

**Seaton Roads (Phases 3-4)  
Class EA Study**

**Section 3, Study Area Background**

**NHS Roads Crossing Checklists**

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

ROADS CHECKLIST FOR NHS ROAD CROSSING 11 SIDELINE 24 - TYPE C ARTERIAL ROAD, GANATSEKIAGON CREEK REACH GA14			
Criterion	Site Specific Assessment Direction (MESPA, 2013)	Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 16)	2015-2017 Updates for Class EA Study <sup>1</sup>
<p><i>Overview of Conditions in Vicinity:</i></p> <ul style="list-style-type: none"> <li>Road alignment crosses three vegetation communities with varying conditions:               <ul style="list-style-type: none"> <li>~300m of agriculture south of creek crossing, located east of existing road allowance to avoid wetland feature</li> <li>~60m swath across creek, exhibiting cattail shallow marsh and a few fenceline trees</li> <li>~140m through fenceline trees in unopened road right of way northwest of crossing</li> </ul> </li> <li>Relatively flat, no valley definition</li> <li>Ephemeral, cold water stream</li> <li>Existing dam and farm lane upstream (south-southwest) of proposed alignment</li> </ul>			
1. Hydraulics	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Minimum hydraulic opening size of 5.0m x 1.5m is required</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
2. Fluvial Geomorphology	<ul style="list-style-type: none"> <li>Required</li> <li>SWMF to discharge in vicinity</li> </ul>	<ul style="list-style-type: none"> <li>Stormwater pond #10. Discharges on upstream side (west) of the crossing</li> <li>Crossing located at a swale</li> <li>No geomorphologic hazard was observed</li> <li>Crossing size should consider hydraulic and terrestrial passage criteria</li> </ul>	<ul style="list-style-type: none"> <li>No change to NFSSR recommendation required (Beacon)</li> </ul>
3. Stormwater Management Requirements	<ul style="list-style-type: none"> <li>Required</li> <li>Runoff from crossing not to enter either channel system directly</li> </ul>	<ul style="list-style-type: none"> <li>Run off cannot be directed to stormwater pond #10 due to grades</li> <li>OGS and LID measures (infiltration) for quality</li> <li>Potential for stormwater management within mixed use block on north side of Taunton Road discharging to reach GA8-1</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> <li>Determine stormwater management at detailed design</li> </ul>
4. Fisheries	<ul style="list-style-type: none"> <li>Open bottom structure required</li> <li>Existing upstream dam and farm lane to be removed</li> </ul>	<ul style="list-style-type: none"> <li>Detailed design to include open bottom</li> <li>Fisheries study concluded no direct fish habitat</li> <li>Removals of existing dam to be completed as part of overall fisheries compensation plan</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
5. Geotechnical and Hydrogeology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Sandy silt to silty sand soils</li> <li>Groundwater elevations ~0.3 to 0.6m below ground</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
6. Wildlife Passage	<ul style="list-style-type: none"> <li>Design for herptile and small mammal passage</li> <li>Non-woody vegetation for 3m on each side of travelled surface on both sides of channel crossing structure</li> </ul>	<ul style="list-style-type: none"> <li>Ecological study completed</li> <li>Terrestrial bench of 1m minimum required</li> </ul>	<ul style="list-style-type: none"> <li>Channel crossing structure sizing specifications to be finalized at detailed design</li> </ul>
7. Vegetation Management	<ul style="list-style-type: none"> <li>Restoration of immediate vicinity</li> </ul>	<ul style="list-style-type: none"> <li>Restoration plans to be provided for detailed design</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
8. Species at Risk	<ul style="list-style-type: none"> <li>Not applicable at this time</li> </ul>	<ul style="list-style-type: none"> <li>Two immature butternuts in this location - under audit by MNRF</li> </ul>	<p><b>Redside Dace</b> Contributing Habitat</p>

<sup>1</sup> Sources: Geomorphic Assessment and Conceptual Design Recommendation Report, Beacon, 2017 and Natural Heritage Letter Report, RJ Burnside, 2017

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 11 SIDELINE 24 - TYPE C ARTERIAL ROAD, GANATSEKIAGON CREEK REACH GA14</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 16)</b>	<b>2015-2017 Updates for Class EA Study<sup>1</sup></b>
			<p><b>Butternut:</b> Overall Benefit Plan (Bird and Hale 2015) – includes planting and monitoring requirements, as well as implementation per landowner. Two non-retainable butternut within proposed grading limit. Two other non-retainable trees within 25 m of proposed grading limit. Confirmation of absence of Species At Risk required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met</p> <p><b>Bobolink – Eastern Meadowlark</b> – refer to Development Plan – Bobolink and Eastern Meadowlark Habitat (Bird and Hale) – May 2015 – provides all of the requisite information as mandated by Section 23.2 (3) of Ont. Reg. 242/08</p>
9. Road Design	<ul style="list-style-type: none"> <li>• Cross-section type (urban/rural) to be determined</li> </ul>	<ul style="list-style-type: none"> <li>• Rural cross-section possible on west side north of crossing subject to detailed design</li> <li>• Rural cross-section possible on both sides south of crossing</li> </ul>	<ul style="list-style-type: none"> <li>• Urban cross-section per updated plans approved by City and Region</li> </ul>
10. Natural Heritage System Trails	<ul style="list-style-type: none"> <li>• Trail/bike route within road allowance; intersection with NHS trail Identified along south limit of NHS; to be located for safe intersection with road</li> </ul>	<ul style="list-style-type: none"> <li>• Trails to be confirmed during detailed design</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>
Recommended Design Criteria	<ul style="list-style-type: none"> <li>• Summarize dimensions, key features</li> </ul>	<ul style="list-style-type: none"> <li>• Preferable to have one wide open bottom culvert rather than two narrow culverts</li> <li>• Hydraulics dictates opening size of 5m x 1.5m</li> <li>• Terrestrial bench of 1m required</li> <li>• <b>Required opening size of 7.0m x1.5m with 1.0m terrestrial bench on either side of the creek</b></li> </ul>	<ul style="list-style-type: none"> <li>• Confirm at detailed design</li> </ul>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 12 SIDELINE 24 - TYPE C ARTERIAL ROAD, GANATSEKIAGON CREEK REACHES G13, G14</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 19)</b>	<b>2015-2017 Updates for Class EA Study<sup>2</sup></b>
<p><i>Overview of Conditions in Vicinity:</i></p> <ul style="list-style-type: none"> <li>• ~775m through fenceline trees in road right of way               <ul style="list-style-type: none"> <li>- South of crossing area (~380m length), agriculture on both sides of treed right of way within NHS</li> <li>- North of crossing area (~300m length), agriculture on east side of treed right of way, outside NHS, and valley of Reach G14 to west; road ~parallels Reach G14 to west</li> <li>- Vicinity of crossing exhibits similar conditions to fenceline conditions, meadow marsh conditions to west</li> </ul> </li> <li>• Crosses creek at G13-G14 reach break</li> <li>• Valley unconfined, some valley definition to east of crossing</li> <li>• Ephemeral, cold water stream with aquatic habitat value ranging from Important to Critical</li> <li>• Existing farm lane within right of way with creek crossing</li> </ul>			
1. Hydraulics	<ul style="list-style-type: none"> <li>• Required</li> </ul>	<ul style="list-style-type: none"> <li>• Minimum hydraulic opening size of 4.0m by 1.5m is required</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>
2. Fluvial Geomorphology	<ul style="list-style-type: none"> <li>• Required</li> <li>• SWMF to discharge upstream of crossing</li> </ul>	<ul style="list-style-type: none"> <li>• Stormwater pond 22a discharges approximately 75m upstream of the crossing</li> <li>• Assessment completed; crossing located on an existing meander with amplitude of 10m</li> <li>• A crossing width of 15m is recommended</li> </ul>	<ul style="list-style-type: none"> <li>• 15.5 m measured meander amplitude in the vicinity of the crossing (2015)</li> <li>• Revised minimum crossing size of 19 m (meander amplitude plus average bankfull width) is recommended</li> </ul>
3. Stormwater Management Requirements	<ul style="list-style-type: none"> <li>• Required</li> <li>• Runoff from crossing not to enter either channel system directly</li> </ul>	<ul style="list-style-type: none"> <li>• Runoff cannot be directed to stormwater pond due to grades</li> <li>• OGS and LID measures (infiltration) for quality</li> <li>• Potential for over control for stormwater pond 22a for quantity</li> </ul>	<ul style="list-style-type: none"> <li>• Potential for over-control no longer indicated at stormwater management pond 22a</li> </ul>
4. Fisheries	<ul style="list-style-type: none"> <li>• Open bottom structure required</li> <li>• Existing creek crossing to be removed</li> </ul>	<ul style="list-style-type: none"> <li>• Fish (creek chub) observed in existing plunge pool; no fish observed upstream of the existing farm crossing</li> <li>• Detailed design to include Open bottom</li> <li>• Removals of existing barriers to be completed as part of overall fisheries compensation plan</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>
5. Geotechnical and Hydrogeology	<ul style="list-style-type: none"> <li>• Required</li> </ul>	<ul style="list-style-type: none"> <li>• Silty sand, sandy silt soils</li> <li>• Groundwater elevations approximately 3-5m below ground</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>
6. Wildlife Passage	<ul style="list-style-type: none"> <li>• Crossing opening to be designed for medium-sized mammals and herptile connectivity</li> <li>• Non-woody vegetation for 3m</li> </ul>	<ul style="list-style-type: none"> <li>• Ecological study completed</li> <li>• Terrestrial bench of minimum 1.5m width and 1-1.2m height required</li> </ul>	<ul style="list-style-type: none"> <li>• Channel crossing structure sizing specifications to be finalized at detailed design</li> </ul>

<sup>2</sup> Sources: Geomorphic Assessment and Conceptual Design Recommendation Report, Beacon, 2017 and Natural Heritage Letter Report, RJ Burnside, 2017

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 12 SIDELINE 24 - TYPE C ARTERIAL ROAD, GANATSEKIAGON CREEK REACHES G13, G14</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 19)</b>	<b>2015-2017 Updates for Class EA Study<sup>2</sup></b>
	<ul style="list-style-type: none"> <li>on each side of travelled surface on both sides of channel crossing structure, south of crossing</li> <li>Road design south of crossing to enhance safe terrestrial wildlife passage, taking into consideration that west side will transition to woodland and east side will be managed as grassland</li> <li>Road design north of crossing to discourage wildlife movement from west of road</li> </ul>		
7. Vegetation Management	<ul style="list-style-type: none"> <li>Restoration of immediate vicinity of crossing</li> </ul>	<ul style="list-style-type: none"> <li>Restoration plans to be provided for detailed design</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
8. Species at Risk	<ul style="list-style-type: none"> <li>Redside dace recovery reach</li> </ul>	<ul style="list-style-type: none"> <li>Endangered Species Act regulations apply; permit to be obtained during detailed design</li> <li>Two immature butternuts identified in ecological study; under audit by MNRF</li> </ul>	<p><b>Redside Dace:</b> Occupied Habitat</p> <p><b>Butternut:</b> Overall Benefit Plan (Bird and Hale 2015) – includes planting and monitoring requirements, as well as implementation per landowner. Three retainable butternut trees within proposed grading limit. One additional retainable butternut tree within 25 m of grading limit. Confirmation of absence of Species At Risk required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met</p> <p><b>Bobolink – Eastern Meadowlark</b> – refer to Development Plan – Bobolink and Eastern Meadowlark Habitat (Bird and Hale) – May 2015 – provides all of the requisite information as mandated by Section 23.2 (3) of Ont. Reg. 242/08</p>
9. Road Design	<ul style="list-style-type: none"> <li>Cross-section type (urban/rural) to be determined</li> <li>Opportunity for rural cross-</li> </ul>	<ul style="list-style-type: none"> <li>Rural cross-section possible on west side north of crossing subject to detailed</li> </ul>	<ul style="list-style-type: none"> <li>Urban cross-section per updated plans approved by City</li> </ul>

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<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 12 SIDELINE 24 - TYPE C ARTERIAL ROAD, GANATSEKIAGON CREEK REACHES G13, G14</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 19)</b>	<b>2015-2017 Updates for Class EA Study<sup>2</sup></b>
	section south of crossing	design • Rural cross-section possible on both sides south of crossing	and Region
10. Natural Heritage System Trails	<ul style="list-style-type: none"> <li>Trail/bike route within road allowance;</li> <li>Three intersections with NHS trail: both north and south of the road a NHS trail intersects with the easterly side of the road; at the southern limit of the NHS, the trail crosses the road where a safe crossing of road required</li> </ul>	<ul style="list-style-type: none"> <li>Trails to be confirmed during detailed design</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
Recommended Design Criteria	<ul style="list-style-type: none"> <li>Summarize dimensions, key features</li> </ul>	<ul style="list-style-type: none"> <li>Preferable to have one open bottom culvert rather than two narrower culverts</li> <li>Meander belt dictates crossing width of 15m</li> <li>Terrestrial dictates crossing height of 1.5m</li> <li>Terrestrial bench required of 1.5m</li> <li>Required opening size of 15.0m by 1.5m with a 1.5m terrestrial bench on either side of creek</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 2 EAST-WEST RESIDENTIAL ARTERIAL ROAD, GANATSEKIAGON CREEK REACHES GB7, GB8</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013) (MESPA)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 19,)</b>	<b>2015-2017 Updates for Class EA Study<sup>3</sup></b>
<b>Overview of Conditions in Vicinity</b>			
<ul style="list-style-type: none"> <li>Entire length through NHS ~ 110m</li> <li>Forested area ~ 40m width with agriculture on both sides</li> <li>Relatively flat, no valley definition</li> <li>Ephemeral cool water stream; proposed to cross GB7 with bankfull width that averages 1.5-4.6m; bankfull depth averages 0.2-0.35m (if moved farther north, would cross GB8, which would be wider) Ephemeral cool water stream; proposed to cross GB8 with bankfull width that averages 3m; bankfull depth averages 0.2-0.25m</li> </ul>			
1. Hydraulics	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary sizing of 53m – 12.81m (W) x 3.05m (H) open space crossing</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
2. Fluvial Geomorphology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Completed, recommended opening of 12.81m (W) x 3.05m (H)</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
3. Stormwater Management Requirements	<ul style="list-style-type: none"> <li>Required</li> <li>Runoff from crossing not to enter channel system directly</li> </ul>	<ul style="list-style-type: none"> <li>Runoff directed to stormwater pond</li> </ul>	<ul style="list-style-type: none"> <li>Potential for stormwater management quantity control</li> </ul>

<sup>3</sup> Sources: Geomorphic Assessment and Conceptual Design Recommendation Report, Beacon, 2017 and Natural Heritage Letter Report, RJ Burnside, 2017

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 2 EAST-WEST RESIDENTIAL ARTERIAL ROAD, GANATSEKIAGON CREEK REACHES GB7, GB8</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013) (MESPA)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 19,)</b>	<b>2015-2017 Updates for Class EA Study<sup>3</sup></b>
			at stormwater management pond #40
4. Fisheries	<ul style="list-style-type: none"> <li>Open bottom structure required</li> <li>Remove existing farm crossing</li> </ul>	<ul style="list-style-type: none"> <li>Detailed design to include open bottom structure</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
5. Geotechnical and Hydrogeology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Approximate groundwater elevations 195-197 (MASL) and soil conditions are silty sand to sandy silt till</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
6. Wildlife Passage	<ul style="list-style-type: none"> <li>Design for herptile and medium-sized mammal passage</li> <li>Non-woody vegetation for 3m on each side of travelled surface on both sides of channel crossing structure</li> </ul>	<ul style="list-style-type: none"> <li>Ecological study completed refer to Appendix J</li> </ul>	<ul style="list-style-type: none"> <li>Channel crossing structure sizing specifications to be finalized at detailed design</li> </ul>
7. Vegetation Management	<ul style="list-style-type: none"> <li>Trees to be removed; edge management required</li> <li>Restoration of immediate vicinity</li> </ul>	<ul style="list-style-type: none"> <li>Edge management plans and restoration plans to be provided at detailed design</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
8. Species at Risk	<ul style="list-style-type: none"> <li>Redside dace recovery reach</li> </ul>	<ul style="list-style-type: none"> <li>Open bottom structure proposed, further information to be provided at detailed design</li> </ul>	<p><b>Redside Dace:</b> Contributing Habitat</p> <p><b>Butternut:</b> Overall Benefit Plan (Bird and Hale 2015) – includes planting and monitoring requirements, as well as implementation per landowner. No butternut within the vicinity of this crossing. Confirmation of absence of Species At Risk required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met</p> <p><b>Bobolink – Eastern Meadowlark – refer to Development Plan – Bobolink and Eastern Meadowlark Habitat (Bird and Hale) – May 2015 – provides all of the requisite information as mandated by Section 23.2 (3) of Ont. Reg. 242/08</b></p>
9. Road Design	<ul style="list-style-type: none"> <li>Urban cross-section</li> </ul>	<ul style="list-style-type: none"> <li>Refer to Figure 8.2 (NFSSR) for additional crossing details</li> </ul>	<ul style="list-style-type: none"> <li>Urban cross-section per updated plans</li> </ul>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 2 EAST-WEST RESIDENTIAL ARTERIAL ROAD, GANATSEKIAGON CREEK REACHES GB7, GB8</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013) (MESPA)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 19,)</b>	<b>2015-2017 Updates for Class EA Study<sup>3</sup></b>
			approved by City and Region
10. Natural Heritage System Trails	<ul style="list-style-type: none"> <li>Trail/bike route within road allowance</li> <li>Intersection with NHS trail Identified along both east and west sides of the valley; to be located for safe intersection with road outside wooded valley or as an underpass</li> </ul>	<ul style="list-style-type: none"> <li>To be included in right of way in detailed design</li> </ul>	<ul style="list-style-type: none"> <li>Not applicable</li> </ul>
Recommended Design Criteria	<ul style="list-style-type: none"> <li>Summarize dimensions, key features</li> </ul>	<ul style="list-style-type: none"> <li>Open bottom, 12.8m wide x 3.05m high structure, includes one dry shoulder on either side of creek</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 3 EAST-WEST RESIDENTIAL ARTERIAL ROAD, GANATSEKIAGON CREEK REACHES G16, G16-1, G16-2</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhoods 18 &amp; 19)</b>	<b>2015-2017 Updates for Class EA Study<sup>4</sup></b>
<p><i>Overview of Conditions in Vicinity:</i></p> <ul style="list-style-type: none"> <li>Crosses Reach G16 and a small swale, Reaches G16-1 and G16-2 to the east; swale is in agricultural field</li> <li>G16 bankfull width averages 0.7m; bankfull depth averages 0.3m; N/A for headwater swale (G16-1 and G16-2)</li> <li>70 m of marsh, including creek, 85 m of wooded savannah and 60 m of agriculture</li> <li>Relatively flat, no valley definition</li> <li>Ephemeral, warm water stream (main); tributaries are swales Note: The swale is still in the NHS – does the design for the section of road immediately east of the culvert need to provide for conveyance of intermittent flow?</li> </ul>			
1. Hydraulics	<ul style="list-style-type: none"> <li>Required for main channel G16 and for G16-1</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary sizing of 25m-6m x 1m open bottom culvert at 0.7%</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
2. Fluvial Geomorphology	<ul style="list-style-type: none"> <li>Required for G16</li> </ul>	<ul style="list-style-type: none"> <li>Completed, recommended opening of 6 m</li> </ul>	<ul style="list-style-type: none"> <li>10.7 m measured meander amplitude</li> <li>NFSSR recommendation deemed sufficient, no change</li> </ul>
3. Stormwater Management Requirements	<ul style="list-style-type: none"> <li>Required</li> <li>Runoff from crossing not to enter either channel system directly</li> </ul>	<ul style="list-style-type: none"> <li>Runoff to be conveyed to conventional storm sewer system and directed to stormwater pond #38. Roadside bioswale recommended to the west of structure</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
4. Fisheries	<ul style="list-style-type: none"> <li>Open bottom structure(s) required</li> </ul>	<ul style="list-style-type: none"> <li>Open bottom structures proposed</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
5. Geotechnical and Hydrogeology	<ul style="list-style-type: none"> <li>Maintain cool-water baseflow contributions</li> </ul>	<ul style="list-style-type: none"> <li>Sandy silt till soils encountered, no structural concerns anticipated.</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>

<sup>4</sup> Sources: Geomorphic Assessment and Conceptual Design Recommendation Report, Beacon, 2017 and Natural Heritage Letter Report, RJ Burnside, 2017



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<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 3 EAST-WEST RESIDENTIAL ARTERIAL ROAD, GANATSEKIAGON CREEK REACHES G16, G16-1, G16-2</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhoods 18 &amp; 19)</b>	<b>2015-2017 Updates for Class EA Study<sup>4</sup></b>
		<ul style="list-style-type: none"> <li>Open bottom culvert proposed, external drainage maintained</li> </ul>	
6. Wildlife Passage	<ul style="list-style-type: none"> <li>On main channel, design opening for herptile and medium-sized mammal passage</li> <li>Non-woody vegetation for 3m on each side of travelled surface on both sides of channel crossing structure; may require removal of trees beyond valley limits</li> <li>West of crossing, address wildlife movement at grade</li> <li>Not required for Reach G16-1</li> </ul>	<ul style="list-style-type: none"> <li>Ecological study completed refer to Appendix J (N19 NFSSR)</li> </ul>	<ul style="list-style-type: none"> <li>Channel crossing structure sizing specifications to be finalized at detailed design</li> </ul>
7. Vegetation Management	<ul style="list-style-type: none"> <li>Trees to be removed west of crossing; edge management required</li> <li>Restoration of immediate vicinity of crossing</li> </ul>	<ul style="list-style-type: none"> <li>Restoration plans to be completed during detailed design</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
8. Species at Risk	<ul style="list-style-type: none"> <li>Redside dace recovery reach</li> </ul>	<ul style="list-style-type: none"> <li>Open bottom culvert proposed, further details as design/permitting stage</li> </ul>	<p><b>Redside Dace</b> Contributing Habitat (main channel, reach G16) <b>Butternut:</b> Overall Benefit Plan (Bird and Hale 2015) – includes planting and monitoring requirements, as well as implementation per landowner. No butternut within the vicinity of this crossing. Confirmation of absence of Species At Risk required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met <b>Bobolink – Eastern Meadowlark – refer to Development Plan – Bobolink and Eastern Meadowlark Habitat (Bird and Hale) – May 2015 – provides all of the requisite information as mandated by Section 23.2 (3) of</b></p>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 3 EAST-WEST RESIDENTIAL ARTERIAL ROAD, GANATSEKIAGON CREEK REACHES G16, G16-1, G16-2</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhoods 18 &amp; 19)</b>	<b>2015-2017 Updates for Class EA Study<sup>4</sup></b>
			Ont. Reg. 242/08
9. Road Design	<ul style="list-style-type: none"> <li>Cross-section type (urban/rural) to be determined</li> </ul>	<ul style="list-style-type: none"> <li>Urban cross-section in vicinity of channel crossing – roadside bioswales proposed</li> </ul>	<ul style="list-style-type: none"> <li>Urban cross-section per updated plans approved by City and Region</li> </ul>
10. Natural Heritage System Trails	<ul style="list-style-type: none"> <li>Trail/bike route within road allowance; intersection with NHS trail identified along east side of the valley; to be located for safe intersection with road outside wetland or as an underpass</li> </ul>	<ul style="list-style-type: none"> <li>Trails to be confirmed during detailed design</li> </ul>	Not applicable
Recommended Design Criteria	<ul style="list-style-type: none"> <li>Summarize dimensions, key features</li> </ul>	<ul style="list-style-type: none"> <li>Open bottom, 6.0m wide x 1.0 m high structure</li> </ul>	No change

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 4 EAST-WEST RESIDENTIAL ARTERIAL ROAD, WHITEVALE CREEK REACH W14</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 18)</b>	<b>2015-2017 Updates for Class EA Study<sup>5</sup></b>
<i>Overview of Conditions in Vicinity:</i>			
<ul style="list-style-type: none"> <li>Meadow marsh extends ~25m on each side of channel with a 30 m band of agriculture on each side (total crossing length ~110m)</li> <li>Relatively flat, no valley definition</li> <li>Ephemeral, warm water stream</li> <li>No defined channel form through meadow marsh</li> </ul>			
1. Hydraulics	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary sizing of 50m – two 1.9m x 1.4m arch culverts @ 2.0%</li> </ul>	No change
2. Fluvial Geomorphology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Geomorphic study completed. No re-design requirements noted</li> </ul>	No change to NFSSR recommendation required
3. Stormwater Management Requirements	<ul style="list-style-type: none"> <li>Required</li> <li>Runoff from crossing not to enter channel system directly</li> </ul>	<ul style="list-style-type: none"> <li>Runoff directed to stormwater pond #18</li> <li>Roadside LID measures can be provided</li> </ul>	Potential for quantity control identified at stormwater management pond #36
4. Fisheries	<ul style="list-style-type: none"> <li>Open bottom structure required</li> </ul>	<ul style="list-style-type: none"> <li>Detailed design to include open bottom</li> </ul>	No change
5. Geotechnical and Hydrogeology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Soil Engineers Ltd. Borehole No. 125. Silty clay, till soils. Dry borehole and High N-</li> </ul>	No change

<sup>5</sup> Sources: Geomorphic Assessment and Conceptual Design Recommendation Report, Beacon, 2017 and Natural Heritage Letter Report, RJ Burnside, 2017

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 4 EAST-WEST RESIDENTIAL ARTERIAL ROAD, WHITEVALE CREEK REACH W14</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 18)</b>	<b>2015-2017 Updates for Class EA Study<sup>5</sup></b>
		values.	
6. Wildlife Passage	<ul style="list-style-type: none"> <li>Design for herptile and medium-sized mammal passage</li> <li>Non-woody vegetation for 3m on each side of travelled surface on both sides of channel crossing structure</li> </ul>	<ul style="list-style-type: none"> <li>Ecological study to be completed</li> </ul>	Channel crossing structure sizing specifications to be finalized at detailed design
7. Vegetation Management	<ul style="list-style-type: none"> <li>Restoration of immediate vicinity of crossing structure</li> </ul>	<ul style="list-style-type: none"> <li>Restoration plans to be provided for detailed design</li> </ul>	No change
8. Species at Risk	<ul style="list-style-type: none"> <li>Not applicable at this time</li> </ul>	<ul style="list-style-type: none"> <li>None noted at this time</li> </ul>	<p>No change – watercourse is not classified as <b>Redside Dace</b> habitat  <b>Butternut:</b> Overall Benefit Plan (Bird and Hale 2015) – includes planting and monitoring requirements, as well as implementation per landowner. No butternut within the vicinity of this crossing.            Confirmation of absence of Species At Risk required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met  <b>Bobolink – Eastern Meadowlark – refer to</b> Development Plan – Bobolink and Eastern Meadowlark Habitat (Bird and Hale) – May 2015 – provides all of the requisite information as mandated by Section 23.2 (3) of Ont. Reg. 242/08</p>
9. Road Design	<ul style="list-style-type: none"> <li>Urban cross-section</li> </ul>	<ul style="list-style-type: none"> <li>Urban cross-section</li> </ul>	Urban cross-section per updated plans approved by City and Region
10. Natural Heritage System Trails	<ul style="list-style-type: none"> <li>Trail/bike route within road allowance; intersection with NHS trail Identified along east side of the valley; to be located for safe intersection with road</li> </ul>	<ul style="list-style-type: none"> <li>Trails to be confirmed during detailed design</li> </ul>	No change

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 4 EAST-WEST RESIDENTIAL ARTERIAL ROAD, WHITEVALE CREEK REACH W14</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 18)</b>	<b>2015-2017 Updates for Class EA Study<sup>5</sup></b>
	outside wetland or as an underpass		
Recommended Design Criteria	<ul style="list-style-type: none"> <li>Summarize dimensions, key features</li> </ul>	<ul style="list-style-type: none"> <li>To be finalized with wildlife passage input</li> </ul>	No change

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 9 EAST-WEST RESIDENTIAL ARTERIAL ROAD, WHITEVALE CREEK REACH WA9</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 18)</b>	<b>2015-2017 Updates for Class EA Study<sup>6</sup></b>
<i>Overview of Conditions in Vicinity:</i>			
<ul style="list-style-type: none"> <li>Crossing of creek will be through ~ 55m of willow lowland forest with a 30m band of agriculture on each side</li> <li>Bankfull width averages 0.6-2.2m; bankfull depth averages 0.1-0.15m</li> <li>Relatively flat, no valley definition</li> <li>Ephemeral, warm water stream</li> </ul>			
1. Hydraulics	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary sizing of 53m – three 2.1m x1.5m arch culvert at 1.5%</li> </ul>	No change
2. Fluvial Geomorphology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Geomorphic completed. Recommend minimum 7m wide open bottom</li> </ul>	No change to NFSSR recommendation required
3. Stormwater Management Requirements	<ul style="list-style-type: none"> <li>Required</li> <li>Runoff from crossing not to enter channel system directly</li> </ul>	<ul style="list-style-type: none"> <li>Runoff to be directed to stormwater pond #18 and #31</li> <li>Roadside LID measures can be provided</li> </ul>	Potential for quantity control identified at stormwater management pond #31
4. Fisheries	<ul style="list-style-type: none"> <li>Open bottom structure required</li> </ul>	<ul style="list-style-type: none"> <li>Detailed design to include open bottom</li> </ul>	No change
5. Geotechnical and Hydrogeology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Soil Engineers Ltd. Boreholes Nos. 117 and 130. Silty-clay, till soils. Dry borehole and high N-values</li> </ul>	No change
6. Wildlife Passage	<ul style="list-style-type: none"> <li>Design for herptile and small mammal passage, some funnelling/control to help contain wildlife within valley</li> </ul>	<ul style="list-style-type: none"> <li>Ecological study to be completed</li> </ul>	Channel crossing structure sizing specifications to be finalized at detailed design
7. Vegetation Management	<ul style="list-style-type: none"> <li>Trees to be removed; edge management required</li> <li>Restoration of immediate vicinity of crossing</li> </ul>	<ul style="list-style-type: none"> <li><b>no change</b></li> </ul>	Restoration plans to be provided at detailed design
8. Species at Risk	<ul style="list-style-type: none"> <li>Not applicable at this time</li> </ul>	<ul style="list-style-type: none"> <li>None noted at this time</li> </ul>	No change – watercourse is not classified as <b>Redside Dace</b>

<sup>6</sup> Sources: Geomorphic Assessment and Conceptual Design Recommendation Report, Beacon, 2017 and Natural Heritage Letter Report, RJ Burnside, 2017

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 9 EAST-WEST RESIDENTIAL ARTERIAL ROAD, WHITEVALE CREEK REACH WA9</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 18)</b>	<b>2015-2017 Updates for Class EA Study<sup>6</sup></b>
			<p>habitat</p> <p><b>Butternut:</b> Overall Benefit Plan (Bird and Hale 2015) – includes planting and monitoring requirements, as well as implementation per landowner. No butternut within the vicinity of this crossing. Confirmation of absence of Species At Risk required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met</p> <p><b>Bobolink – Eastern Meadowlark – refer to Development Plan – Bobolink and Eastern Meadowlark Habitat (Bird and Hale) – May 2015 – provides all of the requisite information as mandated by Section 23.2 (3) of Ont. Reg. 242/08</b></p>
9. Road Design	<ul style="list-style-type: none"> <li>Urban cross-section</li> </ul>	<ul style="list-style-type: none"> <li>Urban cross-section</li> </ul>	Urban cross-section per updated plans approved by City and Region
10. Natural Heritage System Trails	<ul style="list-style-type: none"> <li>Trail/bike route within road allowance; intersection with NHS trail Identified along west side of the valley; to be located for safe intersection with road outside woodland</li> </ul>	<ul style="list-style-type: none"> <li>Trails to be confirmed during detailed design</li> </ul>	No change
Recommended Design Criteria	<ul style="list-style-type: none"> <li>Summarize dimensions, key features</li> </ul>	<ul style="list-style-type: none"> <li>To be finalized with wildlife passage input</li> </ul>	No change

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 16 EMPLOYMENT COLLECTOR ROAD, NORTH OF WHITEVALE CREEK REACH WA9-4</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction</b>	<b>Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Phase I Supplementary, Neighbourhood 21) September 2014</b>	<b>2015-2017 Updates for Class EA Study<sup>7</sup></b>
<p><i>Overview of Conditions in Vicinity:</i></p> <ul style="list-style-type: none"> <li>• ~470m, alignment lies 10m within northern limit of NHS; ~200m along northern limit of sugar maple hardwood forest</li> <li>• Agriculture north of NHS</li> <li>• North of ephemeral, warm water stream, Reach WA9-4</li> <li>• Defined preferential flow path not present, shallow depression through agricultural field</li> </ul>			
1. Hydraulics	<ul style="list-style-type: none"> <li>• Required to direct flow to WA9-4</li> </ul>	<ul style="list-style-type: none"> <li>• Headwater Water Balance For HDF's 9 and 10 (Reaches WA9-4 and WA9-5) indicates roof area of 0.8ha and 0.1ha, respectively, required to maintain water balance to these features; appropriately sized storm sewer required to convey roof drainage south of collector road; flow spreader LID measures to be located south of road to distribute flow in similar manner to existing dispersed overland contributions</li> <li>• Woodland water balance for FC3 indicates roof area of 0.4ha required to maintain water balance to the woodland; appropriately sized storm sewer required to convey roof drainage south of collector road; linear swale LID measure to be located south of road to distribute flow in similar manner to existing dispersed overland contributions</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>
2. Fluvial Geomorphology	<ul style="list-style-type: none"> <li>• Not Required</li> </ul>	<ul style="list-style-type: none"> <li>• Not required</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>
3. Stormwater Management Requirements	<ul style="list-style-type: none"> <li>• Required</li> <li>• Address runoff from north of road and routing to NHS south of road</li> <li>• Consider HDF water balances for Reach WA9-4 and WA9-5</li> </ul>	<ul style="list-style-type: none"> <li>• Road drainage by conventional storm sewer system and directed to stormwater pond #50a</li> <li>• Headwater water balance for HDF's 9 and 10</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>

<sup>7</sup> Sources: Geomorphic Assessment and Conceptual Design Recommendation Report, Beacon, 2017 and Natural Heritage Letter Report, RJ Burnside, 2017

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

ROADS CHECKLIST FOR NHS ROAD CROSSING 16 EMPLOYMENT COLLECTOR ROAD, NORTH OF WHITEVALE CREEK REACH WA9-4			
Criterion	Site Specific Assessment Direction	Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Phase I Supplementary, Neighbourhood 21) September 2014	2015-2017 Updates for Class EA Study <sup>7</sup>
	immediately downstream	(Reaches WA9-4 and WA9-5) indicates roof area of 0.8 ha and 0.1 ha respectively required to maintain water balance to these features; appropriately sized storm sewer required to convey roof drainage south of collector road; flow spreader LID measures to be located south of road to distribute flow in similar manner to existing dispersed overland contributions	
4. Fisheries	<ul style="list-style-type: none"> <li>Not Required</li> </ul>	<ul style="list-style-type: none"> <li>Not required</li> </ul>	<ul style="list-style-type: none"> <li>Not required</li> </ul>
5. Geotechnical and Hydrogeology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Sandy silt to silty sand soils</li> <li>Groundwater elevations 6.1 m to 7.6 m bgs</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
6. Wildlife Passage	<ul style="list-style-type: none"> <li>Road design should discourage wildlife movement from the NHS, located south of the road</li> </ul>	<ul style="list-style-type: none"> <li>Road design components including slope and curb/ditch configuration may assist in reducing wildlife entrance onto the road from south side</li> <li>Structurally diverse plantings along south side of road also may assist</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
7. Vegetation Management	<ul style="list-style-type: none"> <li>Compensation plantings for intrusion into NHS; western area of NHS, west of Reach WA9-4 would be suitable location</li> </ul>	<ul style="list-style-type: none"> <li>Plantings in western area of NHS, west of Reach WA9-4 would be suitable location, to provide additional buffering to channel</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
8. Species at Risk	<ul style="list-style-type: none"> <li>Confirmation of absence of SAR required</li> </ul>	<ul style="list-style-type: none"> <li>Confirmation of absence of Species At Risk required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met</li> </ul>	<p>No change – watercourse is not classified as <b>Redside Dace</b> habitat</p> <p><b>Butternut:</b> Overall Benefit Plan (Bird and Hale 2015) – includes planting and monitoring requirements, as well as implementation per landowner. One non-retainable butternut within 25 m of proposed grading.</p> <p><b>Bobolink – Eastern</b></p>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

ROADS CHECKLIST FOR NHS ROAD CROSSING 16 EMPLOYMENT COLLECTOR ROAD, NORTH OF WHITEVALE CREEK REACH WA9-4			
Criterion	Site Specific Assessment Direction	Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Phase I Supplementary, Neighbourhood 21) September 2014	2015-2017 Updates for Class EA Study <sup>7</sup>
			<b>Meadowlark</b> – refer to Development Plan – Bobolink and Eastern Meadowlark Habitat (Bird and Hale) – May 2015 – provides all of the requisite information as mandated by Section 23.2 (3) of Ont. Reg. 242/08
9. Road Design	<ul style="list-style-type: none"> <li>Cross-section type (urban/rural) to be determined</li> </ul>	<ul style="list-style-type: none"> <li>Semi urban with urban along north side and rural on south side</li> </ul>	<ul style="list-style-type: none"> <li>Urban cross-section per updated plans approved by City and Region</li> </ul>
10. Natural Heritage System Trails	<ul style="list-style-type: none"> <li>Trail/bike route within road allowance; intersection with NHS trail identified at west side of the NHS; to be located for safe connection to road</li> </ul>	<ul style="list-style-type: none"> <li>Further work is required, later by the public authority that will construct the trails</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
Recommended Design Criteria	<ul style="list-style-type: none"> <li>Summarize dimensions, key features</li> </ul>	<ul style="list-style-type: none"> <li>Appropriately sized storm sewer required to convey to roof drainage HDF's 9 and 10, and woodland FC3 south of collector road; LID measures south of road required to disperse flows to features</li> <li>Urban cross-section along north side; rural on south side</li> <li>Road design elements and plantings to minimize wildlife crossings</li> <li>Compensation plantings in NHS west of Reach WA9-4</li> <li>Runoff directed to stormwater pond 50a</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>



**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 17 EMPLOYMENT COLLECTOR ROAD, WHITEVALE CREEK REACH WA17</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Supplementary, Neighbourhood 21) September 2014</b>	<b>2015-2017 Updates for Class EA Study<sup>8</sup></b>
<p><i>Overview of Conditions in Vicinity:</i></p> <ul style="list-style-type: none"> <li>• ~430m, alignment lies 10m within northern limit of NHS; ~280m along northern limit of sugar maple hardwood forest</li> <li>• Crosses ephemeral channel Reach WA17, warm water stream with no riparian vegetation</li> <li>• ~ 250m east of WA17, alignment located immediately upstream of Reach WA15-1</li> </ul>			
1. Hydraulics	<ul style="list-style-type: none"> <li>• Required for crossing of Reach WA17</li> </ul>	<ul style="list-style-type: none"> <li>• Hydraulics requires one 6.0m x 1.5m box culvert (refer to HEC-RAS output)</li> <li>• Water balance completed for headwater HDF11 (reach WA15-1) indicates roof area of 0.07ha required to maintain water balance; appropriately sized storm sewer required to convey roof drainage south of collector road; flow spreader LID measures to be located south of road to distribute flow in similar manner to existing dispersed overland contributions</li> <li>• Woodland water balance for FC4 indicates roof area of 0.5ha required to maintain water balance to the woodland; appropriately sized storm sewer required to convey roof drainage south of the collector road; linear swale LID measure to be located south of road to distribute flow in similar manner to existing dispersed overland contributions</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>
2. Fluvial Geomorphology	<ul style="list-style-type: none"> <li>• Required for Reach WA17</li> </ul>	<ul style="list-style-type: none"> <li>• Reach WA17 consisted of an unconfined and sinuous watercourse flowing through and agricultural field</li> <li>• The feature lacked riparian vegetation</li> <li>• Bankfull widths and depths average 2.0 and 0.55m respectively</li> <li>• Bank materials consisted of clay, silt and sand</li> <li>• Downstream of the</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>

<sup>8</sup> Sources: Geomorphic Assessment and Conceptual Design Recommendation Report, Beacon, 2017 and Natural Heritage Letter Report, RJ Burnside, 2017

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 17 EMPLOYMENT COLLECTOR ROAD, WHITEVALE CREEK REACH WA17</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Supplementary, Neighbourhood 21) September 2014</b>	<b>2015-2017 Updates for Class EA Study<sup>8</sup></b>
		<p>proposed crossing, the watercourse lost definition and large sand deposits were observed</p> <ul style="list-style-type: none"> <li>Upstream of the proposed crossing the watercourse was sinuous</li> <li>At the crossing location, the watercourse was straight with no riparian vegetation</li> <li>No special requirements</li> </ul>	
3. Stormwater Management Requirements	<ul style="list-style-type: none"> <li>Required</li> <li>Runoff from crossing not to enter channel system directly</li> <li>Address runoff from north of road and routing to NHS south of road</li> <li>Consider HDF water balance for Reach WA15-1 within NHS</li> </ul>	<ul style="list-style-type: none"> <li>Road drainage conveyed by conventional storm sewer system and directed to stormwater ponds #50a and 51</li> <li>Headwater balance for HDF11 (reaches WA15-1) indicates roof area of 0.07ha required to maintain water balance to the feature; appropriately sized storm sewer required to convey roof drainage south of road</li> <li>Flow spreader LID measures to be located south of road to distribute flow in similar manner to existing dispersed overland contributions</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
4. Fisheries	<ul style="list-style-type: none"> <li>Open bottom structure required for WA17</li> </ul>	<ul style="list-style-type: none"> <li>The channel was dry at the crossing location during the assessment</li> <li>Environmental constraints requiring consideration through the design process include: open bottom and formalization of a defined channel through the proposed crossing structure to maintain flow conveyance</li> <li>Riparian plantings would significantly enhance the habitat potential of the watercourse</li> <li>Detailed design to include: open bottom leaving existing channel bed intact</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
5. Geotechnical and Hydrogeology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Sandy silt to silty sand soils</li> <li>Boreholes dry upon</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

ROADS CHECKLIST FOR NHS ROAD CROSSING 17 EMPLOYMENT COLLECTOR ROAD, WHITEVALE CREEK REACH WA17			
Criterion	Site Specific Assessment Direction (MESPA, 2013)	Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Supplementary, Neighbourhood 21) September 2014	2015-2017 Updates for Class EA Study <sup>8</sup>
		completion	
6. Wildlife Passage	<ul style="list-style-type: none"> <li>Design opening for herptiles</li> <li>Road design should discourage wildlife movement from the NHS, located south of the road</li> </ul>	<ul style="list-style-type: none"> <li>Crossing opening requires dry benches of 3-4m on each side above bankfull channel and clearance of approximately 1m</li> <li>Embankment on both sides of the road at crossing to be planted with structurally diverse native indigenous species that would provide cover in the vicinity of the road but that would not impede sight of the opening and would assist in funneling wildlife through crossing</li> <li>Road design components including slope and curb/ditch configuration may assist in reducing wildlife entrance onto road from south side; structurally diverse plantings along south side of road also may assist</li> </ul>	<ul style="list-style-type: none"> <li>Channel crossing structure sizing specifications to be finalized at detailed design</li> </ul>
7. Vegetation Management	<ul style="list-style-type: none"> <li>Restoration of immediate vicinity of crossing</li> <li>Compensation plantings for intrusion into NHS; Reach WA17 NHS corridor would be suitable location</li> </ul>	<ul style="list-style-type: none"> <li>Plantings in Reach WA17 NHS corridor would be suitable location</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
8. Species at Risk	<ul style="list-style-type: none"> <li>Not applicable at this time</li> </ul>	<ul style="list-style-type: none"> <li>Confirmation of absence of Species At Risk required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met</li> </ul>	<p>No change – watercourse is not classified as <b>Redside Dace</b> habitat</p> <p><b>Butternut:</b> Overall Benefit Plan (Bird and Hale 2015) – includes planting and monitoring requirements, as well as implementation per landowner. Two non-retainable butternut located beyond, but within 25 m of, the proposed grading limit,</p> <p><b>Bobolink – Eastern Meadowlark</b> – refer to Development Plan – Bobolink and</p>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 17 EMPLOYMENT COLLECTOR ROAD, WHITEVALE CREEK REACH WA17</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Supplementary, Neighbourhood 21) September 2014</b>	<b>2015-2017 Updates for Class EA Study<sup>8</sup></b>
			Eastern Meadowlark Habitat (Bird and Hale) – May 2015 – provides all of the requisite information as mandated by Section 23.2 (3) of Ont. Reg. 242/08
9. Road Design	<ul style="list-style-type: none"> <li>Cross-section type (urban/rural) to be determined</li> </ul>	<ul style="list-style-type: none"> <li>Semi-urban with urban along north side and rural on south side</li> </ul>	<ul style="list-style-type: none"> <li>Urban cross-section per updated plans approved by City and Region</li> </ul>
10. Natural Heritage System Trails	<ul style="list-style-type: none"> <li>Trail/bike route within road allowance</li> <li>Intersection with NHS trail Identified along west side of the valley; to be located for safe intersection with road or as an underpass</li> </ul> <p>(Note NHS trail extends north to Hwy 407 where crossing may not be feasible; alternatively terminate road at collector road?.)</p>	<ul style="list-style-type: none"> <li>Further work is required, by the public authority that determines it will construct the trails</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
Recommended Design Criteria	<ul style="list-style-type: none"> <li>Summarize dimensions, key features</li> </ul>	<ul style="list-style-type: none"> <li>10m x 1m open bottom crossing for Reach WA17 to address hydraulics, fluvial geomorphology, and wildlife passage</li> <li>Crossing opening requires dry benches of 3-4m on each side above bankfull channel and clearance of approximately 1m</li> <li>Flow spreader LID south of road to maintain water balance in vicinity of WA15-1 and woodland FC4</li> <li>Road design elements and plantings to minimize wildlife crossings</li> <li>Compensation plantings in NHS corridor of Reach WA17</li> <li>Urban cross-section on the north side and rural cross-section on the south side</li> <li>Road runoff directed to stormwater ponds #50a and 51</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 18 EMPLOYMENT COLLECTOR ROAD, WHITEVALE CREEK REACH W16</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Supplementary, Neighbourhood 21) September 2014</b>	<b>2015-2017 Updates for Class EA Study<sup>9</sup></b>
<p><i>Overview of Conditions in Vicinity:</i></p> <ul style="list-style-type: none"> <li>• ~600m through north edge of NHS (extends 10m north from the Employment Collector into primarily agriculture lands with ~60m of sugar maple forest and across ephemeral channel with narrow band of riparian vegetation comprising primarily reed canary grass meadow marsh)</li> <li>• ~150m southeast of Reach W16, road will bisect NHS</li> <li>• W16 is an ephemeral, warm water stream; location of road defined by intersection with Sideline 26 and Transit Station which affords insufficient buffer to W16; W16 will require minor shift to west, with accompanying natural channel design</li> <li>• ~ 165m east of W16, road alignment located immediately upstream of Reach W15-1</li> </ul>			
1. Hydraulics	<ul style="list-style-type: none"> <li>• Required for crossing of W16</li> </ul>	<ul style="list-style-type: none"> <li>• Hydraulics requires one 25.0m x 1.5m opening (refer to HEC-RAS output)</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>
2. Fluvial Geomorphology	<ul style="list-style-type: none"> <li>• Required for crossing of Reach W16</li> <li>• Reach W16 south of crossing to be shifted to west to provide buffer area to road; requires natural channel design</li> </ul>	<ul style="list-style-type: none"> <li>• Reach WA16 consisted of an unconfined, straight, and intermittently defined watercourse through an agricultural field</li> <li>• The riparian vegetation consisted of grasses, cattails, and shrubs within a continuous buffer</li> <li>• Where defined, bankfull widths and depths ranged from 1.0 to 1.3 m and 0.5 to 0.7m respectively</li> <li>• No riffle pool development</li> <li>• Channel substrate consisted of sand to cobble and exposed till</li> <li>• Where unconfined, the watercourse had sections of dense vegetation encroachment</li> <li>• The proposed crossing location at a straight section of watercourse</li> <li>• No evidence of erosion was documented at the location of the proposed crossing</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>
3. Stormwater Management Requirements	<ul style="list-style-type: none"> <li>• Required</li> <li>• Runoff from crossing not to enter channel system directly</li> <li>• Address runoff from north of road and routing to NHS south of road</li> <li>• Consider HDF water balance for Reach W15-1 within NHS</li> </ul>	<ul style="list-style-type: none"> <li>• Runoff to be conveyed to conventional storm sewer system and directed to stormwater pond #36</li> <li>• Recommended to consider HDF water balance for Reach W15-1 within NHS within transit station</li> </ul>	<ul style="list-style-type: none"> <li>• No potential for for quantity control identified on west side of Sideline 26</li> <li>• East of Sideline 26, potential for quantity control identified at</li> </ul>

<sup>9</sup> Sources: Geomorphic Assessment and Conceptual Design Recommendation Report, Beacon, 2017 and Natural Heritage Letter Report, RJ Burnside, 2017

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

ROADS CHECKLIST FOR NHS ROAD CROSSING 18 EMPLOYMENT COLLECTOR ROAD, WHITEVALE CREEK REACH W16			
Criterion	Site Specific Assessment Direction (MESPA, 2013)	Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Supplementary, Neighbourhood 21) September 2014	2015-2017 Updates for Class EA Study <sup>9</sup>
			stormwater management pond #63
4. Fisheries	<ul style="list-style-type: none"> <li>Open bottom structure required for W16</li> </ul>	<ul style="list-style-type: none"> <li>The watercourse consisted of an intermittently defined channel with ephemeral flow</li> <li>Low gradient system conveys flows downstream during rain events and was not considered direct fish habitat</li> <li>6-10m wide riparian zone located between two active farm fields</li> <li>Riparian vegetation consisted of low lying grasses, with cattails lining portions of the channel</li> <li>Environmental constraints through design process include: open bottom and formalization of a defined channel through the proposed crossing to maintain flow conveyance downstream</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
5. Geotechnical and Hydrogeology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Sandy silt soils</li> <li>Borehole dry upon completion</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
6. Wildlife Passage	<ul style="list-style-type: none"> <li>Design opening for herptiles</li> <li>Road design should discourage wildlife movement from the NHS, located south of the road</li> </ul>	<ul style="list-style-type: none"> <li>Crossing open across Reach W16 requires dry benches of 3-4m on each side of above bankfull channel and clearance of approximately 1m</li> <li>Embankments on both sides of the road at crossing to be planted with structurally diverse native indigenous species that would provide cover in the vicinity of the road but that not impede sight of the opening and would assist in funnelling wildlife through the crossing</li> <li>Road design components including slope and curb/ditch configuration</li> </ul>	<ul style="list-style-type: none"> <li>Channel crossing structure sizing specifications to be finalized at detailed design</li> </ul>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

ROADS CHECKLIST FOR NHS ROAD CROSSING 18 EMPLOYMENT COLLECTOR ROAD, WHITEVALE CREEK REACH W16			
Criterion	Site Specific Assessment Direction (MESPA, 2013)	Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Supplementary, Neighbourhood 21) September 2014	2015-2017 Updates for Class EA Study <sup>9</sup>
		<p>may assist in reducing wildlife entrance into road from south side</p> <ul style="list-style-type: none"> <li>structurally diverse plantings along the south side of road also may assist</li> </ul>	
7. Vegetation Management	<ul style="list-style-type: none"> <li>Restoration of immediate vicinity of crossing</li> <li>Edge management at intrusion into sugar-maple forest area</li> <li>Appropriate naturalization of realigned segment of Reach W16</li> <li>Compensation plantings for intrusion into NHS and loss of part of woodland; agricultural field southwest of Reach W16 or east of woodland, south of road would be suitable locations.</li> </ul>	<ul style="list-style-type: none"> <li>Detailed natural channel design planting plan</li> <li>Detailed restoration plan to compensate for the area of terrestrial natural communities to be provided as part of detailed design and will comprise plantings of shrubs and trees in – <ul style="list-style-type: none"> <li>The cultural meadow area to south of crossing</li> <li>Along western side of channel north and south of crossing, to enhance the corridor function and stream riparian community</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
8. Species at Risk	<ul style="list-style-type: none"> <li>Inventory for butternut trees in woodland area to be affected.</li> </ul>	<ul style="list-style-type: none"> <li>Confirmation of absence of SAR required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met</li> </ul>	<p>No change – watercourse is not classified as <b>Redside Dace</b> habitat</p> <p><b>Butternut:</b> Overall Benefit Plan (Bird and Hale 2015) – includes planting and monitoring requirements, as well as implementation per landowner. No butternut within the vicinity of the proposed road alignment.</p> <p><b>Bobolink – Eastern Meadowlark</b> – refer</p>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 18 EMPLOYMENT COLLECTOR ROAD, WHITEVALE CREEK REACH W16</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Supplementary, Neighbourhood 21) September 2014</b>	<b>2015-2017 Updates for Class EA Study<sup>9</sup></b>
			to Development Plan – Bobolink and Eastern Meadowlark Habitat (Bird and Hale) – May 2015 – provides all of the requisite information as mandated by Section 23.2 (3) of Ont. Reg. 242/08
9. Road Design	<ul style="list-style-type: none"> <li>• Cross-section type (urban/rural) to be determined</li> </ul>	<ul style="list-style-type: none"> <li>• Semi-urban with urban along north side and rural on south side</li> </ul>	<ul style="list-style-type: none"> <li>• Urban cross-section per updated plans approved by City and Region</li> </ul>
10. Natural Heritage System Trails	<ul style="list-style-type: none"> <li>• Trail/bike route within road allowance</li> <li>• Two identified NHS trail connections with road, east and west of tributary; only one connection, west of tributary required; to be located for safe connection to road, west of tributary corridor NHS</li> </ul>	<ul style="list-style-type: none"> <li>• Further work is required, later through the appropriate EA for the trails, by the public authority that determines it will construct the trails</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>
Recommended Design Criteria	<ul style="list-style-type: none"> <li>• Summarize dimensions, key features</li> </ul>	<ul style="list-style-type: none"> <li>• 25m x 1.5m open bottom crossing for Reach W16 based on hydraulic constraints</li> <li>• Crossing opening across Reach W16 requires dry benches of 3-4m on each side above bankfull channel and clearance of approximately 1m</li> <li>• Natural channel design for re-aligned channel</li> <li>• Urban cross-section on the north side and rural cross-section on the south side</li> <li>• Road design elements and plantings to minimize wildlife crossings</li> <li>• Detailed restoration plan to compensate for crossing through woodland</li> <li>• Road runoff directed to stormwater pond #36</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>



**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 19 EMPLOYMENT COLLECTOR ROAD, GANATSEKIAGON CREEK REACH G18</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Phase 1 Supplementary Submission, Neighbourhood 21) November 2013</b>	<b>2015-2017 Updates for Class EA Study<sup>10</sup></b>
<p><i>Overview of Conditions in Vicinity:</i> Segment of local road that crosses Reach G18, ~175m south of Hwy 407, with proposed Transitway along south side of Hwy407 ~80m north; width of the Reach corridor through which road traverses is ~12m; NHS width ~120m, 2660 m<sup>2</sup> of NHS to be affected.</p> <ul style="list-style-type: none"> <li>• Riparian corridor dominated primarily by cultural meadow species; in vicinity of crossing, there is a very narrow band of meadow marsh (~255m<sup>2</sup> of MAM2-2 is affected) that widens out south of the crossing.</li> <li>• Interfield access across Reach (e.g., for tractors) requires no structure; compaction and ruts present in that vicinity</li> <li>• Channel is ephemeral, warm water stream, with no channel definition; categorized as Redside Dace habitat (Contributing)</li> <li>• East side of corridor supports fenceline trees (CUH1-A) dominated by poplars (basswood, elm) with European buckthorn dominating the understory; ~ 480m<sup>2</sup> of woody vegetation to be removed</li> <li>• East of channel corridor, road to be located along northern limit of NHS to Sideline 24, ~450m, partially through surface catchment of Wetland G10; small area immediately north of wetland periodically wet; cropped but currently dominated by tickle grass and pigweed.</li> <li>• Immediately west of Sideline 24, crossing is located primarily north of existing fenceline of trees. West embankment of Sideline 24 in crossing area and to north supports cultural meadow.</li> </ul>			
1. Hydraulics	<ul style="list-style-type: none"> <li>• Required for G18</li> <li>• Consider water balance to Wetland G10 and determine need to direct flow to south of road</li> </ul>	<ul style="list-style-type: none"> <li>• Hydraulics requires a 11.0m x 1.5m box culvert for Reach G18 watercourse crossing (refer to HEC-RAS output)</li> <li>• Due to land swap, culvert to convey flows to south of road (Wetland G10) no longer required.</li> <li>• Water Balance completed for Wetland G10 (refer to SWMF #63a Attachment C); augmentation of clean roof water to Wetland G10.</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>
2. Fluvial Geomorphology	<ul style="list-style-type: none"> <li>• Required for G18</li> </ul>	<ul style="list-style-type: none"> <li>• Reach G18 consisted of an unconfined and straight swale.</li> <li>• The riparian buffer zone was continuous and consisted of grass and herbaceous vegetation.</li> <li>• No defined bed and banks</li> <li>• Swale substrate was comprised of clay to sand and was heavily vegetated</li> <li>• The watercourse at the proposed crossing location consisted of a swale with characteristics consistent upstream and downstream of the proposed crossing.</li> <li>• No channel processes observed that would pose a hazard to the proposed crossing location (i.e. no meander belt). Fluvial geomorphology therefore not a</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>

<sup>10</sup> Sources: Geomorphic Assessment and Conceptual Design Recommendation Report, Beacon, 2017 and Natural Heritage Letter Report, RJ Burnside, 2017

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 19 EMPLOYMENT COLLECTOR ROAD, GANATSEKIAGON CREEK REACH G18</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Phase 1 Supplementary Submission, Neighbourhood 21) November 2013</b>	<b>2015-2017 Updates for Class EA Study<sup>10</sup></b>
		constraint for sizing of the crossing.	
3. Stormwater Management Requirements	<ul style="list-style-type: none"> <li>Required</li> <li>Runoff from crossing not to enter channel system directly</li> </ul>	<ul style="list-style-type: none"> <li>Portion of road west of crossing to be conveyed to conventional storm sewer system and directed to SWMF 63</li> <li>Crossing itself and road east of crossing to be conveyed to conventional storm sewer system and directed to SWMF 63a</li> <li>Wetland water balance for Wetland G10 (indicates roof area of 0.15ha required to maintain water balance to wetland; linear swale LID measure to be located south of road to distribute flow in similar manner to existing dispersed overland contributions)</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
4. Fisheries	<ul style="list-style-type: none"> <li>Open bottom structure required for Reach G18 crossing</li> <li>Not required for any additional culverts that may be needed related to wetland water balance</li> </ul>	<ul style="list-style-type: none"> <li>Crossing in location already disturbed and in a relatively straight stretch of the reach</li> <li>Detailed design to include open bottom leaving existing channel bed intact, addressing Redside Dace requirements</li> <li>Culvert structure to span riparian meadow marsh community (which is ~ 12 m wide at this location)</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
5. Geotechnical and Hydrogeology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Relatively flat terrain with silty sand to sandy silt till soils; no special design considerations</li> <li>Groundwater elevations at approximately 216masl</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
6. Wildlife Passage	<ul style="list-style-type: none"> <li>Design opening for herptiles</li> <li>Road design west of creek to enhance safe terrestrial wildlife passage, taking into consideration that the NHS will transition to woodland</li> </ul>	<ul style="list-style-type: none"> <li>Hydraulic sizing and 1m height will maintain connectivity for herptiles and small mammals,</li> <li>3-4m dry benches for terrestrial passage required on each side of the bankfull channel</li> <li>The embankments on both sides of the road to be planted with structurally diverse native indigenous species that would provide cover in the vicinity of the road but do not impede sight of the opening.</li> <li>East of corridor, design to promote wildlife staying within NHS; A strip of low stature vegetation or a shoulder should be established to the south of the travel surface, to maintain line-of-sight for both drivers and wildlife.</li> </ul>	<ul style="list-style-type: none"> <li>Channel crossing structure sizing specifications to be finalized at detailed design</li> </ul>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

ROADS CHECKLIST FOR NHS ROAD CROSSING 19 EMPLOYMENT COLLECTOR ROAD, GANATSEKIAGON CREEK REACH G18			
Criterion	Site Specific Assessment Direction (MESPA, 2013)	Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Phase 1 Supplementary Submission, Neighbourhood 21) November 2013	2015-2017 Updates for Class EA Study <sup>10</sup>
		Beyond the shoulder/low vegetation, plantings should occur to provide cover, including trees and shrubs. <ul style="list-style-type: none"> <li>LID feature to maintain water balance to wetland should be located south of the barrier/cover plantings along the south side of the road allowance.</li> </ul>	
7. Vegetation Management	<ul style="list-style-type: none"> <li>Restoration of immediate vicinity of crossing</li> </ul>	<ul style="list-style-type: none"> <li>Details of the restoration plan to compensate for the 480m<sup>2</sup> area of terrestrial natural communities (treed hedgerow) to be provided as part of detailed design and will comprise plantings of shrubs and trees along the west side of the channel north and south of the crossing and, on the east side, north of the crossing, in the agricultural fields.</li> <li>Existing interfield crossing area to be rehabilitated by aerating and loosening the bed.</li> <li>Planting plan also will address requirements to address wildlife requirements (see above).</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
8. Species at Risk	<ul style="list-style-type: none"> <li>Redside Dace recovery reach</li> </ul>	<ul style="list-style-type: none"> <li>No other SAR known to be present at this time; confirmation required prior to construction.</li> <li>Crossing of Reach G18 to span meadow marsh habitat and address Redside Dace requirements.</li> <li>Channel bottom to be left as is</li> </ul>	<p><b>Redside Dace</b> Contributing Habitat  <b>Butternut:</b> Overall Benefit Plan (Bird and Hale 2015) – includes planting and monitoring requirements, as well as implementation per landowner. No butternut within the proposed road alignment. Confirmation of absence of Species At Risk required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met  <b>Bobolink</b> –  <b>Eastern Meadowlark</b> – refer to Development Plan – Bobolink and</p>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 19 EMPLOYMENT COLLECTOR ROAD, GANATSEKIAGON CREEK REACH G18</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Phase 1 Supplementary Submission, Neighbourhood 21) November 2013</b>	<b>2015-2017 Updates for Class EA Study<sup>10</sup></b>
			Eastern Meadowlark Habitat (Bird and Hale) – May 2015 – provides all of the requisite information as mandated by Section 23.2 (3) of Ont. Reg. 242/08
9. Road Design	<ul style="list-style-type: none"> <li>Cross-section type (urban/rural) to be determined</li> </ul>	<ul style="list-style-type: none"> <li>Urban across channel at Reach G18</li> <li>Urban along north side and rural on south side elsewhere</li> </ul>	<ul style="list-style-type: none"> <li>Urban cross-section per updated plans approved by City and Region</li> </ul>
10. Natural Heritage System Trails	<ul style="list-style-type: none"> <li>Trail/bike route within road allowance;</li> <li>Intersection with NHS trail Identified along west side of the valley; to be located for safe intersection with road or as an underpass (Note NHS trail extends north to Hwy 407 where crossing may not be feasible; alternatively terminate road at collector road?)</li> <li>Two NHS trail connections with road identified east of tributary, east and west of Wetland G10 with the intervening stretch being coincident with the road allowance; to be located for safe connections to/accommodation by road</li> </ul>	<ul style="list-style-type: none"> <li>Further work is required, later for the trails, by the public authority that determines it will construct the trails</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
Recommended Design Criteria	<ul style="list-style-type: none"> <li>Summarize dimensions, key features</li> </ul>	<ul style="list-style-type: none"> <li>Crossing size for Reach G18 based on fisheries and comprises width 15m, including dry bench of 3-4m on either side of the bankful channel, and clearance of 1.5m</li> <li>Urban cross section on the north side and rural cross-section on the south except across Reach G18 where it will be fully urban</li> <li>Run-off directed to SWMFs 63 and 63a</li> <li>Moisture augmentation to Wetland G10 via roof-tops to swale feature on south side of road, to be located south of the</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> <li>Urban cross-section per updated plans approved by City and Region</li> </ul>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 19 EMPLOYMENT COLLECTOR ROAD, GANATSEKIAGON CREEK REACH G18</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Phase 1 Supplementary Submission, Neighbourhood 21) November 2013</b>	<b>2015-2017 Updates for Class EA Study<sup>10</sup></b>
		<ul style="list-style-type: none"> <li>barrier plantings</li> <li>Restoration planting required to south of road and along northern limit of the NHS, and east and west of the Reach G18 corridor</li> </ul>	

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 20 EMPLOYMENT COLLECTOR ROAD, through Agricultural fields north of Ganatsekiagon Creek Reach G16-5 and across Sideline 24</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Phase 1 Supplementary Submission, Neighbourhood 21) November 2013</b>	<b>2015-2017 Updates for Class EA Study<sup>11</sup></b>
<p><i>Overview of Conditions in Vicinity:</i></p> <ul style="list-style-type: none"> <li>Segment of local road east of Sideline 24, south of Highway 407</li> <li>Primarily cultural meadow on eastern embankment of Sideline 24 (~35m; 350m<sup>2</sup>)</li> <li>Area to be occupied by road comprises ~50m through meadow marsh (~1000m<sup>2</sup>), south of cattail shallow marsh; and ~90m (2000 m<sup>2</sup>) of cropped agricultural field within the NHS</li> <li>Marsh area would be separated east-west linkage area located south of road</li> <li>Northern part of shallow marsh proposed to be occupied by Transitway in future</li> <li>Area to west of Sideline 24 to be removed from NHS</li> </ul>			
1. Hydraulics	<ul style="list-style-type: none"> <li>Not Required</li> </ul>	<ul style="list-style-type: none"> <li>Not required</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
2. Fluvial Geomorphology	<ul style="list-style-type: none"> <li>Not Required</li> </ul>	<ul style="list-style-type: none"> <li>Not required</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
3. Stormwater Management Requirements	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Road runoff to be conveyed to conventional storm sewer system and directed Stormwater pond 54</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
4. Fisheries	<ul style="list-style-type: none"> <li>Not Required</li> </ul>	<ul style="list-style-type: none"> <li>Not required; wetland communities north of road not hydrologically connected to NHS that would be south of road</li> </ul>	<ul style="list-style-type: none"> <li>Not required</li> </ul>
5. Geotechnical and Hydrogeology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Sandy silt to silty sand soils</li> <li>Groundwater elevation at approximately 214masl to 215masl</li> <li>No special engineering considerations</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>

<sup>11</sup> Sources: Geomorphic Assessment and Conceptual Design Recommendation Report, Beacon, 2017 and Natural Heritage Letter Report, RJ Burnside, 2017

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

ROADS CHECKLIST FOR NHS ROAD CROSSING 20 EMPLOYMENT COLLECTOR ROAD, through Agricultural fields north of Ganatsekiagon Creek Reach G16-5 and across Sideline 24			
Criterion	Site Specific Assessment Direction (MESPA, 2013)	Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Phase 1 Supplementary Submission, Neighbourhood 21) November 2013	2015-2017 Updates for Class EA Study <sup>11</sup>
6. Wildlife Passage	<ul style="list-style-type: none"> <li>Road design to enhance safe terrestrial wildlife passage, taking into consideration that the NHS outside of the wetland will transition to woodland</li> </ul>	<ul style="list-style-type: none"> <li>Shallow marsh not known to support breeding amphibians and thus herptiles connectivity to NHS south of road not required</li> <li>Wildlife currently may broadcast move between wetland area and NHS to the south and east; this small area of NHS north of road likely to be isolated because of development to east, Transitway to north, existing road (with embankment) to west, and new road to south. Some wildlife movement may persist.</li> <li>A strip of low stature vegetation or a shoulder should be established beside the travel surface, to maintain line-of-sight for both drivers and wildlife.</li> <li>Beyond the shoulder/low vegetation, plantings should occur on both sides of the road to provide cover, including trees and shrubs</li> <li>Appropriate signage to be placed on the road (warnings related to wildlife crossing, speed limit reduction, no passing)</li> </ul>	<ul style="list-style-type: none"> <li>Channel crossing structure sizing specifications to be finalized at detailed design</li> </ul>
7. Vegetation Management	<ul style="list-style-type: none"> <li>Not Required</li> </ul>	<ul style="list-style-type: none"> <li>Planting plan requirement to address wildlife movement in vicinity (see "wildlife" above)</li> <li>Details of the restoration plan will be provided as part of detailed design</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
8. Species at Risk	<ul style="list-style-type: none"> <li>Not applicable at this time</li> </ul>	<ul style="list-style-type: none"> <li>None known to be present at this time; confirmation required prior to construction</li> </ul>	<p><b>Redside Dace:</b> not applicable, no watercourse present and no wetlands present that are hydrologically connected to regulated Redside Dace habitat.</p> <p><b>Butternut:</b> Overall Benefit Plan (Bird and Hale 2015) –</p>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

ROADS CHECKLIST FOR NHS ROAD CROSSING 20 EMPLOYMENT COLLECTOR ROAD, through Agricultural fields north of Ganatsekiagon Creek Reach G16-5 and across Sideline 24			
Criterion	Site Specific Assessment Direction (MESPA, 2013)	Assessment Results and Design Recommendations (NFSSR, Infrastructure Ontario Phase 1 Supplementary Submission, Neighbourhood 21) November 2013	2015-2017 Updates for Class EA Study <sup>11</sup>
			includes planting and monitoring requirements, as well as implementation per landowner. No butternut within the proposed road alignment. Confirmation of absence of Species At Risk required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met Confirmation of absence of Species At Risk required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met <b>Bobolink – Eastern Meadowlark</b> – refer to Development Plan – Bobolink and Eastern Meadowlark Habitat (Bird and Hale) – May 2015 – provides all of the requisite information as mandated by Section 23.2 (3) of Ont. Reg. 242/08
9. Road Design	<ul style="list-style-type: none"> <li>Cross-section type (urban/rural) to be determined</li> </ul>	<ul style="list-style-type: none"> <li>Urban</li> </ul>	<ul style="list-style-type: none"> <li>Urban cross-section per updated plans approved by City and Region</li> </ul>
10. Natural Heritage System Trails	<ul style="list-style-type: none"> <li>Trail/bike route within road allowance;</li> </ul>	<ul style="list-style-type: none"> <li>Further work is required, later through the appropriate EA for the trails, by the public authority that determines it will construct the trails</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
Recommended Design Criteria	<ul style="list-style-type: none"> <li>Summarize dimensions, key features</li> </ul>	<ul style="list-style-type: none"> <li>No wildlife passage</li> <li>Urban cross-section</li> <li>Runoff directed stormwater pond 54</li> <li>Plantings along NHS</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 21 EMPLOYMENT COLLECTOR ROAD, north of Ganatsekiagon Creek Reach GB8-1 and across Reach GB9</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 19)</b>	<b>2015-2017 Updates for Class EA Study<sup>12</sup></b>
<p><i>Overview of Conditions in Vicinity:</i></p> <ul style="list-style-type: none"> <li>Local road travels through NHS including agricultural land, cultural thicket (two patches), hedgerow trees and shrubs (near western and eastern limits), lowland forest, and marsh and swamp (two patches)</li> <li>Crosses Reaches GB9 an ephemeral warm water stream, near the southern limit of the swamp unit</li> <li>Crosses small palustrine cattail shallow marsh ~30m east of main channel</li> <li>Road alignment field-located with agencies on site to minimize impact to wetland communities, stands of Butternut trees, and archaeological site.</li> </ul>			
1. Hydraulics	<ul style="list-style-type: none"> <li>Required for main channel, GB9</li> </ul>	<ul style="list-style-type: none"> <li>Minimum hydraulic opening size of 20.0m x 1.5m required</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
2. Fluvial Geomorphology	<ul style="list-style-type: none"> <li>Required for GB9</li> </ul>	<ul style="list-style-type: none"> <li>Assessment completed</li> <li>A crossing size of 3 times the bankfull width (3.1 x 3=9.3m) is recommended</li> </ul>	<ul style="list-style-type: none"> <li>Completed</li> <li>9.5 m measured meander amplitude</li> <li>Revised crossing size of 13 m (meander amplitude plus average bankfull width) is recommended</li> </ul>
3. Stormwater Management Requirements	<ul style="list-style-type: none"> <li>Required</li> <li>Runoff from crossing not to enter channel system directly</li> <li>Consider HDF water balance for Reach GB8-1, a headwater feature south of the right-of-way (consider water balance of reach)</li> <li>Consider moisture connectivity of remaining cattail shallow marsh area, north and south of road, east of valley (if wetland not re-established to north)</li> <li>Runoff from crossing not to enter channel system directly</li> </ul>	<ul style="list-style-type: none"> <li>Runoff cannot be directed to a stormwater pond due to grades</li> <li>OGS and LID measures (infiltration) for quality and erosion</li> <li>SWMF#54 to be over-controlled to compensate for quantity</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
4. Fisheries	<ul style="list-style-type: none"> <li>Open bottom structure required for GB9</li> </ul>	<ul style="list-style-type: none"> <li>Detailed design to include open bottom</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
5. Geotechnical and Hydrogeology	<ul style="list-style-type: none"> <li>Required</li> </ul>	<ul style="list-style-type: none"> <li>Sandy silt to silty sand till soils</li> <li>Groundwater elevation at approximately 204 to 205 masl (~3 to 5m below surface)</li> <li>No special engineering considerations</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
6. Wildlife Passage	<ul style="list-style-type: none"> <li>Road design east and west of creek to enhance safe terrestrial wildlife passage, up to large mammals, taking into</li> </ul>	<ul style="list-style-type: none"> <li>Terrestrial bench of minimum 1.5m width and 1-1.2m height required</li> <li>Non-woody vegetation for</li> </ul>	<ul style="list-style-type: none"> <li>Channel crossing structure sizing specifications to be finalized at</li> </ul>

<sup>12</sup> Sources: Geomorphic Assessment and Conceptual Design Recommendation Report, Beacon, 2017 and Natural Heritage Letter Report, RJ Burnside, 2017



**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

ROADS CHECKLIST FOR NHS ROAD CROSSING 21 EMPLOYMENT COLLECTOR ROAD, north of Ganatsekiagon Creek Reach GB8-1 and across Reach GB9			
Criterion	Site Specific Assessment Direction (MESPA, 2013)	Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 19)	2015-2017 Updates for Class EA Study <sup>12</sup>
	<p>consideration that the NHS will transition to woodland</p> <ul style="list-style-type: none"> <li>• Non-woody vegetation for 3m on each side of travelled surface</li> <li>• If there are remnant cattail shallow marsh areas, north and south of road, east of valley, design culvert for herptiles</li> </ul>	<p>3m on each side of travelled surface</p> <ul style="list-style-type: none"> <li>• If there are remnant cattail shallow marsh areas, north and south of road, east of valley, design culvert for herptiles</li> <li>• Appropriate signage to be placed on the road (warnings related to wildlife crossing, speed limit reduction, no passing).</li> </ul>	<p>detailed design</p>
7. Vegetation Management	<ul style="list-style-type: none"> <li>• Edge management through both fencerows of trees</li> <li>• Restoration in immediate vicinity of road, considering the adjacent land cover</li> </ul>	<ul style="list-style-type: none"> <li>• Edge Management Plans to be provided for detailed design</li> <li>• Edge preparation and management will be required through fenceline of trees, east and west of the road allowance</li> </ul>	<ul style="list-style-type: none"> <li>• No change</li> </ul>
8. Species at Risk	<ul style="list-style-type: none"> <li>• Redside Dace recovery reach</li> <li>• Butternuts in eastern fenceline of trees</li> <li>• Confirmation of absence of SAR required</li> </ul>	<ul style="list-style-type: none"> <li>• Endangered Species Act regulations apply; permit to be obtained during detailed design</li> <li>• Fenceline examined for Butternut; one located west of crossing within woodland; will not be affected by road</li> <li>• Confirmation of absence of other SAR required prior to construction</li> </ul>	<p><b>Redside Dace</b> Contributing Habitat  <b>Butternut:</b> Overall Benefit Plan (Bird and Hale 2015) – includes planting and monitoring requirements, as well as implementation per landowner. One retainable butternut within the proposed grading limit, and one retainable butternut within 25 m of grading limit. Confirmation of absence of Species At Risk required prior to construction; otherwise requirements of Ontario Reg. 242/08 must be met  <b>Bobolink – Eastern Meadowlark</b> – refer to Development Plan – Bobolink and Eastern Meadowlark Habitat (Bird and Hale) – May 2015 – provides all of the requisite information as mandated by Section 23.2 (3) of Ont. Reg. 242/08</p>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

<b>ROADS CHECKLIST FOR NHS ROAD CROSSING 21 EMPLOYMENT COLLECTOR ROAD, north of Ganatsekiagon Creek Reach GB8-1 and across Reach GB9</b>			
<b>Criterion</b>	<b>Site Specific Assessment Direction (MESPA, 2013)</b>	<b>Assessment Results and Design Recommendations (NFSSR, 2013 Neighbourhood 19)</b>	<b>2015-2017 Updates for Class EA Study<sup>12</sup></b>
9. Road Design	<ul style="list-style-type: none"> <li>Cross-section type (urban/rural) to be determined</li> </ul>	<ul style="list-style-type: none"> <li>Rural cross-section</li> </ul>	<ul style="list-style-type: none"> <li>Urban cross-section per updated plans approved by City and Region</li> </ul>
10. Natural Heritage System Trails	<ul style="list-style-type: none"> <li>Trail/bike route within road allowance</li> <li>Intersection of two segments of NHS to connect and then cross road, ~200m west of tributary Reach GB8-1; to be located for safe connection to road and north of fencerow of trees</li> </ul>	<ul style="list-style-type: none"> <li>Trails to be confirmed during detailed design</li> <li>Further work is required, by the public authority that determines it will construct the trails</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>
Recommended Design Criteria	<ul style="list-style-type: none"> <li>Summarize dimensions, key features</li> </ul>	<ul style="list-style-type: none"> <li>Open bottom culvert</li> <li>Hydraulics dictates opening size of 20m wide x 1.5m height</li> <li>1.5m terrestrial bench on both sides</li> <li>Edge preparation and management required through fenceline trees</li> <li>Road runoff cannot be directed to SWMF due to grades; OGS and LID measures (infiltration) for quality</li> <li>Safe wildlife movement requires maintenance of low vegetation/cleared strip along both sides of road; signage required</li> </ul>	<ul style="list-style-type: none"> <li>No change</li> </ul>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

**Roads Checklists Information Sources**

Road IV – East-West Residential Arterial (Special Type C Arterial)

Road Crossing #	Data Sources for Road Crossing Information Prior to 2015-2017 Updates for Seaton Roads (Phases 3-4) Class EA Study
2	<p><b>NFSSR, Neighbourhood 19 - RJBurnside, August 2013</b></p> <ul style="list-style-type: none"> <li>▪ Hydraulics: Appendix G, Section 5.2</li> <li>▪ Fluvial Geomorphology: Appendix J, Section J2 (Page 222)</li> <li>▪ Wildlife Passage: Section 5.2, Table 9 and Appendix G</li> <li>▪ Road Crossing Checklists: Appendix G</li> </ul>
3	<p><b>NFSSR, Neighbourhood 18 - Sernas, August 26, 2013</b></p> <ul style="list-style-type: none"> <li>▪ Hydraulics: Section 3.1</li> <li>▪ Existing Conditions Channel Morphology and Streambank Erosion: Appendix B</li> <li>▪ Fluvial Geomorphology: Section 3.2, Appendix H (NHS 3,4 9),</li> <li>▪ Wildlife Passage: Section 5</li> <li>▪ Environmental Reports: Appendix J</li> <li>▪ Road Crossing Checklists: Appendix H</li> </ul>
4	<p><b>NFSSR, Neighbourhood 18 - Sernas, August 26, 2013</b></p> <ul style="list-style-type: none"> <li>▪ Hydraulics: Section 3.1</li> <li>▪ Existing Conditions Channel Morphology and Streambank Erosion: Appendix B</li> <li>▪ Fluvial Geomorphology: Section 3.2, Appendix H (NHS 3,4 9)</li> <li>▪ Wildlife Passage: Section 5, Table 8)</li> <li>▪ Road Crossing Checklists: Appendix H</li> </ul>
9	<p><b>NFSSR, Neighbourhood 18 - Sernas, August 26, 2013</b></p> <ul style="list-style-type: none"> <li>▪ Hydraulics: Section 3.1</li> <li>▪ Channel Morphology and Streambank Erosion: Appendix B</li> <li>▪ Fluvial Geomorphology: Section 3.2, Appendix H (NHS 3,4 9)</li> <li>▪ Wildlife Passage: Section 5, Table 8</li> <li>▪ Road Crossing Checklists: Appendix H</li> </ul>

Road I – Sideline 24 (Type C Arterial)

Road Crossing #	Data Sources for Road Crossing Information Prior to 2015-2017 Updates for Seaton Roads (Phases 3-4) Class EA Study
11	<p><b>NFSSR, Neighbourhood 16 – SKA, August 26, 2013</b></p> <ul style="list-style-type: none"> <li>▪ Crossing Summary: Table 5.1 page 65</li> <li>▪ Hydraulics: Appendix B, Section 3.1</li> <li>▪ Fluvial Geomorphology: Appendix B, Section 6.0</li> <li>▪ Wildlife Passage: Section 5.2, See also Environmental Reports in Appendix F, (Beacon, Burnside)</li> <li>▪ Road Crossing Checklists: Appendix G</li> <li>▪ Environmental Reports: Appendix F for NHS crossings 11 and 12 (Beacon and RJ Burnside)</li> </ul>
12	<p><b>NFSSR, Neighbourhood 19 – RJB, August 26, 2013</b></p> <ul style="list-style-type: none"> <li>▪ NHS Preliminary Design Crossing Summary, Table 9, page 47</li> <li>▪ Road Crossing checklists: Figures 8.4a and 8.4b for details on the crossing and Appendix G</li> <li>▪ Hydraulics: Section 5.2, Appendix G,</li> <li>▪ Fluvial Geomorphology: Appendix J, Section J1 and J3 (Page 282 – GHD; Page 44 – Parish)</li> <li>▪ Wildlife Passage: Section 5.2.5, Table 9 and Appendix G, Road crossing checklists (see also Appendix J2, Section 4.4.1)</li> </ul> <p>Note: NHS 12 is partially in Neighbourhood 16; it is addressed in Neighbourhood 19 NFSSR</p>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

Road VI – Employment Collector

Road Crossing #	Data Sources for Road Crossing Information Prior to 2015-2017 Updates for Seaton Roads (Phases 3-4) Class EA Study
16	<p><b>NFSSR, Neighbourhood 21 – Sernas, August 2013</b></p> <ul style="list-style-type: none"> <li>▪ Crossing specification: Section 5, Table 6</li> <li>▪ Hydraulics: Section 3.1</li> <li>▪ Fluvial Geomorphology: Section 5.2;Appendix A,</li> <li>▪ Channel Morphology; Appendix G, NHS Crossings</li> <li>▪ Wildlife Passage: not referenced in this report, see Appendix G</li> </ul> <p>Geomorphic and Aquatic Conditions (contains Crossing Size Recommendations 17, 18, 19, 21): Letter to GHD, August 21, 2013, re: Neighbourhood 19 and 21 Crossing Assessment</p> <p><b>Infrastructure Ontario Phase II Submission – GHD, July 2014</b></p> <ul style="list-style-type: none"> <li>▪ Crossing specification: Section 2</li> <li>▪ Hydraulics: Section 2</li> <li>▪ Channel Morphology; IO Section 2</li> <li>▪ Wildlife Passage: Section 2</li> </ul>
17	<p><b>NFSSR, Neighbourhood 21 – Sernas, August 2013</b></p> <ul style="list-style-type: none"> <li>▪ Crossing specification: Section 5, Table 6</li> <li>▪ Hydraulics: Section 3.1</li> <li>▪ Fluvial Geomorphology: NFSSR Section 5.2;Appendix A,</li> <li>▪ Channel Morphology; Appendix G, NHS Crossings</li> <li>▪ Wildlife Passage: not referenced in this report, see Appendix G</li> </ul> <p>Geomorphic and Aquatic Conditions (contains Crossing Size Recommendations 17, 18, 19, 21): Letter to GHD, August 21, 2013, re: Neighbourhood 19 and 21 Crossing Assessment</p> <p><b>Infrastructure Ontario Phase II Submission – GHD, July 2014</b></p> <ul style="list-style-type: none"> <li>▪ Crossing specification: Section 2</li> <li>▪ Hydraulics: Section 2</li> <li>▪ Channel Morphology; IO Section 2</li> <li>▪ Wildlife Passage: Section 2</li> </ul>
18	<p><b>NFSSR, Neighbourhood 21 – Sernas, August 2013</b></p> <ul style="list-style-type: none"> <li>▪ Crossing specification: Section 5, Table 6</li> <li>▪ Hydraulics: Section 3.1</li> <li>▪ Fluvial Geomorphology: Section 5.2;Appendix A,</li> <li>▪ Channel Morphology; Appendix G, NHS Crossings</li> <li>▪ Wildlife Passage: not referenced in this report, see Appendix G</li> </ul> <p>Geomorphic and Aquatic Conditions (contains Crossing Size Recommendations 17, 18, 19, 21): Letter to GHD, August 21, 2013, re: Neighbourhood 19 and 21 Crossing Assessment</p> <p><b>Infrastructure Ontario Phase II Submission – GHD, July 2014</b></p> <ul style="list-style-type: none"> <li>▪ Crossing specification: Section 2</li> <li>▪ Hydraulics: Section 2</li> <li>▪ Channel Morphology; IO Section 2</li> <li>▪ Wildlife Passage: Section 2</li> </ul>
19	<p><b>NFSSR, Neighbourhood 21 – Sernas, August 2013</b></p> <ul style="list-style-type: none"> <li>▪ Crossing specification: Section 5, Table 6</li> <li>▪ Hydraulics: Section 3.1</li> <li>▪ Fluvial Geomorphology: Section 5.2;Appendix A,</li> <li>▪ Channel Morphology; Appendix G, NHS Crossings</li> <li>▪ Wildlife Passage: not referenced in this report, see Appendix G</li> </ul> <p>Geomorphic and Aquatic Conditions (contains Crossing Size Recommendations 17, 18, 19, 21): Letter to GHD, August 21, 2013, re: Neighbourhood 19 and 21 Crossing Assessment</p> <p><b>Infrastructure Ontario Phase II Submission – GHD, July 2014</b></p> <ul style="list-style-type: none"> <li>▪ Crossing specification: Section 2</li> <li>▪ Hydraulics: Section 2</li> <li>▪ Channel Morphology; IO Section 2</li> <li>▪ Wildlife Passage: Section 2</li> </ul>

**Seaton Roads (Phases 3-4) Class EA Study  
Roads Crossing Checklists**

Road Crossing #	Data Sources for Road Crossing Information Prior to 2015-2017 Updates for Seaton Roads (Phases 3-4) Class EA Study
20	<p><b>NFSSR, Neighbourhood 21 – Sernas, August 2013</b></p> <ul style="list-style-type: none"> <li>▪ Crossing specification: Section 5, Table 6</li> <li>▪ Hydraulics: Section 3.1</li> <li>▪ Fluvial Geomorphology: Section 5.2; Appendix A,</li> <li>▪ Channel Morphology; Appendix G, NHS Crossings</li> <li>▪ Wildlife Passage: not referenced in this report, see Appendix G</li> </ul> <p>Geomorphic and Aquatic Conditions (contains Crossing Size Recommendations 17, 18, 19, 21): Letter to GHD, August 21, 2013, re: Neighbourhood 19 and 21 Crossing Assessment</p> <p><b>Infrastructure Ontario Phase II Submission – GHD, July 2014</b></p> <ul style="list-style-type: none"> <li>▪ Crossing specification: Section 2</li> <li>▪ Hydraulics: Section 2</li> <li>▪ Channel Morphology; IO Section 2</li> <li>▪ Wildlife Passage: Section 2</li> </ul>
21	<p><b>NFSSR, Neighbourhood 19 – RJB, August 26, 2013</b></p> <ul style="list-style-type: none"> <li>▪ NHS Preliminary Design Crossing Summary, Table 9, page 47</li> <li>▪ Crossing specifications: Figures 8.4a and 8.4b f, Appendix G for the Road Crossing checklist</li> <li>▪ Hydraulics: Section 5.2.6, Table 9 and Appendix G</li> <li>▪ Fluvial Geomorphology: Appendix J, Section J1 and J3 (Page 282 – GHD; Page 44 – Parish)</li> <li>▪ Wildlife Passage: Section 5.2, Appendix G and J1</li> </ul> <p>See also Neighbourhood 21 NFSSR, Table 6, page 38</p> <p>Geomorphic and Aquatic Conditions (contains Crossing Size Recommendations 17, 18, 19, 21): Letter to GHD, August 21, 2013, re: Neighbourhood 19 and 21 Crossing Assessment</p>