

Highway 101 Twinning and Avon River Aboiteau Replacement & Causeway Upgrading

COMMUNITY LIAISON COMMITTEE (CLC)

PROJECT UPDATE

JULY 20, 2022

Overview

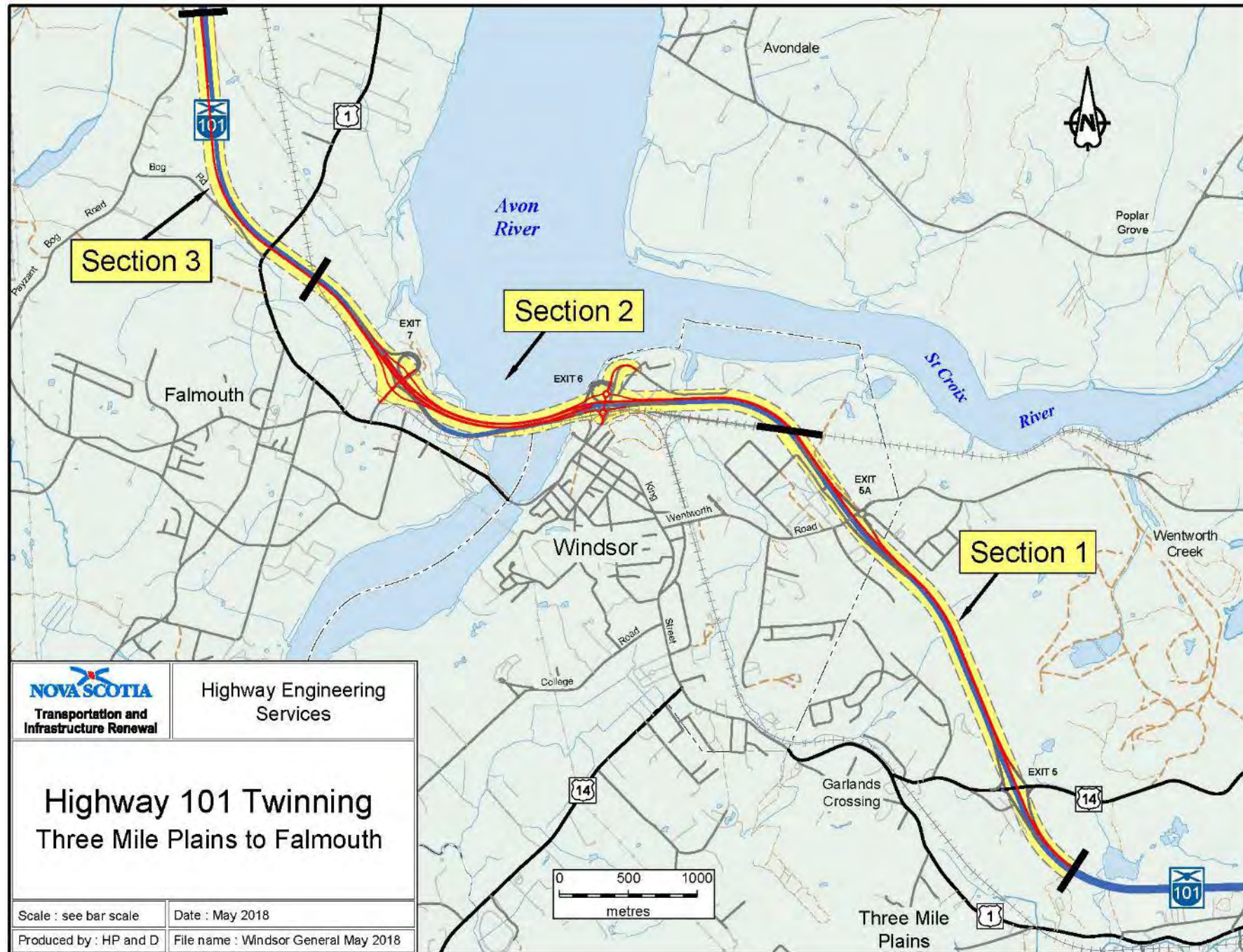
Presentation Outline:

- ▶ Highway 101 Twinning Update (NSDPW)
 - ▶ Project Update
- ▶ Avon River Aboiteau and Causeway Upgrade (NSDPW / CBCL)
 - ▶ Project Recap
 - ▶ Operational Scenario Recap
 - ▶ Regulatory Approvals Status Update
 - ▶ Post Construction Monitoring Plan Update
- ▶ Next Steps
- ▶ Questions / Discussion



Photo from van Proosdij (2018)

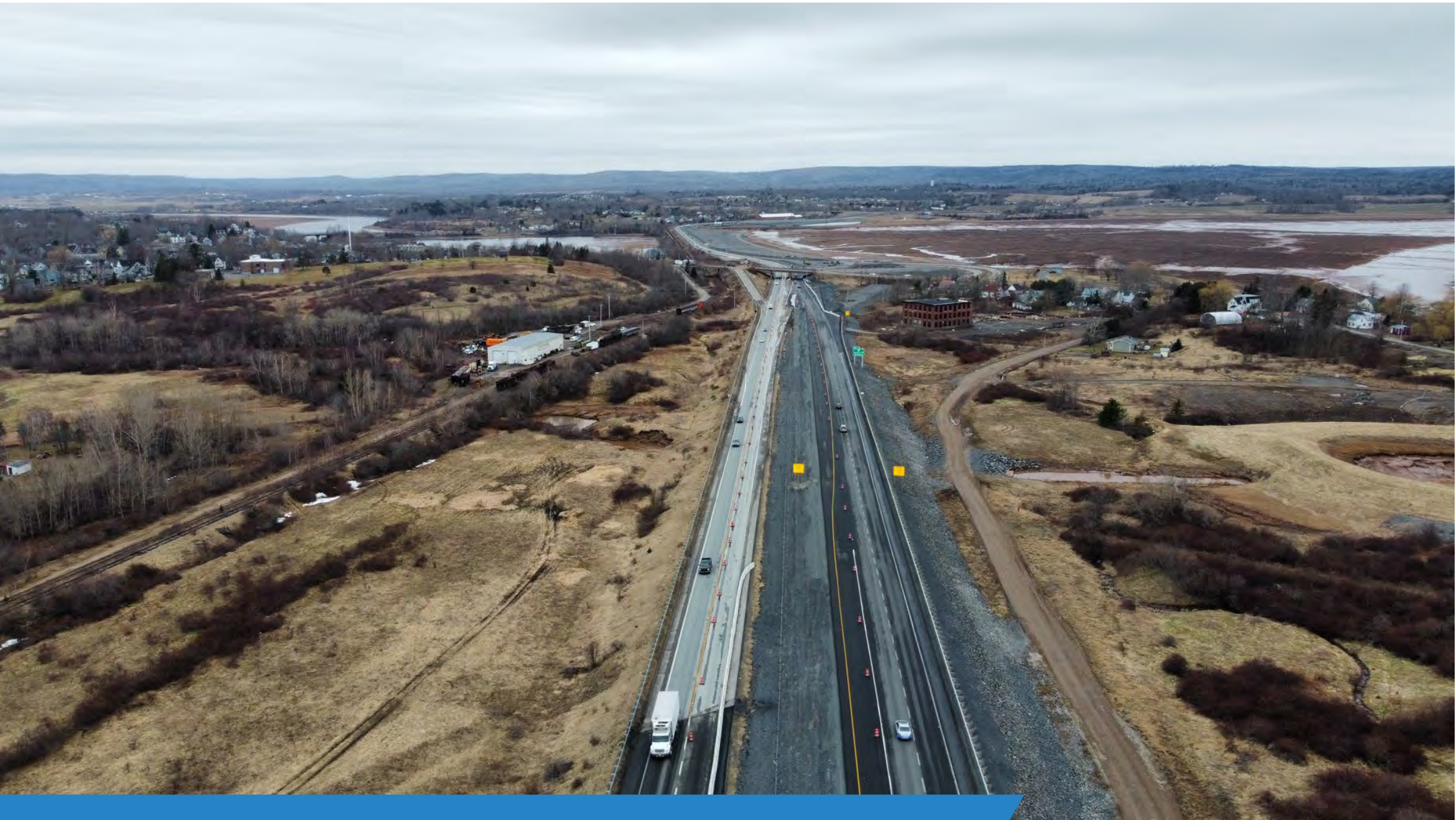
Highway 101 Twinning: Three Mile Plains to Falmouth



Highway 101 Twinning

Section 2A: Windsor Railway Crossing to Exit 6

- ▶ Upgrading to eastbound lanes scheduled for fall 2022, spring 2023



HIGHWAY 101 LOOKING WEST TOWARD EXIT 6



HIGHWAY 101 LOOKING EAST NEAR EXIT 6

Highway 101 Twinning

Section 2B: Exit 6 to Exit 7 (including causeway)

- ▶ Final stage of preload fill along the causeway started June 20th, expected to take approximately 2 months to complete.
- ▶ Exit 6 Interchange/Nesbitt Connector started expected completion fall 2023
 - ▶ Installation of MSE walls
 - ▶ Installation of new sanitary sewer for the Municipality
 - ▶ Pile Installation underway



HIGHWAY 101 AT EXIT 6 (UPPER WATER STREET)



HIGHWAY 101 EXIT 6 INTERCHANGE OVERVIEW



EXIT 6 MUNICIPAL SERVICES INSTALLATION

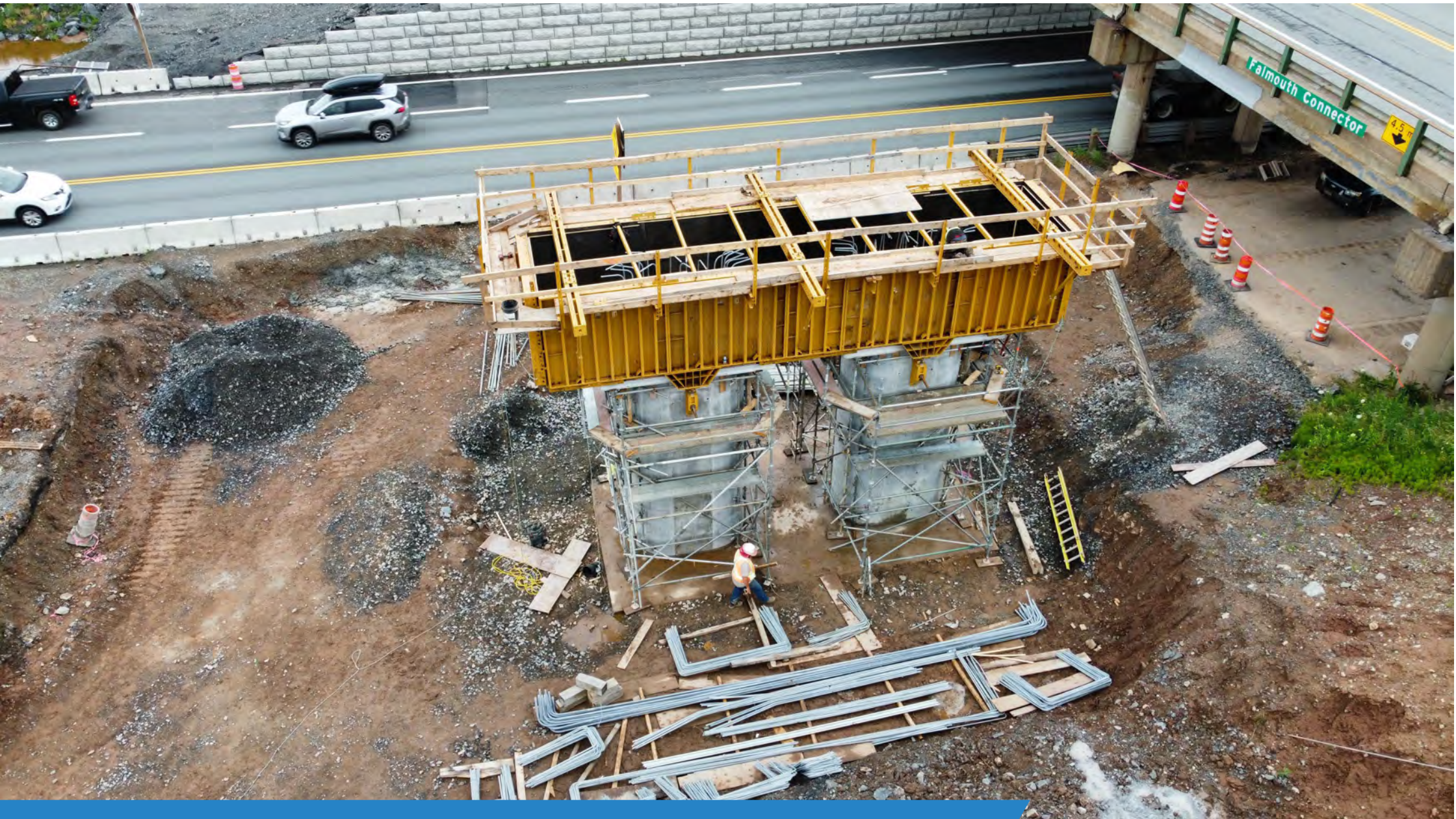
Highway 101 Twinning

Section 3: Exit 7 to Existing Twinning (Falmouth)

- ▶ Connection and tie-in of new eastbound lanes including upgrading westbound lanes expected to begin this fall, completion late 2022
- ▶ Exit 7 Interchange construction underway, expected completion fall 2022
 - ▶ Installation of abutments, centre pier complete
 - ▶ Girders to be erected week of August 8th



HIGHWAY 101 AT EXIT 7 INTERCHANGE (FALMOUTH)



HIGHWAY 101 EXIT 7 INTERCHANGE CENTERPIER

Avon River Aboiteau and Causeway Upgrade

Project Recap

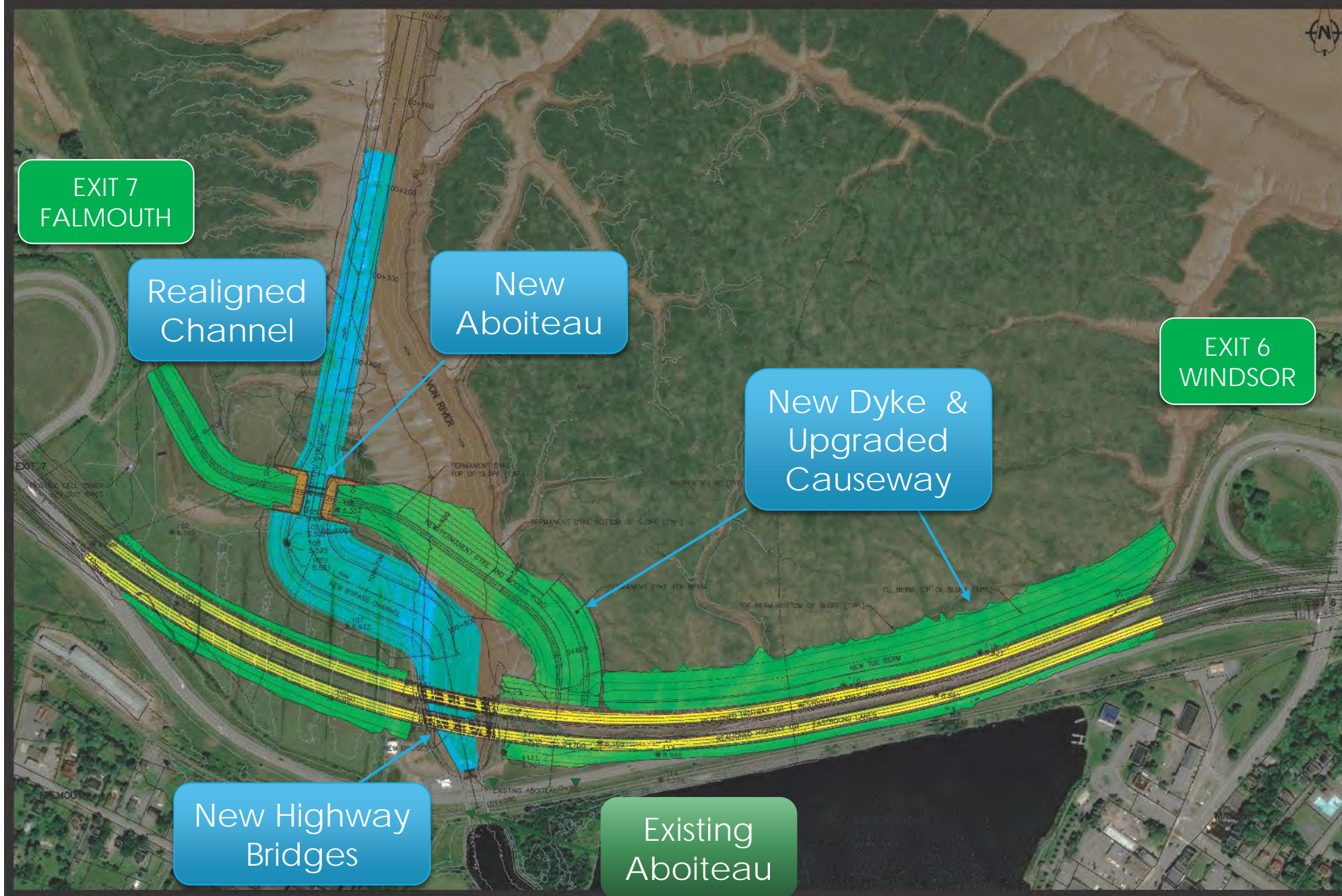
Primary Objectives:

- ▶ To improve **public safety**:
 - **Enhanced flood protection** (& climate change resilience) to protect against flood risks and vulnerability to sea level rise, coupled with the need to protect critical public infrastructure, communities, and valuable agricultural land
 - **Improve highway safety** through the completion of twinning Highway 101 across the Avon River, while also benefitting from the enhanced flood control system to protect the highway and associated bridges

Project Recap

Other Requirements:

- ▶ In addition to meeting the public safety objectives, the project must also satisfy several **regulatory requirements**:
 - **Improved Fish Passage** in compliance with the *Fisheries Act* (DFO) and Environmental Assessment conditions (NSE), including consideration of potential impacts to asserted or established Mi'kmaq Aboriginal or treaty rights
 - **Minimize environmental and societal impacts** through obtaining applicable permits/authorizations and satisfying several EA terms and conditions





Updated Operational Scenarios

- ▶ Expanded development of the 'Brackish' and 'Tidal' water management scenarios, considering DFO comments to date
- ▶ Improvements to Operations and Gate Functionality
- ▶ Hydrodynamic modelling to support fish passage assessment through a tidal cycle



Updated Operational Scenarios

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Brackish Lake

- Two 2-way fishways always open / Eel pass always open
- Roller Gates will operate to maintain water levels during most tides
- Allows some tidal exchange while maintaining a consistent water level (+2.1 m) (fluctuation of approx. 0.3 - 0.6m)
- Equivalent to the previous target water level of Lake Pisiquid (+9 ft)
- ~25% of lake area is affected by salinity and sediments (varies with rainfall/season)

~(2.1m / 9' CGVD2013)
Mostly Constant Water
Level



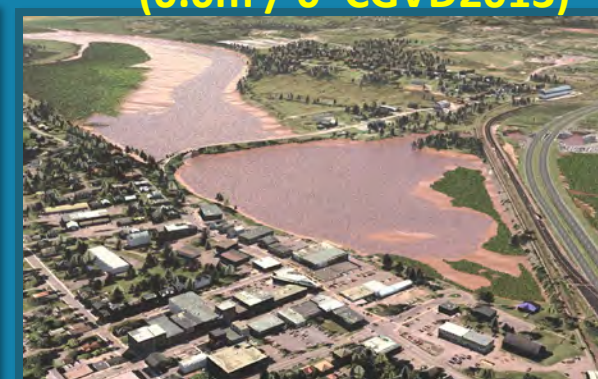
Dampened Tidal

- Two 2-way fishways always open / Eel pass always open
- Allows greater tidal exchange and more estuarine environment
- Fluctuates by approx. 2 m (from -0.5 at low tide to +1.5 m at high tide)
- +1.5 m is equivalent to +7 ft (or 2 ft below historic lake level)
- Higher ingress of sediment and salinity

~(1.5m / 7' CGVD2013)



~(0.0m / 0' CGVD2013)





Brackish Lake Scenario



NOVA SCOTIA
Public Works

NOVA SCOTIA
Department of Agriculture

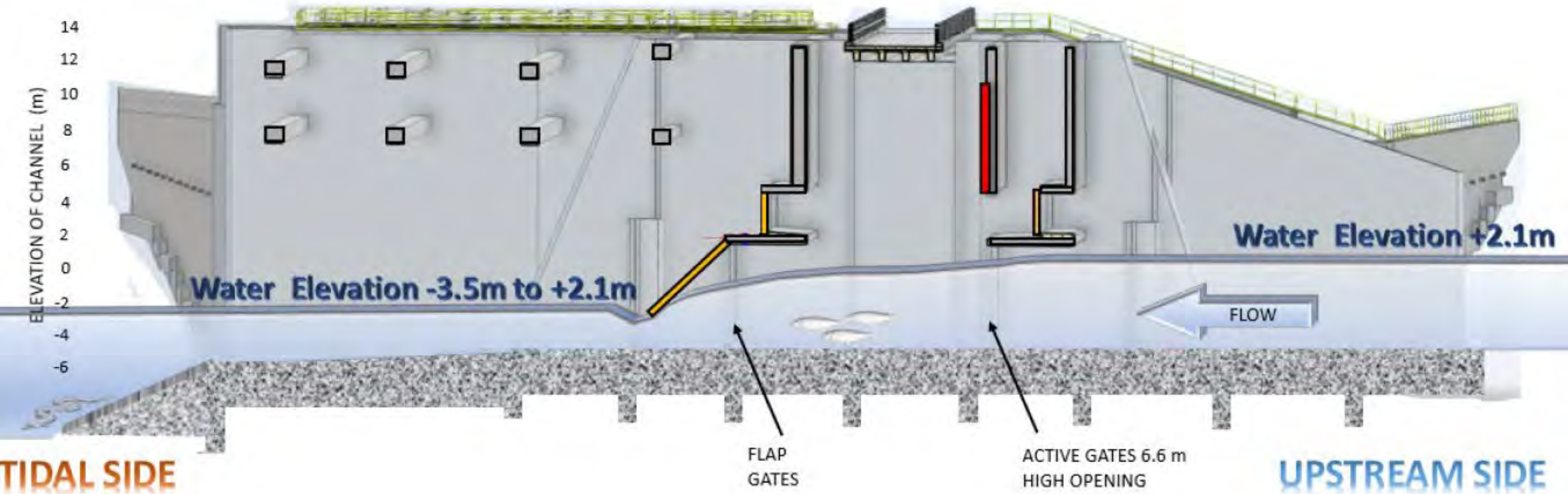
 Static Water Level Extent
 Watershed Boundary

Static Water Level Extent
2.1 m
CGVD2013

Scale: 1:42,000

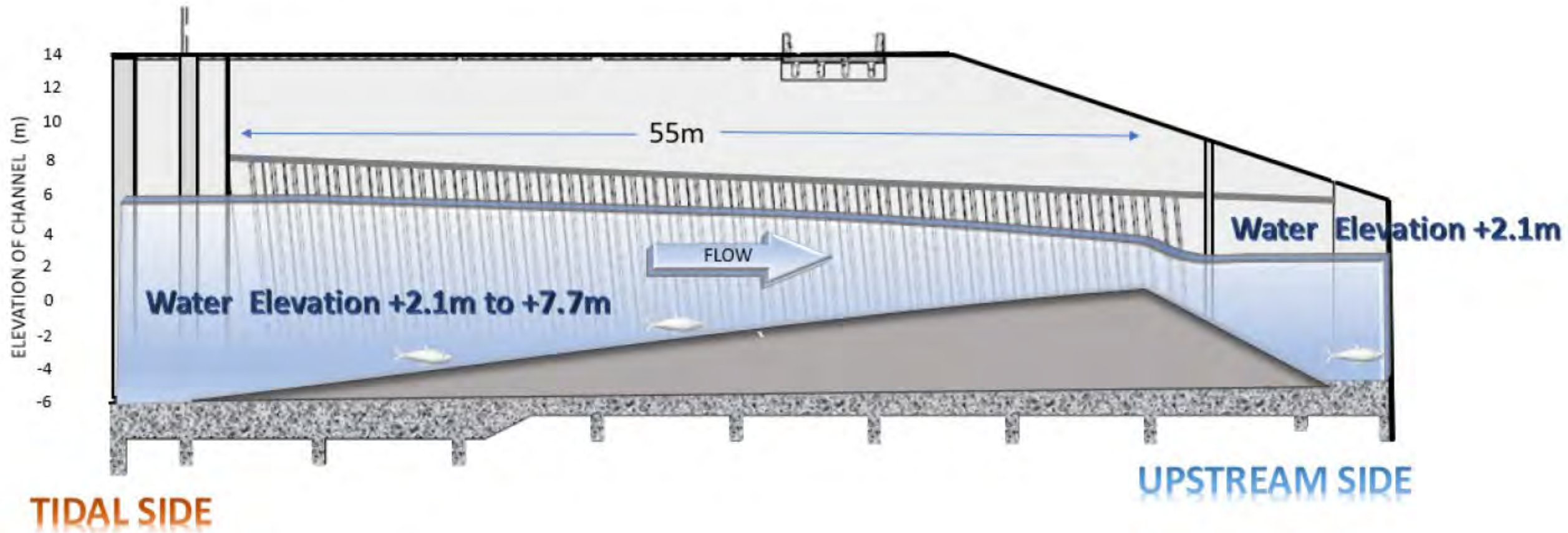
Freshwater and Brackish Lake Scenario

Channel 1 or 2 - Low Falling Tide



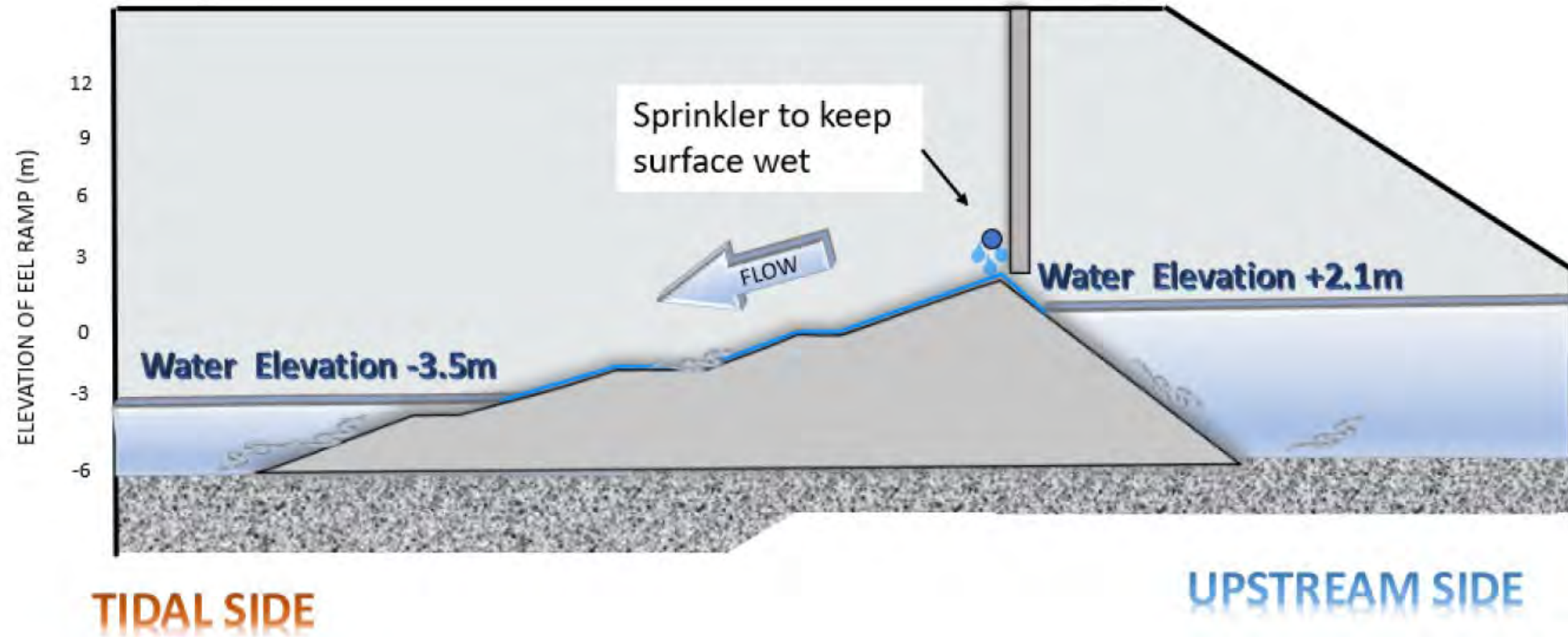
Freshwater and Brackish Lake Scenario

Fishway - High Rising Tide



Freshwater, Brackish Lake Scenario

Eel Ramp – Low Tide



Dampened Tidal Scenario (High Tide)





NOVA SCOTIA

Public Works

NOVA SCOTIA

Department of Agriculture

-  Static Water Level Extent
-  Watershed Boundary

Static Water Level Extent

1.5 m
CGVD2013



Scale: 1:42,000

Dampened Tidal Scenario (Low Tide)



NOVA SCOTIA
Public Works

NOVA SCOTIA
Department of Agriculture

-  Static Water Level Extent
-  Watershed Boundary

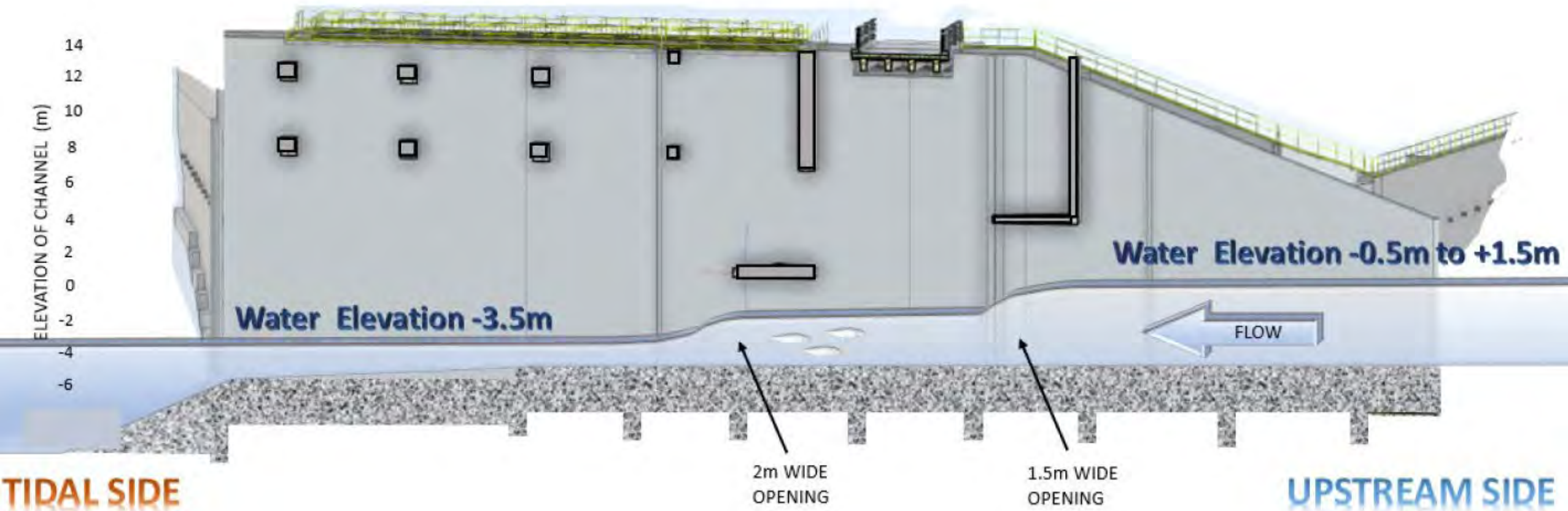
Static Water Level Extent

-0.5 m
CGVD2013

Scale: 1:42,000

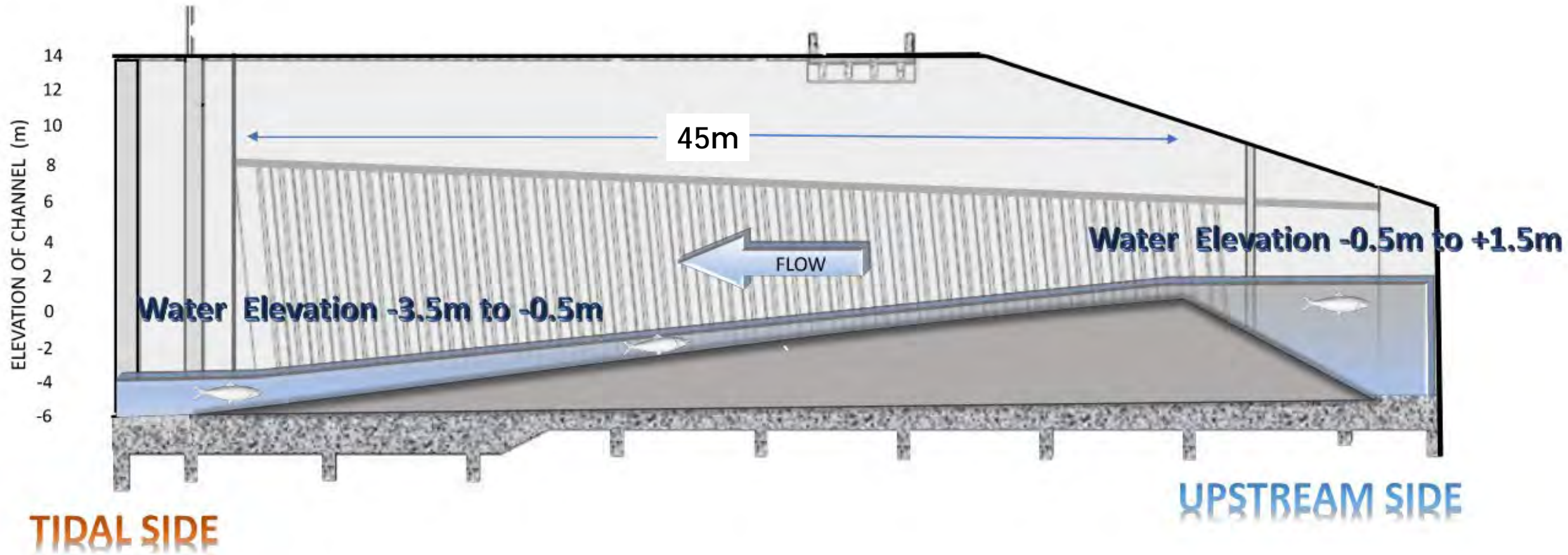
Dampened Tidal Scenario

Channel 1 Vertical Opening - Low Tide



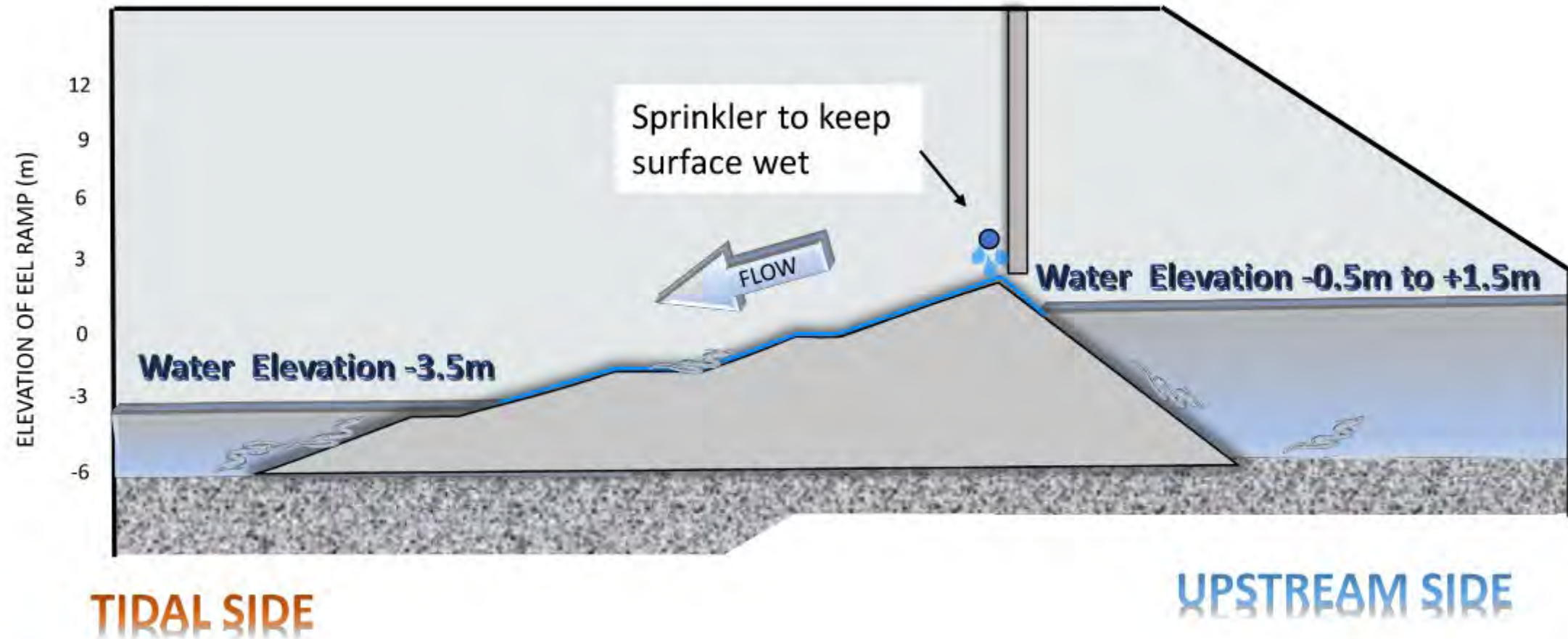
Dampened Tidal Scenario

Fishway - Low Tide



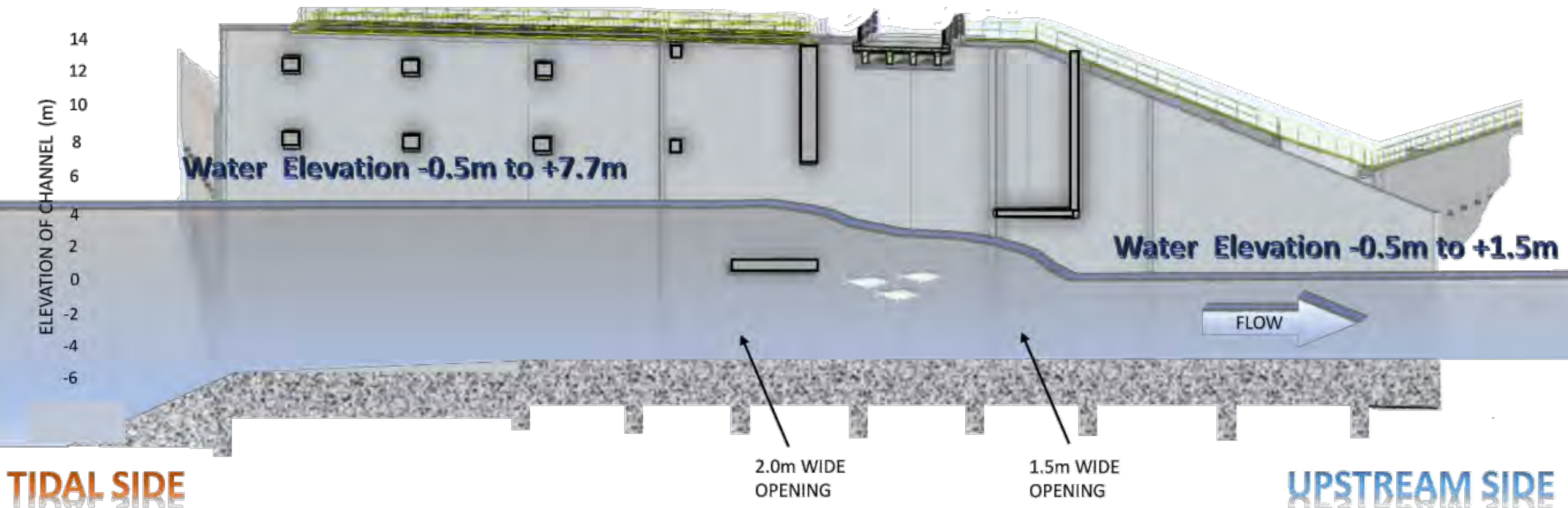
Dampened Lake Scenario

Eel Ramp – Low Tide



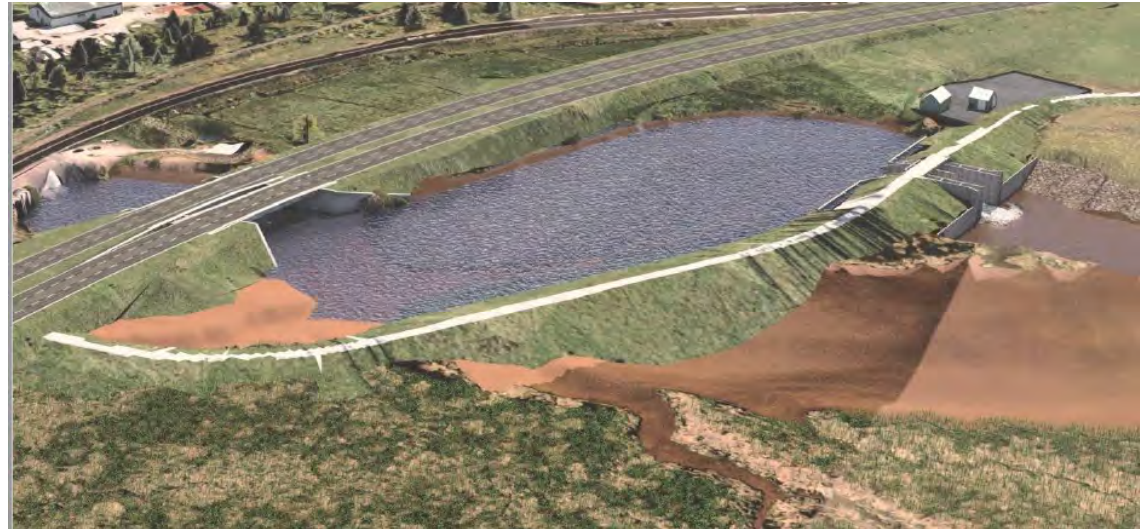
Dampened Tidal Scenario

Channel 1 Vertical Opening - High Rising Tide



Regulatory Approvals Status Update

- ▶ NSECC – Environmental Assessment Project Description Update
- ▶ Transport Canada
- ▶ DFO



Status Update - NSECC

NSECC – Environmental Assessment Project Description Update:

- ▶ Highway 101 Twinning Three Mile Plains to Falmouth Project received approval (with conditions) in **June 2017** (EA Approval).
- ▶ NSECC requested additional information on the changes to the Project, specifically the Avon River Aboiteau.
- ▶ NSDPW provided an update to the Environmental Assessment in **April 2022** to describe the advanced engineering design and operational abilities of the aboiteau structure, their context and rationale and a directed assessment of environmental effects related to the design changes that have evolved since the initial evaluation of the 2017 EA.
- ▶ NSECC is still reviewing the document
- ▶ Continuing Consultation w/ Mi'kmaq (**Ongoing**)

Status Update – Transport Canada

Transport Canada – CNWA Approval Update:

- ▶ Original application submitted in **December 2020**
- ▶ NSDPW provided Updated design drawing in April 2022
- ▶ Transport Canada is still reviewing the document waiting on DFO Approval and Consultation
- ▶ Continuing Consultation w/ Mi'kmaq (**Ongoing**)

Status Update - DFO

DFO *Fisheries Act* Authorization (FAA) Application:

- ▶ Original application submitted in **November 2020** focused on Freshwater Lake operating scenario
- ▶ DFO responded in **March 2021** that the application was incomplete / inadequate & requested additional information focused on other operating scenarios that included tidal exchange
- ▶ A Supplemental Information Package was submitted to DFO in **August 2021**
- ▶ Several meetings have taken place since August to review/discuss the information and subsequent analysis to address DFO's comments
- ▶ Further modelling and assessments were submitted in **June 2022** to address DFO's latest comments and to provide confidence that the new aboiteau will function and accommodate fish appropriately

Status Update - DFO

Design Improvements to Address Fish Passage Concerns:

- ▶ Extensive modelling and analysis completed to refine the aboiteau design and provide effective pathways for fish passage, including:
 - ▶ Review of velocities within and near the aboiteau for various operating conditions to assess/optimize fish passage and attraction flows
 - ▶ Several complex hydrodynamic computer models of the entire facility, to provide highly detailed information to confirm expected conditions and quality of fish passage

Status Update - DFO

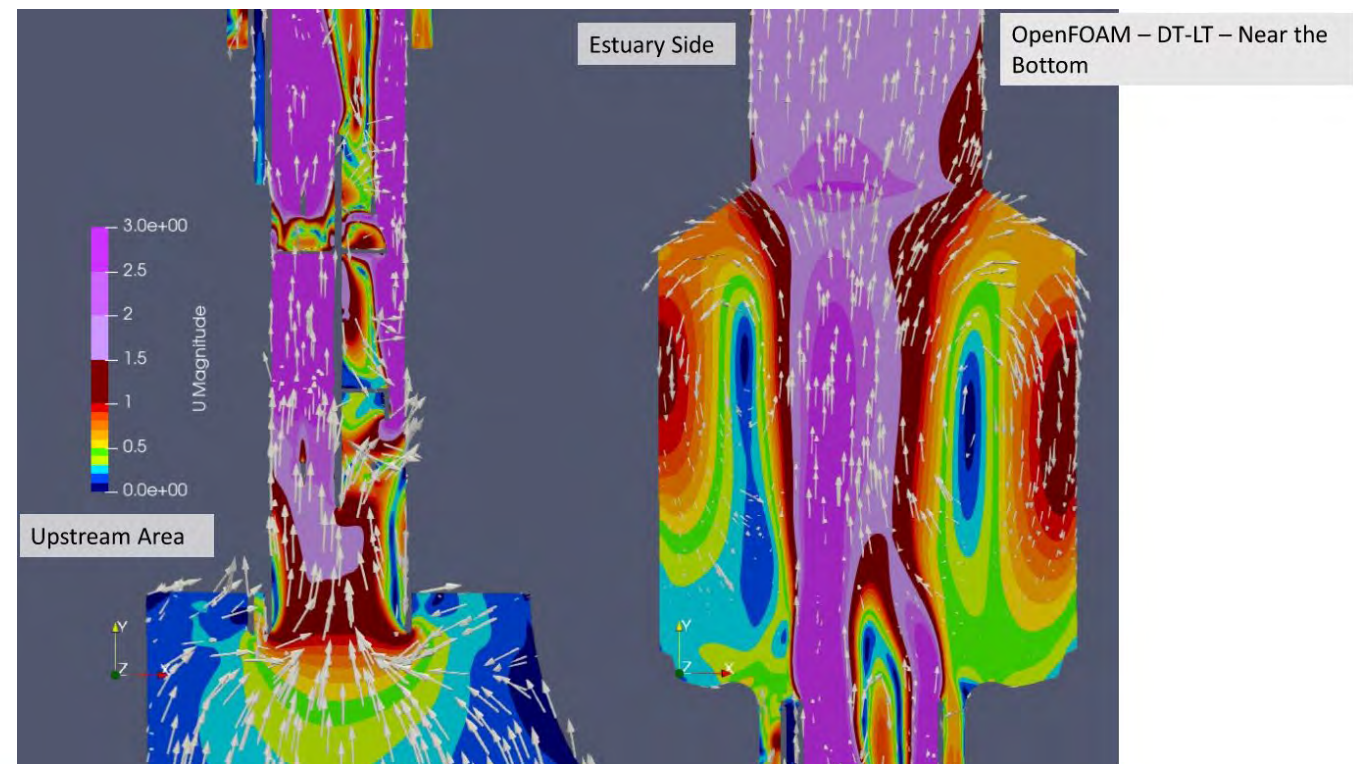
Scenarios

- ▶ Freshwater Lake Scenario
- ▶ Slightly Brackish Lake
- ▶ Dampened Tidal Scenario

3D model

- ▶ Different Tide levels
- ▶ Analysis of fish passage at various water depths
 - ▶ Bottom
 - ▶ Middle
 - ▶ Surface

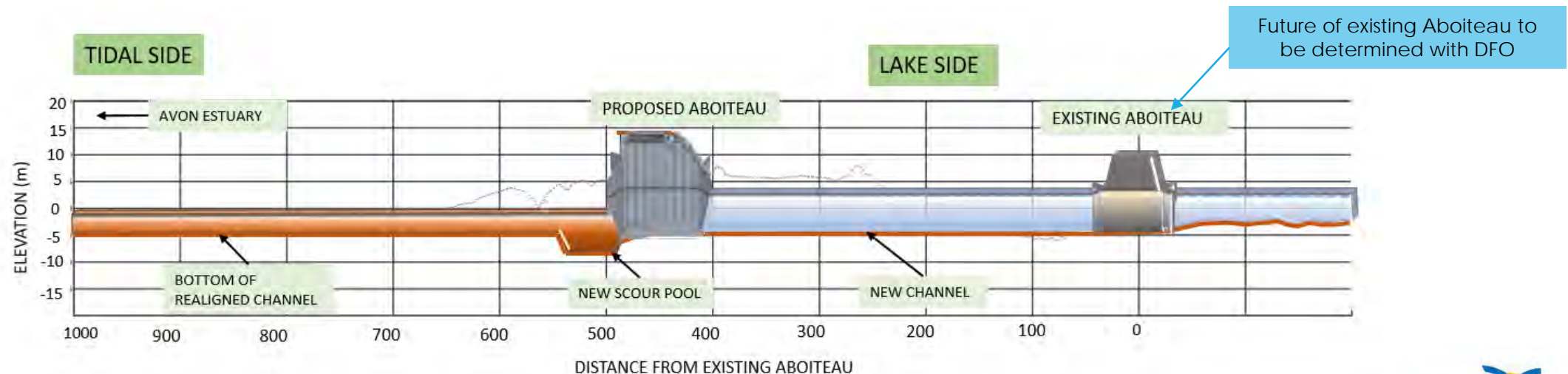
Migratory fish need passage in each tidal cycle when the migratory conditions are suitable.



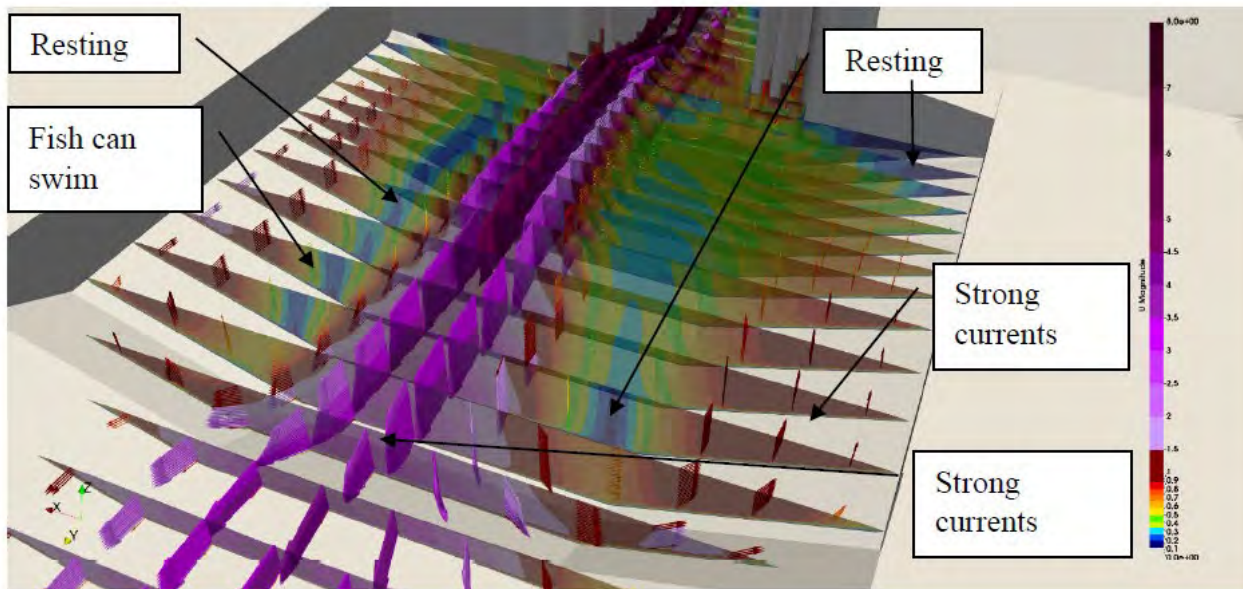
Status Update - DFO

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- ▶ For each of the three scenarios, Thaumasp Environmental Consultants Ltd and Katopodis Ecohydraulics evaluated the calculated velocities and fish passage based on OpenFOAM model results for the following:
 - ▶ In the river downstream of the structure
 - ▶ The tide side pool on the downstream face of the structure
 - ▶ Through the structures proposed for the Avon River estuary
 - ▶ The channel above the structure leading to the old aboiteau structure
 - ▶ The existing aboiteau structure
 - ▶ The channel upstream of the existing structure to the upstream area
 - ▶ Upstream and downstream passage in all the areas listed above



Status Update - DFO

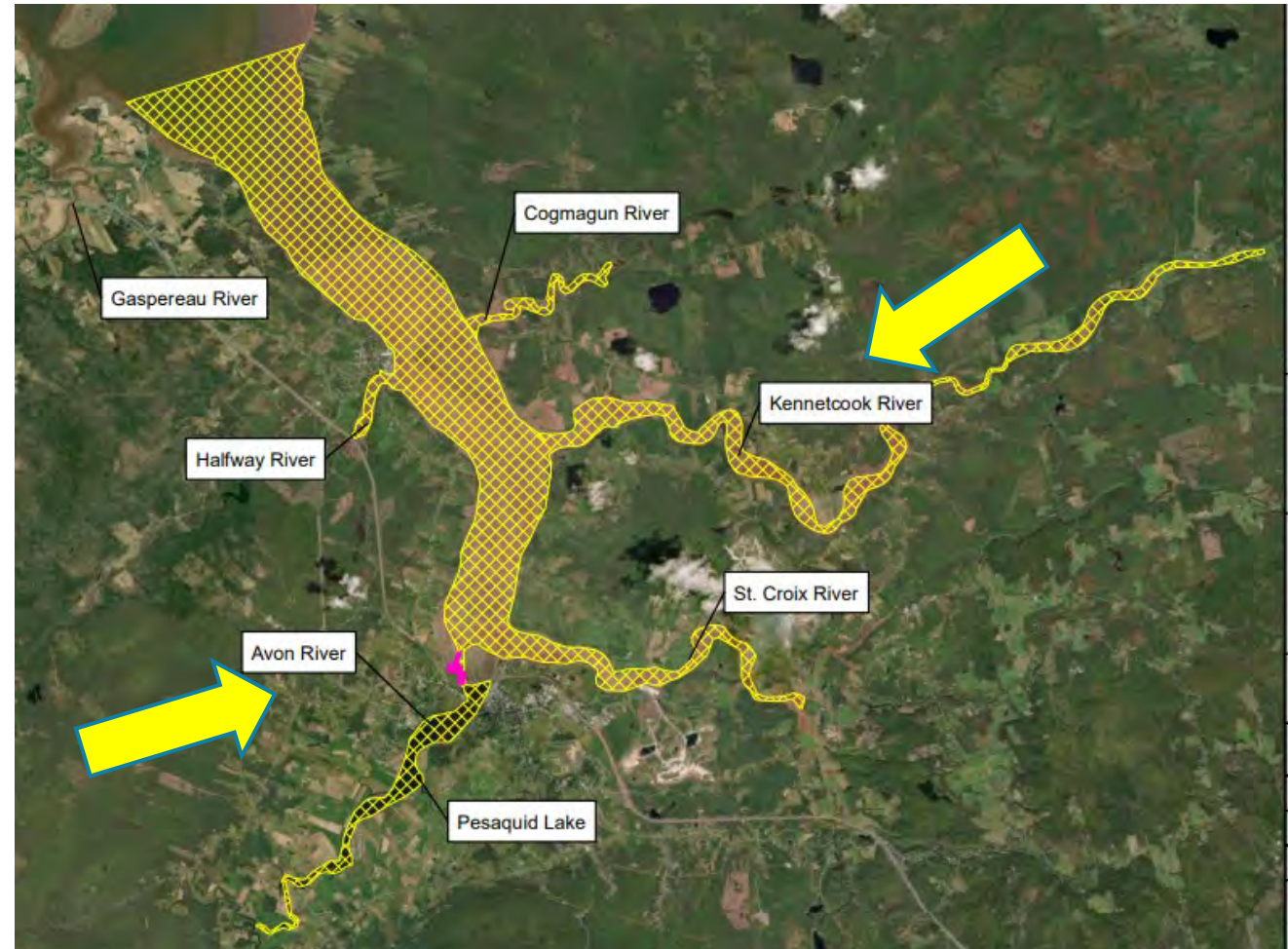


► Based on the evaluation of the OpenFOAM model results:

- While the main gates are open, velocities are often too high for upstream fish passage through the gates or in the river below the structure.
- A scenario that minimizes main gate openings and maximizes fishway operation for both the times when the tide levels are above and below the lake level provides the greatest opportunity for fish passage at the new structure.
- Slightly **Brackish Lake Scenario** provides the longest time on a tide for fish passage compared to the Freshwater Lake and Dampened Tidal Scenarios

Fish Passage Monitoring Plan

- ▶ Development of updated baseline program underway in collaboration with DFO, the Mi'kmaq of NS and commercial fishers
- ▶ Follow-up item From Last CLC:
 - ▶ Reporting Requirements / Schedule – plan is still under review of DFO



Next Steps

- ▶ Continue a Pre-Construction Monitoring Program (**Spring 2022 through 2024**)
- ▶ Tender Ready for Construction Start (**likely Spring 2023**)
- ▶ DFO/Regulatory Approvals (**TBD**)
- ▶ Construction (**TBD - 2 to 3 years**)
- ▶ Initiate Post-Construction Monitoring Program (**TBD – 5+ years**)
- ▶ Continuing Consultation w/ Mi'kmaq (**Ongoing**)
- ▶ Engagement w/ Community Liaison Committee (**Ongoing**)

Thank you

Questions?