

# **Highway 101 Twinning Three Mile Plains to Falmouth – Terms and Conditions for the Environmental Assessment (EA) Approval: Item 4.1\_Communication to the Public and Mi'kmaq About Maintenance of the Avon River Aboiteau and Causeway Over Other Crossing Options**

## **Background**

The current Avon River aboiteau and causeway structures provide flood protection for agriculture and significant community infrastructure while keeping back the high Bay of Fundy tides and allowing freshwater to drain through the aboiteau. Various stakeholders that are impacted or rely on this infrastructure system include aboriginal people, land owners, commercial and recreational fishers, agriculture and agri-business, Ski Martock and other local business, municipal services, recreational interests, and the general public. Without this flood control system, more than 2,100 ha of land would be inundated by tidal flooding – refer to Figure 1 (over). The 700 m-long causeway was designed to replace 26 km of dykes and 60 aboiteau structures that existed prior to its commissioning in 1970. Lands vulnerable to tidal flooding (light blue colours on Figure 1) are legally protected under the *Agricultural Marshlands Conservation Act* and obligate the Government and landowners within the protected lands to maintain the dyke system for the collective good of all Nova Scotians. The system is managed by the NS Department of Agriculture (NSDA) in cooperation with landowners in six legally-incorporated marsh bodies. The causeway also serves as a base for Highway 101, the Windsor and Hantsport Railway (WHRC), telecommunication and power cables, and an active transport (AT) trail. Although WHRC is currently inactive, the company holds a long-term licence for continuing use of the causeway.

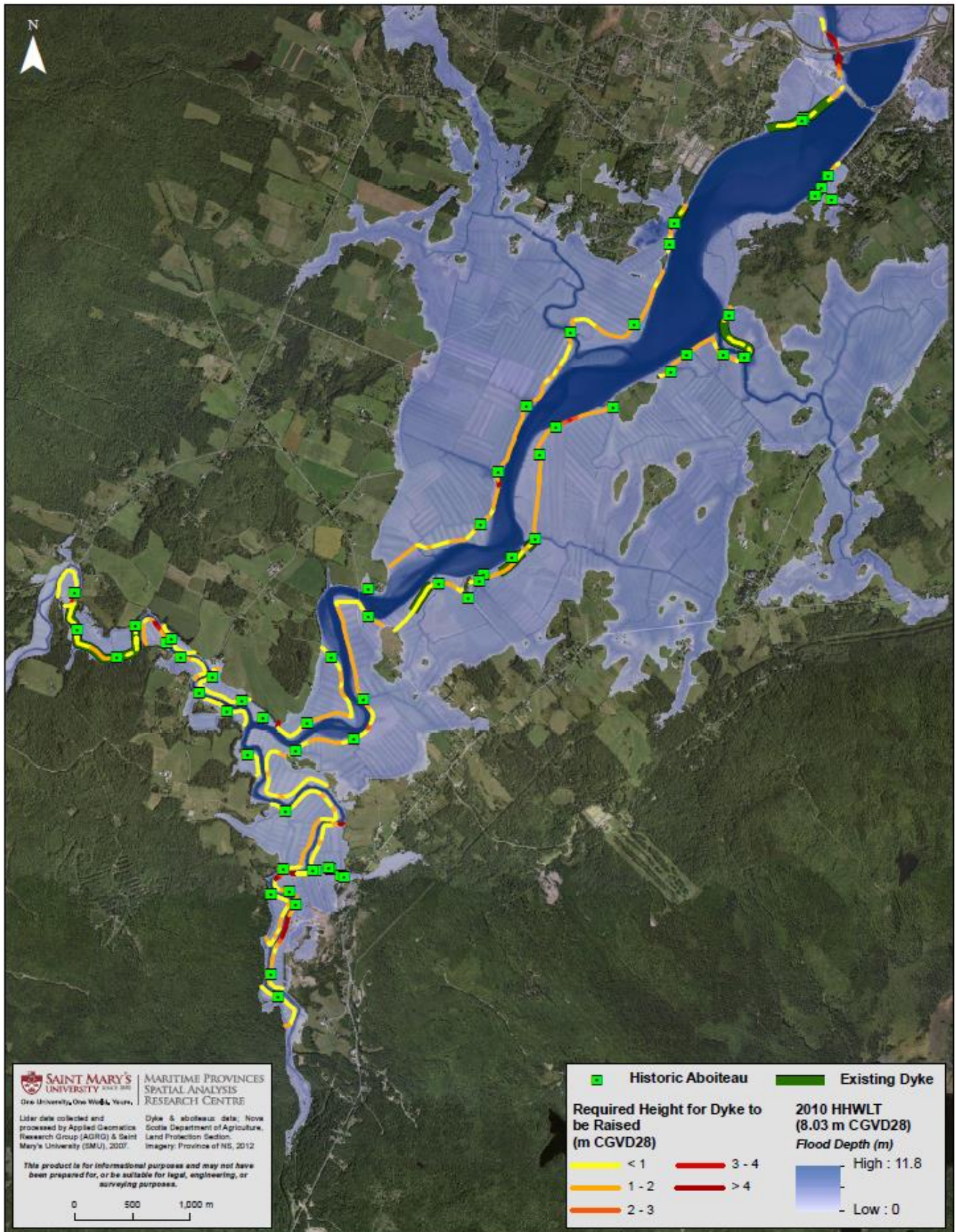
Agriculture is a prime employer and revenue generator, and some farm families have been working agricultural marshlands for over 250 years. Construction of the Avon River aboiteau and causeway in the late 1960s led to huge improvements in crop production and quality, increased crop diversity (from largely hay to soybeans, corn and other market crops), and expansion of the entire agriculture industry as well as the economic base of the Avon Valley. These lands now provide some of the best agricultural production in Nova Scotia. Sustained high productivity, crop and soil quality, and disease resistance requires careful maintenance of water levels in Lake Pisiquid to effectively drain the marshlands after rainfall events. Farmers work closely with NSDA staff and other Lake Pisiquid stakeholders to minimize drainage impacts to farming operations especially during the crucial planting and harvesting seasons (Spring and Fall).

The Integrated Community Sustainability Plans (ICSPs) and the Municipal Planning Strategies (MPS) of the Town of Windsor and the Municipality of the District of West Hants recognize the sustainability of valuable agricultural land (jobs and revenue), protective dyke systems, necessary development constraints on dykeland, collaboration with NS Transportation and Infrastructure Renewal (NSTIR) for an efficient transportation system, and the overall importance of the four pillars of sustainability – Environmental, Economic, Social and Cultural – for planning and decision-making.

Ski Martock is another important industry in the Avon Valley employing 200 people seasonally and 12 year-round. It draws 80,000 to 100,000 customers to the area during winter. Ski Martock relies on the continued operation of the Avon River aboiteau and causeway to provide a freshwater reservoir that allows them to make artificial snow for the ski slopes when there is insufficient snowfall. This privately-owned business would not exist without access to the freshwater stored in Lake Pisiquid or if free tidal flow was restored.

## **Project Planning and Design**

Over the past 15 years, NSTIR has been planning for the twinning of Highway 101. More recently NSTIR and NSDA agreed to partner and include the Avon River aboiteau / causeway system as part of the project. Key objectives include highway safety, community flood protection, fish passage, and climate change adaptation. Following the NS Environment (NSE) approval of the Environmental Assessment (EA) on June 27, 2017, and a formal procurement process, the Province has engaged CBCL Limited to develop a detailed design for an upgraded Avon River system. The design requirements include Fisheries and Oceans Canada (DFO) fish passage requirements, community flood protection, support for highway and other infrastructure, system resilience to failures of upstream NS Power dams, and the collective expectations of the various stakeholders where possible (i.e., following the four pillars of sustainability).



**Figure 1** – Lands currently vulnerable to tidal flooding and the historic dyke system prior to the 1970 causeway.

## **Communication to the Public and Mi'kmaq About Maintenance of the Avon River Aboiteau and Causeway Over Other Crossing Options**

During the early project planning phase, NSTIR and NSDA considered many alternative river crossing methods, highway alignments, and flood control measures. Initially, three options were considered:

1. Enhanced/upgraded aboiteau, causeway, and highway/rail/trail at or near the existing crossing.
2. Highway bridge at or near the existing crossing (bridge option).
3. Alternative highway alignment upstream of the existing crossing (a bypass option).

Although used in other provinces and countries, a tunnel option was not considered technically feasible or financially viable because of high costs and the Karst landscape (soft and soluble gypsum, limestone, and shales).

The registered EA submitted to NSE on May 8, 2017, did not elaborate on these early considerations, nor a fourth alternative, a shorter bridge to facilitate improved fish passage. Table 1, below, summarizes key concerns, implications and critical cost elements that guided the project team's selection of a preferred option – an enhanced/upgraded aboiteau and causeway system. It was clearly the most cost-effective, technically-feasible and sustainable approach to best meet stakeholder objectives. The EA was subsequently approved by NSE on June 27<sup>th</sup> with conditions – <https://novascotia.ca/nse/ea/highway-101-twinning-three-mile-plains-to-falmouth.asp>

### **DFO's Role**

As we move forward with detailed project design, DFO will respond and comment on the proposed designs, and once satisfied, provide regulatory approval with conditions. Essentially their role is to ensure proponents meet the regulatory requirements – not telling them how to get there. The expectation for the Avon River aboiteau design is to have the consulting team lead this process, meeting with stakeholders and regulators to ensure all aspects are considered in the final design. NSTIR and NSDA as proponents are also providing this oversight in relation to the project.

From a regulatory standpoint, DFO is responsible for protecting fish and the fisheries as written in their Fisheries Protection Policy Statement (<http://www.dfo-mpo.gc.ca/pnw-ppe/pol/index-eng.html>) and enshrined in Sections 6, 20 and 35 of the *Fisheries Act*. DFO also ensures protection of aquatic species listed in the *Species at Risk Act* (SARA), and for this Project, the endangered Atlantic Salmon, inner Bay of Fundy (IBOF) population. DFO staff together with many other individuals and organizations have developed a comprehensive recovery plan but neither the Avon River, its estuary or any of its tributaries have been designated as critical habitat.

Projects that permanently alter or destroy fish habitat or impede fish passage require consideration of four factors prior to DFO authorization: 1 – the role of fish and fish habitat affected by the Project in the overall productivity of commercial, recreational and aboriginal (CRA) fisheries, 2 – fisheries management objectives to achieve overarching government policies and strategies, 3 – measures the proponent commits to avoid, mitigate or offset “serious harm to fish”, and 4 – the public interest including issues related to economic development, long-term sustainable development, and impacts on ecosystem goods and services. DFO staff will be closely involved in the detailed design phase of the upgraded aboiteau / causeway system as well as the following construction and operation phases. DFO is also engaged with baseline studies of fisheries resources initiated by NSTIR. Field work by a unique team of local fishers, Acadia University, and Mi'kmaq community members began in April 2017 and will continue to at least Winter 2019. This new information will be used to inform detailed design of an upgraded aboiteau / causeway system. NSTIR has also extended the work of local salt marsh experts, CBWES Inc. and Dr. Danika van Proosdij at Saint Mary's University, to complete baseline studies on the Windsor and Newport marshes and provide advice to the design engineers.

## **Communication to the Public and Mi'kmaq About Maintenance of the Avon River Aboiteau and Causeway Over Other Crossing Options**

### **Current Project Status**

NSTIR/NSDA are working on meeting the Terms and Conditions of the EA Approval. A consulting team led by CBCL Limited has been engaged for the design of the aboiteau and causeway upgrading. Initial work involves an analysis of existing information and regulatory requirements, collection of additional field information, and development of design concepts with multiple options to accommodate engineering and environmental constraints and stakeholder concerns. The second phase, detailed design of the selected option, is anticipated to begin in Spring 2018 and be completed by the end of 2018. Meetings with regulators, DFO and NSE, will be convened as the project reaches key stages.

NSTIR intends on putting out a public tender for construction of new highway bridges at Exits 5 and 5A, Garlands Crossing and Wentworth Road, beginning in Winter-Spring 2018. Limited clearing of the new highway corridor between Exits 5 and 5A is also planned for this Winter. Work on western portions of the highway are anticipated to begin later in 2018 and 2019. Construction tenders for work at and near the causeway will not occur until completion of the contracted detailed design study in late 2018.

Consultation with the public and other key stakeholders will continue throughout the duration of the project. The primary forum for consultation is the Community Liaison Committee (CLC) which has been formed to represent various community interests (<http://hwy101windsor.ca/>). The next CLC meeting is tentatively planned for mid-January 2018 and will include a presentation by our design team lead, CBCL Limited. A Mi'kmaq Communication Plan, addressing EA Approval Term and Condition 9, has been developed and continues activities initiated over the past decade.

In closing, NSTIR and NSDA selected the Avon River aboiteau / causeway option based on consideration of the many environmental, engineering, financial, socio-economic and cultural factors at the crossing location. We have listened and continue to work with all of the partners and stakeholders to best meet their diverse objectives and legal requirements, and anticipate completion of the twinning of Highway 101 in the next 5-7 years.

**Table 1. Comparison of design options and alternatives for the Highway 101 Avon River crossing.**

Design Option	Concerns / Proponents	Implications	Critical Cost Elements
<p>Enhanced/upgraded aboiteau, causeway and highway-rail-trail at or near current location with improved fish passage and climate change adaptation.</p>	<p>Diverse stakeholders (economic, environmental, social, &amp; cultural/FN interests), agricultural production, flood control, fish passage, species at risk (Atlantic salmon)</p>	<p>Year-round fish passage, both upstream and downstream, for most diadromous*<sup>1</sup> fish species (depends on ultimate design – anticipated in Fall 2018)</p>	<p><b>New crossing infrastructure - \$20M</b> (aboiteau/causeway with improved fish passage &amp; climate change adaptation)</p>
<p>Short bridge at current location (~120 m for fish passage) and requisite new dyke system</p>	<p>Environmental interests (fish passage, Atlantic salmon)</p>	<p>Shoreline erosion; rapid infilling of Lake Pisiquid; fish passage and flooding issues at 10+ unmanned aboiteaux for tributary streams (re-creates the Truro situation); agricultural production (loss of ~700 ha plus future business opportunities); rural economy hit; private, municipal &amp; provincial infrastructure impacts; loss/restriction of aquatic recreation, sports, Giant Pumpkin Regatta; loss of freshwater source for Ski Martock, irrigation, livestock &amp; agri-business needs; unknown but largely negative impacts on downstream salt marsh, mudflats, and habitat for migratory birds and fish until the system comes to a new equilibrium (at least several decades).</p>	<p>120 m, 6-lane bridge - \$25M, 120 m rail/trail bridge - \$10M; new dyke system - \$50M minimum (~15 km of new dykes &amp; 10 aboiteaux; land expropriation issues). No cost estimate for loss of business &amp; properties on Windsor waterfront and upstream of the Sangster Bridge. No cost estimate for upgrades to Trunk 1 bridge-causeway, likely removal of Sangster Bridge or protection/demolition of other at-risk infrastructure. <b>Total cost at least \$85M.</b></p>

\*<sup>1</sup> Fish that migrate between fresh and salt water at some stage of their life cycle. Those species that spawn in freshwater and later move to seawater as juveniles or adults are referred to as anadromous species (e.g., Gaspereau and salmonids). The American eel (*Anguila rostrata*) is a catadromous species; they spawn in the ocean and migrate into freshwater as ‘elvers’ where they spend most of their life in streams, rivers, lakes and adjacent coastal/estuarine areas.

**Table 1. Comparison of design options and alternatives for the Highway 101 Avon River crossing.**

Design Option	Concerns / Proponents	Implications	Critical Cost Elements
<p>Long bridge at current location (~240 m to restore full tidal flow) and requisite new dyke system</p>	<p>Environmental and cultural interests</p>	<p>As above. The bridge options are highly unlikely to increase the population of Atlantic salmon as the decline is not believed to be related to availability of freshwater habitat. The Avon watershed also has other stressors upstream of the Causeway (e.g., NS Power hydro and water control dams) that limit access, passage and habitat quality for diadromous fish*<sup>1</sup>.</p>	<p>240 m, 6-lane bridge including provision for trail/utilities (rail not considered) - \$100M range, new dyke system - \$50M minimum (~15 km of new dykes &amp; ~10 aboiteaux; land expropriation issues). No cost estimate for loss of business &amp; properties on Windsor waterfront and upstream of the Sangster Bridge. No cost estimates for upgrades to Trunk 1 bridge-causeway, likely removal of Sangster Bridge or protection/demolition of other at-risk infrastructure. <b>Total cost at least \$150M.</b></p>
<p>Bypass Option (upstream bridge; new highway alignment; new dyke system)</p>	<p>Alternative highway alignment respecting longer-term sea-level rise (SLR; reduced risk to highway infrastructure, enhanced public safety and no fish barrier)</p>	<p>As above, plus both positive and negative impacts on Windsor/Falmouth business communities.</p>	<p>~100 m, 4-lane bridge - \$20M; 16 km of new, 4-lane divided highway - \$90M; 2 new interchanges - \$24M; 3 new overpasses - \$6M; new dyke system - \$50M (same comments as above); No cost estimates for land acquisition-expropriation and partial demolition of existing aboiteau/causeway to meet regulatory requirements. <b>Total cost at least \$190M.</b></p>

\*<sup>1</sup> Fish that migrate between fresh and salt water at some stage of their life cycle. Those species that spawn in freshwater and later move to seawater as juveniles or adults are referred to as anadromous species (e.g., Gaspereau and salmonids). The American eel (*Anguila rostrata*) is a catadromous species; they spawn in the ocean and migrate into freshwater as ‘elvers’ where they spend most of their life in streams, rivers, lakes and adjacent coastal/estuarine areas.