.g. amphibian breeding habitat) • Potentially suitable habitat present for Rapid's Clubtail in the Main and East Humber Rivers. This species is only known from 4 rivers in Ontario, of which the Humber River is one of the main subpopulations • Fragmentation of two large natural corridors associated with the Humber River and East Humber River • Removals through this alternative would represent ~87.3 ha loss of habitat with respect to total ELC units affected by this alternative. • Reduction of wildlife habitat quality through indirect effects that cannot be fully mitigated including edge effects (e.g. increased light and noise and the introduction of pathways for invasive species) and increased potential for animal-vehicle collisions • Moderate amount of fragmentation (fragmentation of the two large habitat blocks surrounding the Humber River and East Humber River) and potential for impacts to SAR and SWH. Existing disturbances (residential properties) lessen the extent of fragmentation in this location.	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation/enhancement measures; until confirmed, net effects remain the same as potential effects. Net effects include: • Permanent loss of wildlife habitat including confirmed habitat for 4 SAR and 5 SCC, large tracts of confirmed SWH and other areas for breeding and rearing of young (e.g. amphibian breeding habitat). One of the SAR confirmed (Rapid's Clubtail) is only known from 4 rivers in Ontario, of which the Humber River is one of the main subpopulations. Potentially suitable habitat is also present in the East Humber River. • Fragmentation of two large natural corridors associated with the Main Humber River and East Humber River • Removals through this alternative would represent ~99.1 ha loss of habitat with respect to total ELC units affected by this alternative. • Reduction of wildlife habitat quality through indirect effects that cannot be fully mitigated including edge effects (e.g. increased light and noise and the introduction of pathways for invasive species) and increased potential for animal-vehicle collisions • High amount of fragmentation (fragmentation of the two large habitat blocks surrounding the Humber River and East Humber River) and potential for impacts to SAR and SWH. • Direct impacts on 0.49 ha of interior forest area (northwest of patch HU-MH-54; >100 m from edge).	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation/enhancement measures; until confirmed, net effects remain the same as potential effects. Net effects include: • Permanent loss of wildlife habitat including confirmed habitat for 4 SAR and 5 SCC, large tracts of confirmed SWH and other areas for breeding and rearing of young (e.g. amphibian breeding habitat). One of the SAR confirmed (Rapid's Clubtail) is only known from 4 rivers in Ontario, of which the Humber River is one of the main subpopulations. Potentially suitable habitat is also present in the East Humber River. • Fragmentation of two large natural corridors associated with the Main Humber River and East Humber River • Removals through this alternative would represent ~102.1_ha loss of habitat with respect to total ELC units affected by this alternative. • Reduction of wildlife habitat quality through indirect effects that cannot be fully mitigated including edge effects (e.g. increased light and noise and the introduction of pathways for invasive species) and increased potential for animal-vehicle collisions • Moderate-high amount of fragmentation (fragmentation of the two large habitat blocks surrounding the Humber River and East Humber River) and potential for impacts to SAR and SWH. • No direct impacts on interior forest areas; however, due to the proximity of this route to interior forest northwest

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		Summary of Potential Net Effects and Ranking	
	• Direct impacts on 0.05 ha of interior forest area (in Humber River valley; >100 m from edge); however, this interior forest area consists of primarily coniferous cultural plantation (CUP3 ELC unit), which represents lower quality wildlife habitat and less suitable breeding habitat for area-sensitive birds. MODERATE NET EFFECT	Based on air photo interpretation, this interior forest area consists of mixed forest vegetation communities, which represent higher quality wildlife habitat and suitable breeding habitat for area-sensitive birds. HIGH NET EFFECT	of patch HU-MH-54, there is a greater potential for indirect impacts on this higher quality interior habitat (mixed forest ELC units), which is suitable breeding habitat for area-sensitive birds. HIGH NET EFFECT
	RANKING: 1st Although fragmentation of the two large habitat blocks surrounding the Humber River and East Humber River are notable, this alternative has minimal impacts on interior forest habitat (direct impacts on 0.05 ha of lower quality interior habitat area >100 m from edge) and comparatively less significant fragmentation of the Humber River Valley than S8-4 and S8-5 due to existing disturbances within S8-3 (residential properties and abundance of cultural plantation).	**RANKING: 3rd** This route has a higher potential for impacts or removal of interior forest habitat (direct impacts on 0.49 ha of area >100 m from edge) in the Main Humber River Valley than S8-3 or S8-5 routes; this interior forest habitat is rare in the landscape and important for area-sensitive birds and other wildlife species.	**RANKING: 2nd** Although fragmentation of the two large habitat corridors surrounding the Humber River and East Humber River are notable, this route results in no direct removal of interior forest habitat (>100 m from edge) in the main Humber River Valley, however, the proximity of this route results in greater potential for indirect impacts to higher quality interior forest habitat than S8-3. Relative to S8-3, this route has a greater impact on candidate old growth SWH and less disturbed forest areas (whereas S8-3 includes rural residential areas and more cultural plantation).
1.2.2 Wetlands	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation/enhancement measures; until confirmed, net effects remain the same as potential effects. Net effects include: • Removal of ~12.1 ha of wetland, of which 1.5 ha is PSW • Reduction in wetland quality through indirect effects that cannot be fully mitigated including edge effects (e.g. increased light, wind, road contaminants and the introduction of pathways for invasive species) and impacts to hydrologic and groundwater inputs that support these features Affected wetlands are generally small but contribute to feature diversity. MODERATE NET EFFECT	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation / enhancement measures; until confirmed, net effects remain the same as potential effects. Net effects include: • Removal of ~15.8 ha of wetland, of which 1.5 ha is PSW • Reduction in wetland quality through indirect effects that cannot be fully mitigated including edge effects (e.g. increased light, wind, road contaminants and the introduction of pathways for invasive species) and impacts to hydrologic and groundwater inputs that support these features Affected wetlands are generally small but contribute to feature diversity. MODERATE NET EFFECT	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation / enhancement measures; until confirmed, net effects remain the same as potential effects. Net effects include: • Removal of ~13.3 ha of wetland, of which 1.5 ha is PSW • Reduction in wetland quality through indirect effects that cannot be fully mitigated including edge effects (e.g. increased light, wind, road contaminants and the introduction of pathways for invasive species) and impacts to hydrologic and groundwater inputs that support these features Affected wetlands are generally small but contribute to feature diversity. MODERATE NET EFFECT
	RANKING: 1st All alternatives impact wetlands, including both PSW and unevaluated wetlands. Ranking based on total area of wetland removed (regardless of PSW classification).	**RANKING: 3rd** All alternatives impact wetlands, including both PSW and unevaluated wetlands. Ranking based on total area of wetland removed (regardless of PSW classification).	**RANKING: 2nd** All alternatives impact wetlands, including both PSW and unevaluated wetlands. Ranking based on total area of wetland removed (regardless of PSW classification).
1.2.3 Woodlands and Vegetation	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation/enhancement measures; until confirmed, net effects remain the same as potential effects. Net effects include: • Removal of ~82.3 ha of forest, meadow, thicket, plantation and treed swamp • Removal of 31.0 ha of potentially significant woodland	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation / enhancement measures; until confirmed, net effects remain the same as potential effects. Net effects include: • Removal of ~88.8 ha of plantation, thicket, meadow, forest, and swamp • Removal of 25.4 ha of potentially significant woodland	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation / enhancement measures; until confirmed, net effects remain the same as potential effects. Net effects include: • Removal of ~92.7 ha of plantation, thicket, woodland, meadow, forest, and swamp. • Removal of 27.8 ha of potentially significant woodland

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	Summary of Potential Net Effects and Ranking		
	• Removal of 54.2 ha of woodland (forest, treed swamp and plantation) • Removal of 0.05 ha of interior woodland (however, it is considered lower quality interior forest as it is primarily composed of coniferous plantation) • Crossing would require spanning a wide, deep portion of the river valley (~660 m long and ~32 m deep) to avoid infilling into the river valley • Impacts to one Butternut (END); however, impacts may be compensated pending results of a future Butternut Health Assessment. • Impacts to two potentially significant valleylands. • Reduction in vegetation community quality through Indirect effects that cannot be fully mitigated including effects from road contaminants (e.g. salt, heavy metals, sediment / debris), introduction of pathways for invasive species, edge / exposure impacts (e.g. canopy blow down) Vegetation communities within this alternative are generally large and represent some of the least disturbed and most well-established vegetation communities in the study area. No rare vegetation communities are affected by this alternative. MODERATE NET EFFECT	• Removal of 52.7 ha of woodland (forest, treed swamp and plantation) • Removal of 0.49 ha of interior woodland and associated degradation of remaining adjacent interior woodland. • Crossing would require spanning a wide, deep portion of the river valley (~1020 m long and 40 m deep) to avoid infilling into the river valley • Impacts to one Butternut (END); however, impacts may be compensated pending results of a future Butternut Health Assessment. • Impacts to two potentially significant valleylands. • Reduction in vegetation community quality through indirect effects that cannot be fully mitigated including effects from road contaminants (e.g. salt, heavy metals, sediment / debris), introduction of pathways for invasive species, edge / exposure impacts (e.g. canopy blow down) Vegetation communities within this alternative are generally large and represent some of the least disturbed and most well-established vegetation communities in the study area. No rare vegetation communities are affected by this alternative. MODERATE NET EFFECT	• Removal of 56.0 ha of woodland (forest, treed swamp and plantation) • Crossing would require spanning a wide, deep portion of the river valley (~700 m long and 35 m deep) to avoid infilling into the river valley • Impacts to one Butternut (END); however, impacts may be compensated pending results of a future Butternut Health Assessment. • Impacts to two potentially significant valleylands. • Reduction in vegetation community quality through indirect effects that cannot be fully mitigated including effects from road contaminants (e.g. salt, heavy metals, sediment / debris), introduction of pathways for invasive species, edge / exposure impacts (e.g. canopy blow down) Vegetation communities within this alternative are generally large and represent some of the least disturbed and most well-established vegetation communities in the study area. No rare vegetation communities are affected by this alternative. MODERATE NET EFFECT
	RANKING: 1st All alternatives fragment large habitat blocks associated with the Main Humber River and East Humber River valleys. Ranking based on total area removed and significance of those removals (e.g. area of interior woodland, area of woodland, area of potentially significant woodlands, and favouring removals from Cultural Plantation (CUP) units, rather than forest (FOD, FOC, FOM, SWD, SWC, SWM units). All alternatives have similar impacts to total area, woodland, and potentially significant woodland; however, S8-3 and S8-5 have the least amount of impact to high quality interior forest habitat. While S8-3 impacts the highest amount of potentially significant woodland, and has some minor removal of lower quality interior woodland, greater consideration was given to impacts to high quality interior habitat and separation from higher quality portions of the valley.	**RANKING: 3rd** All alternatives fragment large habitat blocks associated with the Main Humber River and East Humber River valleys. Ranking based on total area removed and significance of those removals (e.g. area of interior woodland, area of woodland, area of potentially significant woodlands, and favouring removals from Cultural Plantation (CUP) units, rather than forest (FOD, FOC, FOM, SWD, SWC, SWM units). All alternatives have similar impacts to total area, woodland, and potentially significant woodland; however, S8-4 impacts the most interior woodland and higher quality upland forest, and is adjacent to remaining high quality upland forest habitat.	**RANKING: 1st** All alternatives fragment large habitat blocks associated with the Main Humber River and East Humber River valleys. Ranking based on total area removed and significance of those removals (e.g. area of interior woodland, area of woodland, area of potentially significant woodlands, and favouring removals from Cultural Plantation (CUP) units, rather than forest (FOD, FOC, FOM, SWD, SWC, SWM units). All alternatives have similar impacts to total area, woodland, and potentially significant woodland; however, S8-3 and S8-5 have the least amount of impact to high quality interior forest habitat. While S8-5 impacts the highest amount of total removals and total woodland, this alternative impacts no interior woodland.
1.2.4 Designated/Special/ Natural Areas	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation/enhancement measures; until confirmed, net effects remain the same as potential effects. Net effects include: • Removal of ~11.5 ha (mixed forest/coniferous forest/deciduous forest/ cultural meadow) of the East Humber River ESA • Removal of 138.5 ha within the Natural Heritage System of the Greenbelt Plan	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation / enhancement measures; until confirmed, net effects remain the same as potential effects. Net effects include: • Removal of ~11.5 ha of East Humber River ESA • Removal of 165.7 ha of Natural Heritage System Area of the Greenbelt Plan • Removals within the York Region ‘Greenlands System’ and ‘Core Features’ within the City of Vaughan	Net effects associated with the alternative are dependent on the ability to implement avoidance, mitigation, compensation / enhancement measures; until confirmed, net effects remain the same as potential effects. Net effects include: • Removal of ~11.5 ha of East Humber River ESA • Removal of 164.9 ha of the Natural Heritage System of the Greenbelt Plan • Removals within the York Region ‘Greenlands System’ and ‘Core Features’ within the City of Vaughan

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	• Removals within the York Region 'Greenlands System' and 'Core Features' within the City of Vaughan • Removal of ~0.8 ha of Kirby Lands Property (TRCA properties) and ~4.1 ha of Nashville Resource Management Tract Conservation Reserve (TRCA properties) HIGH NET EFFECT	• Removal of ~0.9 ha of Kirby Lands Property (TRCA properties) and ~32.1 ha of Nashville Resource Management Track Conservation Reserve (TRCA properties) HIGH NET EFFECT	• Removal of ~0.9 ha of Kirby Lands Property (TRCA properties) and ~34.6 ha of Nashville Resource Management Tract Conservation Reserve (TRCA properties) HIGH NET EFFECT
	RANKING: 1st All alternatives fragment / remove portions of the East Humber River ESA, Greenbelt Plan's Natural Heritage System, lands within the Nashville Conservation Reserve (TRCA), York Region Greenlands System and Core Features within the City of Vaughan. This alternative removes the least amount of the Greenbelt Plan's Natural Heritage System, and the least amount of TRCA conservation lands.	**RANKING: 2nd** All alternatives fragment / remove portions of the East Humber River ESA, Greenbelt Plan's Natural Heritage System, lands within the Nashville Conservation Reserve (TRCA), York Region Greenlands System and Core Features within the City of Vaughan.	**RANKING: 3rd** All alternatives fragment / remove portions of the East Humber River ESA, Greenbelt Plan's Natural Heritage System, lands within the Nashville Conservation Reserve (TRCA), York Region Greenlands System and Core Features within the City of Vaughan. This alternative removes slightly less of the Greenbelt Plan's Natural Heritage System than S8-4, but removes the largest amount of TRCA conservation lands.
1.3 Ecosystem Services	**Relative ES Value[1]** • Agriculture: Low • Natural Cover: High • Cumulative: High **ES Value Representation** • Agriculture: 14% • Natural Cover: 86% HIGH NET EFFECT	**Relative ES Value[2]** • Agriculture: Low • Natural Cover: High • Cumulative: High **ES Value Representation** • Agriculture: 13% • Natural Cover: 87% HIGH NET EFFECT	**Relative ES Value[3]** • Agriculture: Low • Natural Cover: High • Cumulative: High **ES Value Representation** • Agriculture: 12% • Natural Cover: 88% HIGH NET EFFECT
	RANKING: 1st All Section 8 alternatives have High Net Effects for Ecosystem Services using the Ecosystem Service (ES) Net Effects weighting and similar Natural Cover contributions. Differentiation between these alternatives is generated by examining the proportion of Natural Cover and relative contribution of Natural Cover ES value to total value. Alternative S8-3 is preferred as it has the lowest % natural cover.	**RANKING: 2nd** All Section 8 alternatives have High Net Effects for Ecosystem Services using the Ecosystem Service (ES) Net Effects weighting and similar Natural Cover contributions. Differentiation between these alternatives is generated by examining the proportion of Natural Cover and relative contribution of Natural Cover ES value to total value. Alternative S8-4 had the second lowest % natural cover.	**RANKING: 3rd** All Section 8 alternatives have High Net Effects for Ecosystem Services using the Ecosystem Service (ES) Net Effects weighting and similar Natural Cover contributions. Differentiation between these alternatives is generated by examining the proportion of Natural Cover and relative contribution of Natural Cover ES value to total value. Alternative S8-5 has the highest % natural cover.
1.4 Groundwater			
1.4.1 Areas of Groundwater Recharge or Discharge	• Small to moderate loss of recharge due to footprint on permeable soils and small loss of discharge due to interception. MODERATE NET EFFECT	• Small loss of recharge due to footprint on permeable soils and small loss of discharge due to interception. LOW NET EFFECT	• Small loss of recharge due to footprint on permeable soils and small loss of discharge due to interception. LOW NET EFFECT
	RANKING: 3rd Higher relative proportion of alternative overlying permeable soils.	**RANKING: 1st** Lower relative proportion of alternative overlying permeable soils.	**RANKING: 1st** Lower relative proportion of alternative overlying permeable soils.
1.4.2 Groundwater Source Areas and Wellhead Protection Areas	• There is no effect on WHPAs NO NET EFFECT	• There is no net effect on WHPAs NO NET EFFECT	• There is no net effect on WHPAs NO NET EFFECT

[1] Calculated relative to the range of ecosystem service values for each category (Agriculture, Natural Cover, Total) across all sections & alternatives (i.e. S1-S9 alternatives cumulatively).
[2] Calculated relative to the range of ecosystem service values for each category (Agriculture, Natural Cover, Total) across all sections & alternatives (i.e. S1-S9 alternatives cumulatively).
[3] Calculated relative to the range of ecosystem service values for each category (Agriculture, Natural Cover, Total) across all sections & alternatives (i.e. S1-S9 alternatives cumulatively).

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4 Summary of Potential Net Effects and Ranking	Alternative S8-5
	RANKING: 1st No relative ranking; effect on indicator is not present for any alternative.	**RANKING: 1st** No relative ranking; effect on indicator is not present for any alternative.	**RANKING: 1st** No relative ranking; effect on indicator is not present for any alternative.
1.4.3 Large Volume Wells	• One large volume well may potentially need to be decommissioned. LOW NET EFFECT	• One large volume well may potentially need to be decommissioned. LOW NET EFFECT	• Two large volume wells may potentially need to be decommissioned. LOW NET EFFECT
	RANKING: 1st One large volume well may be affected	**RANKING: 1st** One large volume well may be affected.	**RANKING: 3rd** Two large volume wells may be affected.
1.4.4 Private Wells	• Potential reduction in water quality in at least 10 wells due to potential salt issue only, because wells are shallow. • At least 31 wells are to be removed / decommissioned by alternative. MODERATE NET EFFECT	• Potential reduction in water quality in at least 3 wells due to potential salt issue only, because wells are shallow • At least 23 wells are to be removed / decommissioned by alternative. MODERATE NET EFFECT	• Potential reduction in water quality in at least 2 wells due to potential salt issue only, because wells are shallow • At least 39 wells are to be removed / decommissioned by alternative. MODERATE NET EFFECT
	RANKING: 2nd The alternative potentially affects a moderate number of wells.	**RANKING: 1st** The alternative potentially affects a low number of wells.	**RANKING: 2nd** The alternative potentially affects a moderate number of wells.
1.4.5 Groundwater-Dependent Commercial Enterprises	• No commercial use and well displacement NO NET EFFECT	• No commercial use and well displacement NO NET EFFECT	• No commercial use and well displacement NO NET EFFECT
	RANKING: 1st No commercial wells present in the alternative or buffer zone.	**RANKING: 1st** No commercial wells present in the alternative or buffer zone.	**RANKING: 1st** No commercial wells present in the alternative or buffer zone.
1.4.6 Groundwater-Sensitive Ecosystems	• Low potential to affect sensitive ecosystems with four (4) wetland areas within alternative that may be displaced. • Sixteen (16) additional wetland areas and warmwater streams present in buffer zone that are not dependent on groundwater. Minimal loss of discharge function anticipated. • There are at least five (5) cool to coldwater streams within alternative / buffer zone that are somewhat dependent on groundwater. Some loss of discharge function anticipated. MODERATE NET EFFECT	• Low potential to affect sensitive ecosystems with four (4) wetland areas within alternative that may be displaced. • Sixteen (16) additional wetland areas and warmwater streams present in buffer zone that are not dependent on groundwater. Minimal loss of discharge function anticipated. • There are at least five (5) cool to coldwater streams within alternative/buffer that are somewhat dependent on groundwater. Some loss of discharge function anticipated. MODERATE NET EFFECT	• Low potential to affect sensitive ecosystems with four (4) wetland areas within alternative that may be displaced. • Sixteen (16) additional wetland areas and warmwater streams present in buffer zone that are not dependent on groundwater. Minimal loss of discharge function anticipated. • There are at least five (5) cool to coldwater streams within alternative/buffer that are somewhat dependent on groundwater. Some loss of discharge function anticipated. MODERATE NET EFFECT
	RANKING: 1st Moderate potential to adversely affect groundwater sensitive ecosystems.	**RANKING: 1st** Moderate potential to adversely affect groundwater sensitive ecosystems.	**RANKING: 1st** Moderate potential to adversely affect groundwater sensitive ecosystems.
1.5 Surface Water			
1.5.1 Watershed / Subwatershed Drainage Features / Patterns	• Out of 9 watercourse crossings, seven watercourse crossings require fluvial geomorphology assessment, including the Humber River and the East Humber River. The East Humber River is designated Redside Dace habitat and has wide setbacks. Both Humber River valleys are relatively deep. Remaining crossings will be minor to moderate and require crossing structures.	• Out of 11 watercourse crossings, seven crossings require fluvial assessments, including the Humber River and the East Humber River. The East Humber River is designated Redside Dace habitat and has wide setbacks. Both Humber River valleys are relatively deep. Remaining crossings would be minor to moderate and require crossing structures. • The river has a sinuous planform through this section.	• Out of 9 watercourse crossings, seven crossings require fluvial assessments, including the Humber River and the East Humber River. The East Humber River is designated Redside Dace habitat and has wide setbacks. Both Humber River valleys are relatively deep. Remaining crossings would be minor to moderate and require crossing structures.

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4	Alternative S8-5
	Summary of Potential Net Effects and Ranking		
	• Comparatively less meandering planform and recent aerial imagery does not show any obvious signs of instability. • The proposed alignment crosses at a generally straight section of the watercourse. • The floodplain width of Humber River is ~175 m. The valley crossing of Humber River will require a total span of ~660 m depending upon the placement of abutments. This route has the lowest impact on the flood plain. • Highway 27 interchange can be mitigated by realigning the tributary connection upstream to eliminate the need for a second culvert. MODERATE NET EFFECT	• Corridor runs nearly parallel to Humber River where it crosses the valley. • The flood plain width at the crossing location is ~430 m. The valley crossing of Humber River will require a total span of ~1020 m depending upon the placement of abutments. The placement of piers could be influenced by the meandering channel. The presence of the meandering channel, as seen on aerial imagery, through this reach indicates a higher risk of channel migration along the flood plain. • Highway 27 interchange can be mitigated by realigning the tributary connection upstream to eliminate the need for a second culvert. HIGH NET EFFECT	• Although a short section of the Humber River is straight at the river crossing (west bank), the channel meanders through this section and flows along the base of the west valley slope. A large erosion scarp is also identifiable in aerial imagery along the eastern portion of the valley with the meandering watercourse located at the base of this scarp. • The flood plain width at the crossing location is ~460 m. The valley crossing of Humber River will require a total span of ~700 m depending upon the placement of abutments. The placement of piers could be influenced by the meandering channel. The presence of the meandering channel, as seen on aerial imagery, through this reach indicates a higher risk of channel migration along the flood plain. • Highway 27 interchange can be mitigated by realigning the tributary connection upstream to eliminate the need for a second culvert. HIGH NET EFFECT
	RANKING: 1st Humber River crossing over a straight reach decreases risk to stream processes and has less impact to flood plain and river meander.	**RANKING: 3rd** Largest valley crossings are required at both valleys of Humber River. This route runs parallel to the main channel of Humber River and has the largest impact to the flood plain and meandering river system.	**RANKING: 2nd** The route has larger impact to flood plain than Route 8-3. The route has moderate impact to the meandering river system immediately upstream and downstream of the crossing.
1.5.2 Surface Water Quality and Quantity	• Introduces 46 ha of impervious area including 3 ha to the tributary of Main Humber, 16 ha to Main Branch of Main Humber, 27 ha to East Humber River. • Three (3) regulated watercourse crossings; • Medium impacts on quality through direct and indirect discharges of contaminated and sediment-laden run-off. • Low impacts on hydrology due to changes in ground permeability. • Low effects on modifications to surface drainage patterns and alterations of water bodies • Road runoff from long structure will require a storm collection system to be integrated into the structure design. LOW NET EFFECT	• Introduces 52 ha impervious area including 3 ha to the tributary of Main Humber, 18 ha to Main Branch of Main Humber, 31 ha to East Humber River. • Three (3) regulated watercourse crossings; • Medium impacts on quality through direct and indirect discharges of contaminated and sediment-laden runoff. • Low impacts on hydrology due to changes in ground permeability. • Low effects on modifications to surface drainage patterns and alterations of water bodies. • Road runoff from long structure will require a storm collection system to be integrated into the structure design. MODERATE NET EFFECT	• Introduces 50 ha of impervious area including 3 ha to the tributary of Main Humber, 18 ha to Main Branch of Main Humber, 29 ha to East Humber River. • Three (3) regulated watercourse crossings; • Medium impacts on quality through direct and indirect discharges of contaminated and sediment-laden runoff. • Low impacts on hydrology due to changes in ground permeability. • Low effects on modifications to surface drainage patterns and alterations of water bodies. • Road runoff from long structure will require a storm collection system to be integrated into the structure design. MODERATE NET EFFECT
	RANKING: 1st Low net effect.	**RANKING: 2nd** Introduces the most impervious area.	**RANKING: 2nd** Low net effect.
1.6 Air Quality and Climate Change			
1.6.1 Local and regional air quality impacts; greenhouse gas emissions	• A few residences (Huntington Rd., Kirby Rd., Highway 27 and Kipling Ave.) are anticipated to be close enough to experience a change in air quality, but pollutants will be within acceptable levels. LOW NET EFFECT	• A few residences (Huntington Rd., Kirby Rd., Highway 27 and Kipling Ave.) are anticipated to be close enough to experience a change in air quality, but pollutants will be within acceptable levels. LOW NET EFFECT	• A few residences (Huntington Rd., Kirby Rd., Highway 27 and Kipling Ave.) are anticipated to be close enough to experience a change in air quality, but pollutants will be within acceptable levels. LOW NET EFFECT
	RANKING: 3rd	**RANKING: 1st**	**RANKING: 1st**

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4	Alternative S8-5
		Summary of Potential Net Effects and Ranking	
	Closer to residences east of Huntington Road and North Nashville Road.	More distant from residences east of Huntington Road and North of Nashville Road. This alternative has a comparable route length to S8-3 and, thus, is comparable in terms of regional emissions and GHGs.	More distant from residences east of Huntington Road and North of Nashville Road. This alternative has a comparable route length to S8-3 and, thus, is comparable in terms of regional emissions and GHGs.
2.0 Land Use / Socio-Economic Environment			
2.1 Land Use Planning Policies, Goals, Objectives			
2.1.1 Indigenous Land Claims	Treaties including Nanfan (1701), Treaty 3 (1795), Treaty 3.75 (1795), Treaty 13 (1805), Treaty 13A (1805), Treaty 18, 1818, Treaty 19 (1918), Williams Treaty (1923), as well as various Assertions and Claims. • Additional Indigenous Assertions and/or Claims may be filed and/or proven at any time. MODERATE NET EFFECT	Treaties including Nanfan (1701), Treaty 3 (1795), Treaty 3.75 (1795), Treaty 13 (1805), Treaty 13A (1805), Treaty 18, 1818, Treaty 19 (1918), Williams Treaty (1923), as well as various Assertions and Claims. • Additional Indigenous Assertions and/or Claims may be filed and/or proven at any time. MODERATE NET EFFECT	Treaties including Nanfan (1701), Treaty 3 (1795), Treaty 3.75 (1795), Treaty 13 (1805), Treaty 13A (1805), Treaty 18, 1818, Treaty 19 (1918), Williams Treaty (1923), as well as various Assertions and Claims. • Additional Indigenous Assertions and/or Claims may be filed and/or proven at any time. MODERATE NET EFFECT
	RANKING: 1st No difference between alternatives.	**RANKING: 1st** No difference between alternatives.	**RANKING: 1st** No difference between alternatives.
2.1.2 Provincial / Federal Land Use Planning Policies / Goals / Objectives	• Impacts PPS agricultural lands policies. • Impacts 153 hectares of Greenbelt (Lands Protected Countryside & NHS). • Impacts 31 hectares of Agricultural lands. • Impacts 4 ha of existing Urban Area • Impacts 16 ha of Rural Area MODERATE NET EFFECT	• Impacts PPS agricultural lands policies. • Impacts 188 ha of Greenbelt (Lands Protected Countryside & NHS) • Impacts 37 ha of Agricultural lands • Impacts 6 ha of existing Urban Area HIGH NET EFFECT	• Impacts PPS agricultural lands policies. • Impacts 185 ha of Greenbelt Lands (Lands Protected Countryside & NHS) • Impacts 38 ha of Agricultural lands • Impacts 3 ha of existing Urban Area • Impacts 2 ha of Rural Area HIGH NET EFFECT
	RANKING: 1st Impacts the least overall area of Agricultural and Greenbelt lands. Impacts 3 – 38 ha less of Greenbelt than the other alternatives.	**RANKING: 2nd** Impacts large area of Greenbelt. Establishment of new infrastructure where there are other alternatives having less impact on the Greenbelt, is contrary to the stated policy.	**RANKING: 2nd** Impacts large area of Greenbelt. Establishment of new infrastructure where there are other alternatives having less impact on the Greenbelt, is contrary to the stated policy.
2.1.3 Municipal (local and regional) Land Use Planning Policies / Goals / Objectives	• Impacts 153 ha of lands designated as Greenbelt. (Protected Countryside & NHS). • Impacts 31 ha of Agricultural lands • Impacts 46 ha of North Kleinburg Nashville Secondary Plan. • Impacts 22 ha of Huntington Road Community Area Impacts 3 hectares of Environmental Policy Area. • Impacts 16 hectares of Rural Area. MODERATE NET EFFECT	• Impacts 188 ha of lands designated as Greenbelt (Protected Countryside & NHS). • Impacts 37 ha of Agricultural lands. • Impacts 0.46 ha North Kleinburg Nashville Secondary Plan • No impacts to Huntington Road Community Area • Future Urban Area impact is approximately 0.5 ha of non-active development applications. HIGH NET EFFECT	• Impacts 185 ha of lands designated as Greenbelt (Protected Countryside & NHS). • Impacts 38 ha of Agricultural Area. • Impacts 13.5 ha of North Kleinburg Nashville Secondary Plan. • Impacts 1.4 ha of the Huntington Road Community Area. HIGH NET EFFECT
	RANKING: 1st Has a low impact on agricultural lands but also impacts employment lands, environmental policy area lands and rural area lands. North Kleinburg Nashville Secondary Plan anticipates and provides for the corridor through this area.	**RANKING: 2nd** Impacts large area of Greenbelt. Establishment of new infrastructure where there are other alternatives having less impact on the Greenbelt, is contrary to the stated policy.	**RANKING: 2nd** Impacts large area of Greenbelt. Policies give priority to protecting natural environment. Alternate future urban development areas are available in Vaughan to meet growth needs. Municipal policies recognize priority of GTA West over urban development.
2.1.4 Development Objectives of Private Property Owners	• Impacts 45.5 hectares of North Kleinburg Nashville Secondary Plan. Impact is anticipated by Secondary Plan policies but would require significant revision to that Plan. HIGH NET EFFECT	• Avoids most of North Kleinburg Nashville Secondary Plan (impacts 0.46 ha). Future Urban Area located on lands outside of developable areas. LOW NET EFFECT	• Impacts 13.5 ha of North Kleinburg Nashville Secondary Plan. MODERATE NET EFFECT

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4 Summary of Potential Net Effects and Ranking	Alternative S8-5
	RANKING: 3rd Impacts greatest amount of future development lands of North Kleinburg Nashville Secondary Plan.	**RANKING: 1st** Very minor impact to North Kleinburg Nashville Secondary Plan.	**RANKING: 2nd** Reduced effect when compared to S8-3 and impact is limited to northerly portion of North Kleinburg Nashville Secondary Plan Designated Natural Area. No division of community.
2.2 Land Use – Community			
2.2.1 First Nation Reserves	• No reserves in study area. NO NET EFFECT	• No reserves in study area. NO NET EFFECT	• No reserves in study area. NO NET EFFECT
	RANKING: 1st No difference between alternatives.	**RANKING: 1st** No difference between alternatives.	**RANKING: 1st** No difference between alternatives.
2.2.2 Indigenous Sacred Areas	• No known or reported Indigenous Sacred Areas NO NET EFFECT	• No known or reported Indigenous Sacred Areas NO NET EFFECT	• No known or reported Indigenous Sacred Areas NO NET EFFECT
	RANKING: 1st No difference between alternatives.	**RANKING: 1st** No difference between alternatives.	**RANKING: 1st** No difference between alternatives.
2.2.3 Urban and Rural Residential Uses and Properties	• 28 residential properties impacted. HIGH NET EFFECT	• 20 residential properties impacted. MODERATE NET EFFECT	• 22 residential properties impacted. MODERATE NET EFFECT
	RANKING: 3rd Impacts the most residential properties.	**RANKING: 1st** Impacts fewest residential properties. Through preliminary design, impacts on 3 or 4 of the properties could be avoided but impacts of being adjacent to corridor would remain.	**RANKING: 2nd** Through preliminary design, impacts on 3 or 4 of the properties could be avoided but impacts of being adjacent to corridor would remain.
2.2.4 Commercial/ Industrial Uses and Properties	• Impacts four (4) commercial operations: Huntington E. Stud Farm, Nashville Sod Supply, Silver Spur Camp and Empire Venus Group LTD. LOW NET EFFECT	• Impacts four (4) commercial operations: Downsview Group Storage, Pets Get Physical, Silver Spur Camp and Young-Winfield Inc. LOW NET EFFECT	• Impacts five (5) commercial operations: RGH Bloodstock, Downsview Group Storage, Pets Get Physical, Silver Spur Camp and Young-Winfield Inc. LOW NET EFFECT
	RANKING: 1st Impacts a low number of properties that are transitional uses in future urban area.	**RANKING: 1st** These uses tend to be transitional uses that would disappear as urbanization occurs. Impacts cannot be avoided.	**RANKING: 1st** These uses tend to be transitional uses that would disappear as urbanization occurs. Impacts cannot be avoided.
2.2.5 Recreational Areas and Tourist Attractions	• Route crosses small portion of the Humber Valley Heritage Trail however impacts can be mitigated. NO NET EFFECT	• Route crosses the west trailhead access and a northerly portion of the Humber Valley Heritage Trail and may reduce the natural heritage/ urban wilderness values associated with the trail. MODERATE NET EFFECT	• Crosses a central portion of the Humber Valley Heritage Trail and may reduce the natural heritage/ urban wilderness values of that portion of the trail. MODERATE NET EFFECT
	RANKING: 1st Very minor impact which can be mitigated.	**RANKING: 3rd** Elevation of freeway and transitway would minimize direct impacts on the trails but would have greater visual impacts	**RANKING: 2nd** Elevation of freeway and transitway would minimize direct impacts on the trails but would have greater visual impacts. Marginally better than S8-4.
2.2.6 Community Facilities / Institutions	• No impacts. NO NET EFFECT	• No impacts. NO NET EFFECT	• No impacts. NO NET EFFECT
	RANKING: 1st No impacts.	**RANKING: 1st** No impacts.	**RANKING: 1st** No impacts.
	• No impacts.	• No impacts.	• No impacts.

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4 Summary of Potential Net Effects and Ranking	Alternative S8-5
2.2.7 Municipal Infrastructure and Public Service Facilities	NO NET EFFECT	NO NET EFFECT	NO NET EFFECTS
	RANKING: 1st No impacts.	**RANKING: 1st** No impacts.	**RANKING: 1st** No impacts.
2.3 Noise Sensitive Areas (NSA's)			
2.3.1 Transportation Noise	• This alternative is the closest route to existing and future residential developments. • Several residences (Huntington Rd., Kirby Rd., Highway 27 and Kipling Ave., subdivision on Orico and Belsite Courts, future subdivision off Highway 27, south of Kirby Rd.) are anticipated to be close enough to experience an increase in traffic noise. LOW NET EFFECT	• This alternative is the furthest away from existing and future developments. For example, it is more than 1km from the existing community in the northeast quadrant of Nashville Road and Huntington Road. • Several residences (Huntington Rd., Kirby Rd., Highway 27 and Kipling Ave., subdivision on Orico and Belsite Courts,) are anticipated to be close enough to result in an increase in traffic noise levels. LOW NET EFFECT	• This alternative is further from existing and future developments than S8-3 but closer than S8-4. It is nearly 1km from the existing community in the northeast quadrant of Nashville Road and Huntington Road. • Several residences (Huntington Rd., Kirby Rd., Highway 27 and Kipling Ave., subdivision on Orico and Belsite Courts,) are anticipated to be close enough to result in an increase in traffic noise levels. LOW NET EFFECT
	RANKING: 3rd Closer to residences east of Huntington Road and North Nashville Road.	**RANKING: 1st** Farther from residences east of Huntington Road and North Nashville Road.	**RANKING: 1st** Farther from residences east of Huntington Road and North Nashville Road.
2.4 Land Use – Resources			
2.4.1 Indigenous Treaty Rights and Land Use Management	Treaties including Nanfan (1701), Treaty 3 (1795), Treaty 3.75 (1795), Treaty 13 (1805), Treaty 13A (1805), Treaty 18, 1818, Treaty 19 (1918), Williams Treaty (1923), as well as various Assertions and Claims. • Additional Indigenous Assertions and/or Claims may be filed and/or proven at any time. MODERATE NET EFFECT	Treaties including Nanfan (1701), Treaty 3 (1795), Treaty 3.75 (1795), Treaty 13 (1805), Treaty 13A (1805), Treaty 18, 1818, Treaty 19 (1918), Williams Treaty (1923), as well as various Assertions and Claims. • Additional Indigenous Assertions and/or Claims may be filed and/or proven at any time. MODERATE NET EFFECT	Treaties including Nanfan (1701), Treaty 3 (1795), Treaty 3.75 (1795), Treaty 13 (1805), Treaty 13A (1805), Treaty 18, 1818, Treaty 19 (1918), Williams Treaty (1923), as well as various Assertions and Claims. • Additional Indigenous Assertions and/or Claims may be filed and/or proven at any time. MODERATE NET EFFECT
	RANKING: 1st No difference between alternatives.	**RANKING: 1st** No difference between alternatives.	**RANKING: 1st** No difference between alternatives.
2.4.2 Agriculture / Specialty Crop • Removal or sterilization of Class 1 – 3 agricultural lands • Specialty Crops/Cropland affected • Cropland affected • Livestock operations affected • Loss of agricultural buildings • Agricultural buildings within 50 m • Field crop operations affected	• Loss of 66.3 ha of Class 1 – 3 lands • No effect • Potential effect remains the same • Three livestock operations affected (horse, 2 hobby horse) (loss of land and farm residential unit on horse farm, loss of buildings and land on both hobby horse farms) • Potential effect remains the same • Potential effect remains the same • Potential effect remains the same	• Loss of 17.5 ha of Class 1 – 3 lands • Loss of 1.9 ha of nursery stock lands • Potential effect remains the same • Four livestock operations affected (3 horse and one poultry) (buildings and land) • Potential effect remains the same • No effect • Potential effect remains the same	• Loss of 18.8 ha of Class 1 – 3 lands • Loss of 1.9 ha of nursery stock lands • Potential effect remains the same • Four livestock operations affected (3 horse and one poultry) (buildings and land) • Potential effect remains the same • No effect • Potential effect remains the same

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4 Summary of Potential Net Effects and Ranking	Alternative S8-5
• Farm properties greater than 20 ha affected	• Potential effect remains the same	• Potential effect remains the same	• Potential effect remains the same
• Farm properties less than 20 ha affected	• Potential effect remains the same	• Potential effect remains the same	• Potential effect remains the same
• Severed parcels greater than 20 ha created	• Eight severed parcels greater than 20 ha created	• Fifteen severed parcels greater than 20 ha created	• Thirteen severed parcels greater than 20 ha created
• Severed parcels less than 20 ha created	• Nine severed parcels less than 20 ha created	• Twenty-one severed parcels less than 20 ha created	• Nineteen severed parcels less than 20 ha created
• Landlocked parcels created	• Ten landlocked parcels created	• Ten landlocked parcels created	• Nine landlocked parcels created
• High investment operations affected	• No effect	• No effect	• No effect
• Farm equipment transportation routes affected	• No effect	• No effect	• No effect
• Division of agricultural community areas	• No effect	• No effect	• No effect
• Loss of tile drainage	• Loss of 5.9 ha of systematic tile drainage MODERATE NET EFFECT	• No effect HIGH NET EFFECT	• No effect HIGH NET EFFECT
	RANKING: 1st • Loss of 2.4 ha of Class 1 – 3 lands • Three livestock operations affected (horse, 2 hobby horse) (loss of land and farm residential unit on horse farm, loss of buildings and land on both hobby horse farms) • Loss of 5.8 ha of systematic tile drainage	**RANKING: 2nd** • Loss of 17.5 ha of Class 1 – 3 lands • Four livestock operations affected (3 horse and one poultry) (buildings and land)	**RANKING: 2nd** • Loss of 18.8 ha of Class 1 – 3 lands • Four livestock operations affected (3 horse and one poultry) (buildings and land)
2.4.3 Recreation	• Route crosses small portion of the Humber Valley Heritage Trail however impacts can be mitigated. NO NET EFFECT	• Route crosses northerly portion of the Humber Valley Heritage Trail and may reduce the natural heritage/ urban wilderness values associated with the trail. MODERATE NET EFFECT	• Crosses the central portion of the Humber Valley Heritage Trail and may reduce the natural heritage/ urban wilderness values of that portion of the trail. MODERATE NET EFFECT
	RANKING: 1st Very minor impact which can be mitigated.	**RANKING: 3rd** Elevation of freeway and transitway would minimize direct impacts on the trails but would have greater visual impacts.	**RANKING: 2nd** Elevation of freeway and transitway would minimize direct impacts on the trails but would have greater visual impacts.
2.4.4 Aggregate and Mineral Resources	• No impacts. NO NET EFFECT	• No impacts. NO NET EFFECT	• No impacts. NO NET EFFECT
	RANKING: 1st No impacts.	**RANKING: 1st** No impacts.	**RANKING: 1st** No impacts.
2.5 Major Utility Transmission Corridors and Pipelines			
2.5.1 Major Existing Utility Transmission Corridors and Pipelines	• Alternative has 1 hydro line crossing. • Alternative has 1 pipeline crossing.	• Alternative has 1 hydro line crossing. • Alternative has 1 pipeline crossing.	• Alternative has 1 hydro line crossing. • Alternative has 1 pipeline crossing.

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4	Alternative S8-5
		Summary of Potential Net Effects and Ranking	
	LOW NET EFFECT	LOW NET EFFECT	LOW NET EFFECT
	RANKING: 1st All alternatives have 1 hydro line crossing and 1 pipeline crossing. Impacts can be mitigated through design refinements. Cost of mitigation in constructability and costs criteria.	**RANKING: 1st** All alternatives have 1 hydro line crossing and 1 pipeline crossing. Impacts can be mitigated through design refinements. Cost of mitigation in constructability and costs criteria.	**RANKING: 1st** All alternatives have 1 hydro line crossing and 1 pipeline crossing. Impacts can be mitigated through design refinements. Cost of mitigation in constructability and costs criteria.
2.5.2 Major Proposed Utility Transmission Corridors and Pipelines	• No impacts. NO NET EFFECT	• No impacts. NO NET EFFECT	• No impacts. NO NET EFFECT
	RANKING: 1st No impacts.	**RANKING: 1st** No impacts.	**RANKING: 1st** No impacts.
2.6 Contaminated Property and Waste Management	**Properties within alternative:** • A waste disposal site is located at the southeast corner of Kipling Avenue and King-Vaughan Road (4853 King Vaughan Road) in Vaughan • A waste disposal site is present at the west end of the Kirby Road. This waste disposal site has been closed for >25 years • One (1) commercial property. **Properties within 250 m of alternative:** • One (1) commercial property. HIGH NET EFFECT	**Properties within alternative:** • A waste disposal site is located at the southeast corner of Kipling Avenue and King-Vaughan Road (4853 King Vaughan Road) in Vaughan • A waste disposal site is present at the west end of the Kirby Road. This waste disposal site has been closed for >25 years • One (1) commercial property with farm operations, outdoor storage and abandoned automobiles. **Properties within 250 m of alternative:** • One (1) commercial property with outdoor storage and abandoned/used cars. HIGH NET EFFECT	**Properties within alternative:** • A waste disposal site is located at the southeast corner of Kipling Avenue and King-Vaughan Road (4853 King Vaughan Road) in Vaughan • A waste disposal site is present at the west end of the Kirby Road. This waste disposal site has been closed for >25 years; • One (1) commercial property with outdoor storage and abandoned/used cars. **Properties within 250 m of alternative:** • One (1) commercial property with farm operations, outdoor storage and abandoned automobiles. HIGH NET EFFECT
	RANKING: 1st Two properties of significantly high concern to be indirectly impacted (waste disposal sites); one property of medium concern to be directly impacted; one property of medium concern to be indirectly impacted.	**RANKING: 1st** Two properties of significantly high concern to be directly impacted (waste disposal sites); One property of medium concern to be directly impacted; and one property of medium concern to be indirectly impacted.	**RANKING: 1st** Two properties of significantly high concern to be directly impacted (waste disposal sites); One property of medium concern to be directly impacted; and one property of medium concern to be indirectly impacted.
2.7 Landscape Composition			
2.7.1 Terrain	• Rolling hills with some flat agricultural lands. • Designated primarily Greenbelt Protected Countryside, small areas designated Agricultural area and Future Urban area, near southern end of Hwy 27 borders on a developed area. • Small area of wetland impacted/removed. • Affects 9 watercourses including 2 high-level watercourses. • Majority of this alternative falls within the Greenbelt Protected Countryside (low level) constraint. • Conceptual bridge crossing for Humber River Main covers a moderate gap in this alternative. • Humber East River crossing for this alternative alters more surrounding terrain. MODERATE NET EFFECT	• Rolling hills with some flat agricultural lands. • Designated primarily Greenbelt Protected Countryside, small designated Agricultural area and Future Urban area, near southern end of Hwy 27 borders on a developed area. • Moderate area of wetland impacted/removed. • Affects 12 watercourses. • Majority of the alternative falls within the Greenbelt Protected Countryside (low level) constraint. • Conceptual bridge crossing for Humber River Main River covers a moderate to large gap in this alternative. • Humber East River crossing for this alternative alters the least terrain. • West end of alternative impacts Downsview Group Outdoor storage. HIGH NET EFFECT	• Rolling hills with some flat agricultural lands. • Designated primarily Greenbelt Protected Countryside, small designated Agricultural area and Future Urban area, near southern end of Hwy 27 borders on a developed area. • Moderate area of wetland impacted/removed. • Affects 9watercourses. • Majority of the alternative falls within the Greenbelt Protected Countryside (low level) constraint. • Conceptual bridge crossing for Humber River Main River covers a moderate gap in this alternative. • Humber East River crossing for this alternative alters the least terrain. • West end of alternative goes through Downsview Group Outdoor storage. MODERATE NET EFFECT
	RANKING: 1st	**RANKING: 3rd**	**RANKING: 1st**

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4	Alternative S8-5
	Summary of Potential Net Effects and Ranking		
	Alternative S8-3 is preferred as it has less watercourse crossings and the least area of wetland removal. More terrain impacted for Humber East River crossing in this alternative.	Highest effect on Humber River as this alternative has the most watercourse crossings, largest area of wetland removal. Less terrain impacted for Humber East River crossing in this alternative.	Alternative S8-5 is preferred as it has less watercourse crossings and moderate area of wetland removal. Less terrain impacted for Humber East River crossing in this alternative.
2.7.2 Vegetation	• Intersects East Humber River ESA. • Affects 7 unevaluated wetlands. • Affects 1 Provincially Significant Wetland (PSW). • Interior woodland removal of 0.05 ha. • Interrupts 2 potentially significant wooded areas. • ~54 ha of woodland removed (deciduous forest, coniferous forest, mixed forest, deciduous swamp, mixed swamp and cultural plantation). MODERATE NET EFFECT	• Intersects East Humber River ESA. • Affects 8 unevaluated wetlands. • Affects 1 Provincially Significant Wetland (PSW). • Interior woodland removal of 0.49 ha. • Interrupts 2 potentially significant wooded areas. • ~53 ha of woodland removed (deciduous forest, coniferous forest, mixed forest, deciduous swamp, mixed swamp and cultural plantation). MODERATE NET EFFECT	• Intersects East Humber River ESA. • Affects 10 unevaluated wetlands. • Affects 1 Provincially Significant Wetland (PSW). • Interrupts 2 potentially significant wooded areas. • ~56 ha of woodland removed (cultural woodland, deciduous forest, coniferous forest, mixed forest, deciduous swamp, mixed swamp and cultural plantation). MODERATE NET EFFECT
	RANKING: 1st S8-3 is the preferred alternative as it has the least effect on the East Humber River ESA, unevaluated wetlands and PSWs, and less effect on interior woodland.	**RANKING: 2nd** Greater effect on East Humber River ESA and greatest effect on interior woodland.	**RANKING: 2nd** Greatest effect on East Humber River ESA, unevaluated wetlands and wooded areas. However no interior woodland is impacted.
2.7.3 Visual Impacts	• Diminished aesthetic quality of scenic views, reduced visual effect through mitigation/compensation measures. • Key receptor at Humber Valley Heritage Trail likely less affected by this alternative. • Nobleton key receptor least affected (and 2 closer residential clusters moderately) least affected by this alternative. • Kleinburg and Nashville receptors and 2 closer residential subdivisions clusters most affected by this alternative. • Low landscape absorptivity at west end of alternative and moderate through east end, moderate to high absorptivity through the rest of the alternative, some natural buffering (forested areas) between two of the key receptors and the alternative. • Subdivision north of Nashville likely the most affected, particularly by this alternative. MODERATE NET EFFECT	• Diminished aesthetic quality of scenic views, reduced visual effect through mitigation/compensation measures. • Key receptor at Humber Valley Heritage Trail likely affected by this alternative. • Nobleton key receptor least affected and 2 closer residential clusters less affected by this alternative. • Kleinburg and Nashville receptors and closer residential subdivisions less affected by this alternative. • Moderate to high landscape absorptivity at west end of alternative at the East Humber River valley and moderate to low through east end where it becomes predominately agriculture. Some natural buffering (forested areas) between two of the key receptors and the alternative. • Subdivision north of Nashville likely the most affected. LOW NET EFFECT	• Diminished aesthetic quality of scenic views, reduced visual effect through mitigation/compensation measures. • Key receptor at Humber Valley Heritage Trail likely affected by this alternative. • Nobleton key receptor least affected and 2 closer residential clusters less affected by this alternative. • Kleinburg and Nashville receptors and closer residential subdivisions less affected by this alternative. • Moderate to high landscape absorptivity at west end of alternative at the East Humber River valley and moderate to low through east end where it becomes predominately agriculture. Some natural buffering (forested areas) between two of the key receptors and the alternative. • Subdivision north of Nashville likely the most affected. MODERATE NET EFFECT
	RANKING: 3rd Greatest effect on the residential receptors.	**RANKING: 1st** S8-4 is preferred as it has a low effect on all receptors and low effect on the Humber Valley Heritage Trail.	**RANKING: 2nd** This alternative has a low effect on all receptors and high effect on the Humber Valley Heritage Trail.
2.7.4 Aesthetics	• Alternative fairly related to landscape, compatibility with residential uses to the south may be challenging. • Several commercial/industrial facilities are located under the west end of this alternative. • Potential vistas of the Greenbelt wooded areas and watercourses. MODERATE NET EFFECT	• Alternative fairly well related to landscape • Several commercial/industrial facilities are located under the west end of this alternative. • Potential vistas of the Greenbelt wooded areas and watercourses. MODERATE NET EFFECT	• Alternative fairly related to landscape • Few commercial/industrial facilities are located under the west end of this alternative. • Potential vistas of the Greenbelt wooded areas and watercourses. MODERATE NET EFFECT
	RANKING: 3rd	**RANKING: 1st**	**RANKING: 2nd**

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4 Summary of Potential Net Effects and Ranking	Alternative S8-5
	Less aligned with the topography, this alternative affects existing residential clusters to the south, and several industrial and commercial uses will be affected.	S8-4 is preferred as it is better aligned with the topography, although several industrial and commercial uses affected.	Less aligned with the topography, with few industrial and commercial uses affected.
3.0 Cultural Environment			
3.1 Built Heritage and Cultural Heritage Landscapes			
3.1.1 Built Heritage Resources	• There are five (5) listed BHRs (BHR 235, BHR 236, BHR 242, BHR 244, BHR 245) and one (1) potential BHR (BHR 250) affected by this alternative HIGH NET EFFECT	• There are four (4) listed BHRs (BHR 238, BHR 242, BHR 244, BHR 245), two (2) potential BHRs (BHR 239, BHR 250), and one (1) Designated BHR (BHR 237) affected by this alternative. HIGH NET EFFECT	• There are four (4) listed BHRs (BHR 238, BHR 242, BHR 244, BHR 245), two (2) potential BHRs (BHR 239, BHR 250), and one (1) Designated BHR (BHR 237) affected by this alternative. HIGH NET EFFECT
	RANKING: 1st There are five (5) listed BHRs and one (1) potential BHR affected by this alternative which will require further evaluation in order to determine their Cultural Heritage Value and Interest. Once Cultural Heritage Value and Interest has been determined, avoidance, protection and mitigation measures must be completed.	**RANKING: 1st** There are four (4) listed BHRs, two (2) potential BHRs, and one (1) Designated BHR affected by this alternative which will require further evaluation in order to determine their Cultural Heritage Value and Interest. Once Cultural Heritage Value and Interest has been determined, avoidance, protection and mitigation measures must be completed.	**RANKING: 1st** There are four (4) listed BHRs, two (2) potential BHRs, and one (1) Designated BHR affected by this alternative which will require further evaluation in order to determine their Cultural Heritage Value and Interest. Once Cultural Heritage Value and Interest has been determined, avoidance, protection and mitigation measures must be completed.
3.1.2 Heritage Bridges	• There are no Heritage Bridges affected by this alternative NO NET EFFECT	• There are no Heritage Bridges affected by this alternative NO NET EFFECT	• There are no Heritage Bridges affected by this alternative NO NET EFFECT
	RANKING: 1st There are no Heritage Bridges affected by this alternative.	**RANKING: 1st** There are no Heritage Bridges affected by this alternative.	**RANKING: 1st** There are no Heritage Bridges affected by this alternative.
3.1.3 Cultural Heritage Landscapes	• There are two (2) listed (CHL 241 and CHL 243) CHLs affected by this alternative. MODERATE NET EFFECT	• There are two (2) listed (CHL 241, CHL 243) CHLs affected by this alternative. MODERATE NET EFFECT	• There are two (2) listed (CHL 241, CHL 243) CHLs affected by this alternative. MODERATE NET EFFECT
	RANKING: 1st There are two (2) listed CHLs affected by this alternative which will require further evaluation in order to determine its Cultural Heritage Value and Interest. Once Cultural Heritage Value and Interest has been determined, avoidance, protection and mitigation measures must be completed.	**RANKING: 1st** There are two (2) listed CHLs affected by this alternative which will require further evaluation in order to determine its Cultural Heritage Value and Interest. Once Cultural Heritage Value and Interest has been determined, avoidance, protection and mitigation measures must be completed.	**RANKING: 1st** There are two (2) listed CHLs affected by this alternative which will require further evaluation in order to determine its Cultural Heritage Value and Interest. Once Cultural Heritage Value and Interest has been determined, avoidance, protection and mitigation measures must be completed.
3.2 Archaeology			

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4	Alternative S8-5
		Summary of Potential Net Effects and Ranking	
3.2.1 Pre-Contact and Contact Indigenous Archaeological Sites	• No registered sites, however archaeological potential is present within 189 hectares of this alternative LOW NET EFFECT	• There are five (5) registered pre-contact or contact Indigenous Archaeological sites (AlGv-399, AlGv-79, AlGv-80, AlGv-81 and findspot NDFS-0049) within this alternative. No further work is required on NDFS-0049. Archaeological potential is present within 235 hectares of this alternative MODERATE NET EFFECT	• There are three (3) registered pre-contact or contact Indigenous Archaeological sites (AlGv-67, AlGv-79, AlGv-80) within this alternative. Archaeological potential is present within 227 hectares of this alternative MODERATE NET EFFECT
	RANKING: 1st No registered pre-contact and contact Indigenous sites are present within this alternative. This alternative contains 189 hectares of undisturbed land containing archaeological potential.	**RANKING: 2nd** There are five (5) registered pre-contact or contact Indigenous Archaeological sites (AlGv-399, AlGv-79, AlGv-80, AlGv-81 and findspot NDFS-0049) within this alternative. No further work is required on NDFS-0049. Archaeological potential is present within 235 hectares of this alternative.	**RANKING: 2nd** There are three (3) registered pre-contact or contact Indigenous Archaeological sites (AlGv-67, AlGv-79, AlGv-80) within this alternative. Archaeological potential is present within 227 hectares of this alternative.
3.2.2 Historic Euro-Canadian Archaeological Sites	• No registered sites, however archaeological potential is present within 189 hectares of this alternative. LOW NET EFFECT	• There is one (1) registered archaeological site (AlGw-188), although the site has no further work required as it has been cleared. Archaeological potential is also present within 235 hectares of this alterative. LOW NET EFFECT	• There are no registered Euro-Canadian Archaeological sites within this alternative. However archaeological potential is present within 227 hectares of this alternative. LOW NET EFFECT
	RANKING: 1st No difference between alternatives.	**RANKING: 1st** No difference between alternatives.	**RANKING: 1st** No difference between alternatives.
3.2.3 Indigenous Burial Sites	• No known or reported Indigenous Burial Sites NO NET EFFECT	• No known or reported Indigenous Burial Sites NO NET EFFECT	• No known or reported Indigenous Burial Sites NO NET EFFECT
	RANKING: 1st No difference between alternatives.	**RANKING: 1st** No difference between alternatives.	**RANKING: 1st** No difference between alternatives.
3.2.4 Cemeteries	• No cemeteries present within this alternative NO NET EFFECT	• No cemeteries present within this alternative NO NET EFFECT	• No cemeteries present within this alternative NO NET EFFECT
	RANKING: 1st No difference between alternatives.	**RANKING: 1st** No difference between alternatives.	**RANKING: 1st** No difference between alternatives.
4.0 Transportation			
4.1 System Capacity & Efficiency			
4.1.1 Movement of People	• 706,000 auto vehicle km • 2,937,000 auto vehicle km • 86% better than LOS D (80% in base without GTAW) • 68% better than LOS (60% in base without GTAW) • Improves connections to existing and planned urban centres. • Improves connections to transitway from urban centres, mobility hubs, and other transit services. • Improved transportation options for travellers. • GTA West – 5.8 km, MODERATE CAPACITY & EFFICIENCY	• 706,000 auto vehicle km • 2,937,000 auto vehicle km • 86% better than LOS D (80% in base without GTAW) • 68% better than LOS (60% in base without GTAW) • Improves connections to existing and planned urban centres. • Improves connections to transitway from urban centres, mobility hubs, and other transit services. • Improved transportation options for travellers. • GTA West – 5.8 km, MODERATE CAPACITY & EFFICIENCY	• 706,000 auto vehicle km • 2,937,000 auto vehicle km • 86% better than LOS D (80% in base without GTAW) • 68% better than LOS (60% in base without GTAW) • Improves connections to existing and planned urban centres. • Improves connections to transitway from urban centres, mobility hubs, and other transit services. • Improved transportation options for travellers. • GTA West – 5.8 km, MODERATE CAPACITY & EFFICIENCY
	RANKING: 1st	**RANKING: 1st**	**RANKING: 1st**

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4	Alternative S8-5
		Summary of Potential Net Effects and Ranking	
	All alternatives have similar people movements.	All alternatives have similar people movements.	All alternatives have similar people movements.
4.1.2 Movement of Goods	• GTAW (East of Hwy 27) - 390 vehicles • 52,000 truck vehicle km • 255,000 truck vehicle km • 85% better than LOS D (78%) • 69% better than LOS D (62%) • Supports connections to existing and planned freight trip generators MODERATE CAPACITY & EFFICIENCY	• GTAW (East of Hwy 27) - 390 vehicles • 52,000 truck vehicle km • 255,000 truck vehicle km • 85% better than LOS D (78%) • 69% better than LOS D (62%) • Supports connections to existing and planned freight trip generators MODERATE CAPACITY & EFFICIENCY	• GTAW (East of Hwy 27) - 390 vehicles • 52,000 truck vehicle km • 255,000 truck vehicle km • 85% better than LOS D (78%) • 69% better than LOS D (62%) • Supports connections to existing and planned freight trip generators MODERATE CAPACITY & EFFICIENCY
	RANKING: 1st All alternatives have similar goods movements.	**RANKING: 1st** All alternatives have similar goods movements.	**RANKING: 1st** All alternatives have similar goods movements.
4.1.3 System performance during peak periods	• South of King St - 0.79 • North of Teston Rd / Nashville Rd - 0.52 • West of Hwy 27 - 0.67 • East of Hwy 27 - 0.65 • GTAW (West of Hwy 27) – 0.96 • GTAW (East of Hwy 27) – 0.83 • Hwy 27 (South of King St) - 0.86 • Hwy 27 (North of Kirby Rd) - 0.60 • Hwy 27 (North of Teston Rd / Nashville Rd) - 0.71 • Islington Ave (North of Teston Rd / Nashville Rd) - 0.41 • Supports potential demand management strategies and travel demand supportive measures MODERATE CAPACITY & EFFICIENCY	• South of King St - 0.79 • North of Teston Rd / Nashville Rd - 0.52 • West of Hwy 27 - 0.67 • East of Hwy 27 - 0.65 • GTAW (West of Hwy 27) – 0.96 • GTAW (East of Hwy 27) – 0.83 • Hwy 27 (South of King St) - 0.86 • Hwy 27 (North of Kirby Rd) - 0.60 • Hwy 27 (North of Teston Rd / Nashville Rd) - 0.71 • Islington Ave (North of Teston Rd / Nashville Rd) - 0.41 • Supports potential demand management strategies and travel demand supportive measures MODERATE CAPACITY & EFFICIENCY	• South of King St - 0.79 • North of Teston Rd / Nashville Rd - 0.52 • West of Hwy 27 - 0.67 • East of Hwy 27 - 0.65 • GTAW (West of Hwy 27) – 0.96 • GTAW (East of Hwy 27) – 0.83 • Hwy 27 (South of King St) - 0.86 • Hwy 27 (North of Kirby Rd) - 0.60 • Hwy 27 (North of Teston Rd / Nashville Rd) - 0.71 • Islington Ave (North of Teston Rd / Nashville Rd) - 0.41 • Supports potential demand management strategies and travel demand supportive measures MODERATE CAPACITY & EFFICIENCY
	RANKING: 1st All alternatives have same performance during peak periods.	**RANKING: 1st** All alternatives have same performance during peak periods.	**RANKING: 1st** All alternatives have same performance during peak periods.
4.2 System reliability / redundancy	• Good opportunity for redundancy on the local road network. HIGH RELIABILITY / REDUNDANCY	• Good opportunity for redundancy on the local road network. HIGH RELIABILITY / REDUNDANCY	• Good opportunity for redundancy on the local road network. HIGH RELIABILITY / REDUNDANCY
	RANKING: 1st All alternatives have similar reliability / redundancy.	**RANKING: 1st** All alternatives have similar reliability / redundancy.	**RANKING: 1st** All alternatives have similar reliability / redundancy.
4.3 Safety			
4.3.1 Traffic Safety	• Good opportunity for traffic safety on the local road network. HIGH POTENTIAL FOR IMPROVEMENT	• Good opportunity for traffic safety on the local road network. HIGH POTENTIAL FOR IMPROVEMENT	• Good opportunity for traffic safety on the local road network. HIGH POTENTIAL FOR IMPROVEMENT
	RANKING: 1st All alternatives have similar improvements to traffic safety.	**RANKING: 1st** All alternatives have similar improvements to traffic safety.	**RANKING: 1st** All alternatives have similar improvements to traffic safety.
4.3.2 Emergency Access	• High potential for improved access without reductions to existing access. HIGH ACCESS	• High potential for improved access without reductions to existing access. HIGH ACCESS	• High potential for improved access without reductions to existing access. HIGH ACCESS
	RANKING: 1st	**RANKING: 1st**	**RANKING: 1st**

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4	Alternative S8-5
		Summary of Potential Net Effects and Ranking	
	All alternatives have similar improvements to emergency access.	All alternatives have similar improvements to emergency access.	All alternatives have similar improvements to emergency access.
4.4 Mobility & Accessibility			
4.4.1 Modal integration and balance	• Good opportunity for intermodal connections at transitway stations and carpool lots. HIGH POTENTIAL FOR IMPROVEMENT	• Good opportunity for intermodal connections at transitway stations and carpool lots. HIGH POTENTIAL FOR IMPROVEMENT	• Good opportunity for intermodal connections at transitway stations and carpool lots. HIGH POTENTIAL FOR IMPROVEMENT
	RANKING: 1st All alternatives have similar modal improvements.	**RANKING: 1st** All alternatives have similar modal improvements.	**RANKING: 1st** All alternatives have similar modal improvements.
4.4.2 Linkages to Population and Employment Centres	• Improved access to future employment lands. MODERATE ACCESSIBILITY	• Improved access to future employment lands. MODERATE ACCESSIBILITY	• Improved access to future employment lands. MODERATE ACCESSIBILITY
	RANKING: 1st All alternatives have similar linkages to population and employment centres.	**RANKING: 1st** All alternatives have similar linkages to population and employment centres.	**RANKING: 1st** All alternatives have similar linkages to population and employment centres.
4.4.3 Recreation and Tourism Travel	• High support for inter-regional connections. HIGH SUPPORT	• High support for inter-regional connections. HIGH SUPPORT	• High support for inter-regional connections. HIGH SUPPORT
	RANKING: 1st All alternatives have similar connections to recreation and tourism sites.	**RANKING: 1st** All alternatives have similar connections to recreation and tourism sites.	**RANKING: 1st** All alternatives have similar connections to recreation and tourism sites.
4.4.4 Accommodation for pedestrians, cyclists, snowmobiles, and specialized vehicles	• Maintains all existing roads crossing the future corridor HIGH ACCOMMODATION	• Maintains all existing roads crossing the future corridor HIGH ACCOMMODATION	• Maintains all existing roads crossing the future corridor HIGH ACCOMMODATION
	RANKING: 1st All alternatives have similar accommodations for pedestrians, cyclists, snowmobiles, and specialized vehicles.	**RANKING: 1st** All alternatives have similar accommodations for pedestrians, cyclists, snowmobiles, and specialized vehicles.	**RANKING: 1st** All alternatives have similar accommodations for pedestrians, cyclists, snowmobiles, and specialized vehicles.
4.5 Network Compatibility			
4.5.1 Network connectivity	• High potential for improved connectivity to/from the Study Area HIGH CONNECTIVITY	• High potential for improved connectivity to/from the Study Area HIGH CONNECTIVITY	• High potential for improved connectivity to/from the Study Area HIGH CONNECTIVITY
	RANKING: 1st All alternatives have similar connectivity to local network.	**RANKING: 1st** All alternatives have similar connectivity to local network.	**RANKING: 1st** All alternatives have similar connectivity to local network.
4.5.2 Flexibility for future expansion	• Opportunities to expand freeway and transitway within the proposed right-of-way HIGH FLEXIBILITY	• Opportunities to expand freeway and transitway within the proposed right-of-way HIGH FLEXIBILITY	• Opportunities to expand freeway and transitway within the proposed right-of-way HIGH FLEXIBILITY
	RANKING: 1st All alternatives have similar flexibility for future expansion.	**RANKING: 1st** All alternatives have similar flexibility for future expansion.	**RANKING: 1st** All alternatives have similar flexibility for future expansion.
4.6 Engineering			
4.6.1 Constructability	• Significant constructability issues related to the crossing of the Humber Valley and associated tributaries. This alternative falls into the middle in terms of combined structure length (~1,120 m). Length of crossing and number of piers in deep river valley will contribute to constructability issues.	• Significant constructability issues related to the crossing of the Humber Valley and associated tributaries. This alternative falls into a higher range in terms of combined structure length (~1,500 m). Length of crossing and number of piers in deep river valley will contribute to more significant constructability issues.	• Significant constructability issues related to the crossing of the Humber Valley and associated tributaries. This alternative falls into the middle in terms of combined structure length (~1,250 m). Length of crossing and number of piers in deep river valley will contribute to constructability issues.

Evaluation Factors and Sub-Factors	Alternative S8-3 (2019 Preferred)	Alternative S8-4	Alternative S8-5
		Summary of Potential Net Effects and Ranking	
	MODERATE POTENTIAL FOR CONSTRUCTABILITY ISSUES	HIGH POTENTIAL FOR CONSTRUCTABILITY ISSUES	MODERATE POTENTIAL FOR CONSTRUCTABILITY ISSUES
	RANKING: 1st All alternatives have similar constructability issues, but ranking also based on length of structure and location of crossing.	**RANKING: 3rd** All alternatives have similar constructability issues, but ranking also based on length of structure and location of crossing.	**RANKING: 1st** All alternatives have similar constructability issues, but ranking also based on length of structure and location of crossing.
4.6.2 Compliance with design criteria	• Conforms to design criteria HIGH CONFORMITY	• Conforms to design criteria HIGH CONFORMITY	• Conforms to design criteria HIGH CONFORMITY
	RANKING: 1st All alternatives comply with design criteria.	**RANKING: 1st** All alternatives comply with design criteria.	**RANKING: 1st** All alternatives comply with design criteria.
4.7 Construction Cost	• Estimated Cost – 373 M dollars ○ The cost estimates assume that the Humber River crossings are multi-span, using short-to-medium span lengths (i.e., girder-type structures). Long-span structures (i.e., greater than 50 m spans such as concrete segmental, variable depth steel girder, cable-type bridges) can be assessed further in preliminary design to mitigate impacts in the river valleys; construction costs would greatly increase depending on required span lengths and structure types. LOW RELATIVE COST	• Estimated Cost – 460 M dollars ○ The cost estimates assume that the Humber River crossings are multi-span, using short-to-medium span lengths (i.e., girder-type structures). Long-span structures (i.e., greater than 50 m spans such as concrete segmental, variable depth steel girder, cable-type bridges) can be assessed further in preliminary design to mitigate impacts in the river valleys; construction costs would greatly increase depending on required span lengths and structure types. HIGH RELATIVE COST	• Estimated Cost – 403 M dollars ○ The cost estimates assume that the Humber River crossings are multi-span, using short-to-medium span lengths (i.e., girder-type structures). Long-span structures (i.e., greater than 50 m spans such as concrete segmental, variable depth steel girder, cable-type bridges) can be assessed further in preliminary design to mitigate impacts in the river valleys; construction costs would greatly increase depending on required span lengths and structure types. LOW RELATIVE COST
	RANKING: 1st	**RANKING: 3rd**	**RANKING: 1st**
4.8 Traffic Operations	• Low potential of reduced traffic operations LOW POTENTIAL FOR NEGATIVE EFFECT	• Low potential of reduced traffic operations LOW POTENTIAL FOR NEGATIVE EFFECT	• Low potential of reduced traffic operations LOW POTENTIAL FOR NEGATIVE EFFECT
	RANKING: 1st All alternatives have similar effects on traffic operations.	**RANKING: 1st** All alternatives have similar effects on traffic operations.	**RANKING: 1st** All alternatives have similar effects on traffic operations.